

4th Market and Technological Study (2018/19)

Executive Summary

(HKPC Project Ref.: 10006971)

Prepared by

Environmental Management Division

Hong Kong Productivity Council



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Background and Objectives

1. Hong Kong Productivity Council (HKPC), which was engaged by the HKSAR Government as the Secretariat of the Recycling Fund, conducts studies on recycling markets and technologies under the Recycling Fund. The 4th Market and Technological Study was commenced in June 2018 with the aims to review Hong Kong's recycling industry and to identify the key factors that determine the success of the Recycling Fund continuously. The study covers the possibility of setting up manufacturing facilities for waste paper and waste plastics in Hong Kong, existing handling practices or technologies in waste furniture recycling, current situation of the recycling industry in Hong Kong, the markets and potential buyers of recyclables, etc.
2. In order to gain a more in-depth understanding of the recycling industry in light of the findings from the 1st, 2nd and 3rd Market and Technological Studies, the key objective of the Study is to obtain the latest market and technological information related to the recycling industry so as to facilitate the implementation of the Recycling Fund and to enrich the industry's knowledge on the latest market and technological developments.
3. This Study covers various key recyclable materials in Hong Kong, including waste paper, waste plastics, waste ferrous-metals, waste non-ferrous metals, waste electrical and electronic equipment (WEEE), used clothes /textiles, wood /yard waste, waste glass, waste rubber tyres, food waste and used cooking oil (UCO). To identify possible support that the Recycling Fund can provide, this Study also evaluates the feasibility of setting up manufacturing facility for handling local waste paper and plastics in Hong Kong, as well as the latest situation of handling waste furniture.
4. This Study includes four sections as follows:
 - i) To review manufacturing technologies and processes suitable for handling local waste paper and plastics for adoption in Hong Kong: 11 local waste paper and plastics recycling/manufacturing companies were engaged for gathering their views on the willingness on investing and setting up recycled paper and plastics manufacturing facilities in Hong Kong;
 - ii) To review recycling practices/technologies for handling local waste furniture in Hong Kong and other economies: 11 furniture recycling/second hand companies were engaged for understanding the bottlenecks and operational needs of local waste furniture recycling. Mainland China, Taiwan, Japan, Singapore and the United Kingdom (UK) were reviewed for their existing handling practices/technologies, machineries in waste furniture recycling and the relevant government support measures;
 - iii) To continuously review and update how waste and recyclable materials emerge in Hong Kong currently: a desktop research has been conducted to review how Hong Kong enterprises collect, process and export recyclable materials. Also, surveys have been conducted with stakeholders of the recycling chain to reveal the situation of the

industry. There are also suggestions for the Recycling Fund in terms of supporting measures; and

- iv) To study thoroughly on previous, current and potential markets/outlets for various types of recyclables: import and export policy and control of Mainland China and other major export regions, and the export prices of various key recyclable materials were explored.

Key Findings of Section I - Review on Manufacturing Technologies and Processes for Handling Local Waste Paper and Plastics in Hong Kong

5. Most of interviewees mentioned that they have some experience in manufacturing semi- or final recycled plastic products. Their most familiar technologies and equipment come from Mainland China, Japan, Taiwan and Germany, e.g. Tomra, Unisoft sorting machineries from Germany, Boretac treatment machineries from Mainland China, etc. On the other hand, some interviewees mentioned that some of above technologies and machineries require large area for operation, and the payback period would be more than 3 years; but the current land arrangement of Hong Kong for recycling industry (e.g. small land size and up to 3 years of short term tenancy) may not provide recyclers with sufficient confidence to invest on new technologies and machineries.
6. To all interviewees' understanding, there is no recycled plastic bags or Wood Plastic Composites (WPC) manufacturer in Hong Kong currently but there are only a few plastics recyclers who process waste plastics into recycled plastic semi-products (i.e. plastic pellets, flakes). Most of interviewees also indicated that unstable market situation and tightening import policies of Mainland China as well as Southeast Asian Countries are major constraints for plastics recycling. Most of them also expressed that due to the high labour cost and land cost as well as the difficulty in recruitment of workers, the manufacture of semi-products with simple treatment process and less land requirement have higher potential than the manufacture of final products in Hong Kong.
7. Interviewees suggested additional support measures from the Government such as fund support including rental cost, logistic cost, more lands for industrial use, consultation service to recruit technical specialists to establish recycled plastics manufacturing facilities in Hong Kong, etc. They also suggested that the Recycling Fund could directly provide subsidy to the frontline workers involved in source separation of waste plastics, and increase the maximum funding amount to at least HK\$15 million for setting up such recycled plastics manufacturing business in Hong Kong. For long term and sustainable development of the local recycling industry in recruiting adequate labours, some interviewees suggested that the Recycling Fund could support educational institutes or training organisations to organise courses or training programmes on advanced recycling technologies and knowledge.
8. Most of the interviewees have no experience in manufacturing recycled paper products in Hong Kong since there was no local recycled paper manufacturer during the period of study.

Recyclers in Hong Kong mainly focus on separation and sorting of collected waste paper only.

9. Similar to plastics recycling, most interviewees expressed that the major difficulties of collecting recycled paper in Hong Kong are inadequate quantity of recyclables in the market, weakness in source separation/clean recycling and insufficient land for industrial use. They believed that manufacturing recycled paper products in Hong Kong is not profitable, be it recycled office paper, tissue paper or corrugated paper. It is because high operational cost in Hong Kong and keen competition from Mainland China are the major constraints. They considered that there were no advantages for setting up paper manufacturing facility in Hong Kong if there is no government support or subsidies.
10. To soothe the waste problem in Hong Kong, it is important to promote waste paper and plastics recycling so as to divert waste from landfills. Based on the views and comments of interviewed stakeholders on the feasibility of manufacturing recycled paper/plastic products, the following measures are proposed under the current framework of Recycling Fund regarding the applicant's eligibility, disbursement arrangement and funding aspects:
 - a) To relax the experience requirement of at least 1 year involved in recycling operation so that other industries can establish recycling plant to manufacture recycled products through getting the funding support;
 - b) To increase the upfront payment for allowing better cash flow on new equipment investment; and
 - c) To support the rental expenses.

Key Findings of Section II - Review on the Existing Handling Practices/Technologies in Waste Furniture Recycling and the Relevant Government Support Measures

11. Local waste producers of both domestic and commercial & industrial (C&I) sectors including the Government organs with commercial cleansing contractors can directly dispose of their bulky waste (e.g. waste furniture) at Refuse Collection Points (RCPs). Alternatively, the bulky waste can also be handled and collected by their property management companies (PMCs) together with municipal solid waste (MSW), and then delivered to Refuse Transfer Stations (RTSs) and eventually to landfills.
12. At present, there is no operation identified to dismantle waste furniture for recycling or recovering raw materials (e.g. wood, metals, plastics, textiles) to produce new products in Hong Kong. Second hand market is quite popular in Hong Kong for handling used furniture, especially used office furniture and antique furniture. These types of used furniture are usually sold to the second hand shops and then processed with cleaning and repairing before being re-sold to the public and commercial tenants.
13. Currently in Hong Kong, there is no legislation or control scheme to specifically support the recycling of waste furniture. The Recycling Fund welcomes the applications for

enhancing the handling capability of recyclables, including waste furniture. Some other funding schemes, such as Environment and Conservation Fund, Innovation and Technology Fund, also accept various industries and institutes to invent and improve different processes of waste handling (e.g. source separation, collection, treatment, upcycling).

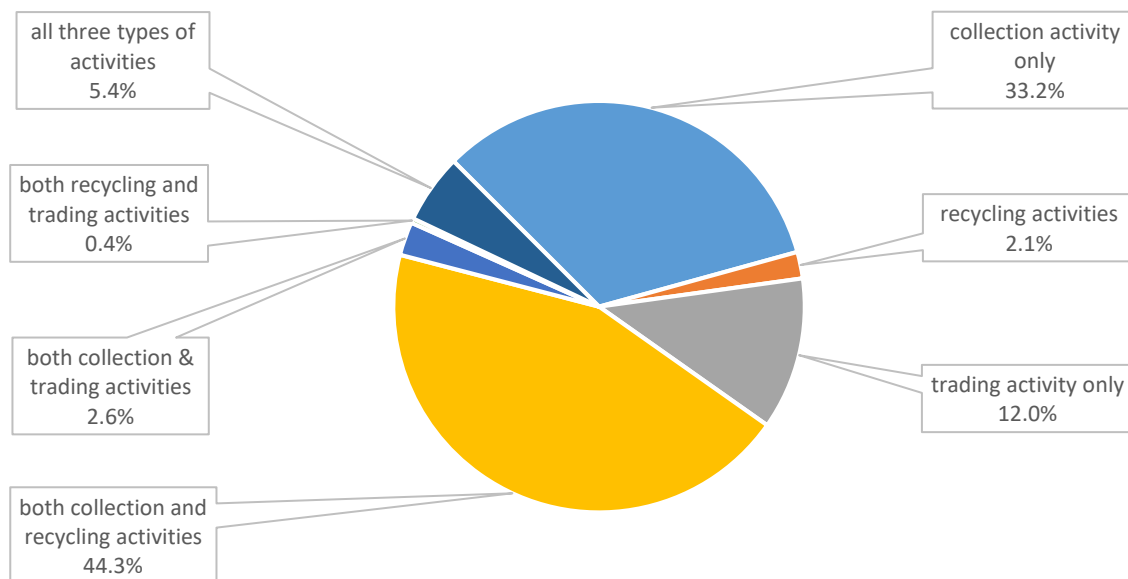
14. Most of recycling companies consider high land cost, high labour cost and high transportation cost to be the top three limitations in their business operation due to the large-size of waste/used furniture.
15. In Mainland China, Taiwan, Japan, Singapore and the UK, waste furniture recycling are controlled by local legislations related to waste management. These Governments encourage the reuse and recycling of waste furniture through imposing the disposal charge. Some Governments also provide free platform and network for local residents to donate and recycle their used furniture.
16. To promote waste furniture recycling business in Hong Kong, the Government could consider the following support measures:
 - a) To invite and support non-profit-distributing organisations (NPOs) to conduct business/technology demonstration projects related to waste furniture recycling to identify business opportunities, models and up-to-date technologies for recycling waste furniture in Hong Kong;
 - b) To support second hand shops which handle waste/used furniture for reuse after processing (e.g. repairing, refurbishing, etc.) or upcycling by funding their labour cost, rental and transportation cost; and
 - c) To support organisations like non-government organisations (NGOs) and charities to set up platform or network for lining up waste producers and waste handlers such as collectors/recyclers/second hand shops/charities to reuse, donate and upcycle waste/used furniture.

Key Findings of Section III - Profile of the Local Recycling Industry

17. This Study has reviewed 4 databases, which include Census & Statistics Department's database, Environmental Protection Department's collector/recycler contact list available from the Hong Kong Waste Reduction Website, HKPC's in-house database, and Yellow Page's information, on any updated information against the existing database in respect of ceased companies and newly opened companies. 179 companies were found to have their business ceased after 2017, while another 143 companies were found newly opened in 2018. The current number of recyclables collection, recycling and trading companies is 1,810 which is less than the total number of 1,846 as identified in 2017.
18. Among the 1,810 companies reviewed, over 80% of them were found to have employment size information. Among them, about 88% were small-sized companies with 1 to 9 employees, while about 6% and 4% were medium-sized companies with 10 to 19 and 20

to 49 employees respectively. On the other hand, about 2% of them had at least 50 employees. It shows that the recycling industry was dominated by small and medium sized companies.

19. Among those companies that had closed and newly opened, around 90% of them were small-sized companies with 1 to 9 employees. Among them, more than 70% employed less than 5 employees. It appears that small companies were more sensitive to market fluctuation and tightening import policies of Mainland China on recyclables. The majority of business nature for both ceased and newly opened companies after 2017 was similar, which involved both collection and recycling activities - with 42.3% for ceased companies and 51.8% for newly opened companies.
20. Based on the available information from the consolidated database, the distribution of the business nature in the recycling industry in 2018 was shown in the below chart:



21. Most companies handle several types of recyclables, including waste metals (around 1,150 companies), waste paper (around 800 companies), waste plastics (600 companies), WEEE (including computers and electrical appliances) (around 500 companies) and waste textiles (around 220 companies), with more readily available market outlets. There were fewer collectors/recyclers (less than 100 companies) to handle other recyclable materials with limited and uncertain demand like glass, wood, rubber tyres and food waste.
22. Among the 1,810 enterprises engaged in recycling operations in Hong Kong in 2018, about 50% of them were registered to non-ground floor multi-storey buildings and it was observed that some of these buildings were used as office premises, and some were used as temporary storages of recyclables. 26% of their registered addresses were located on ground floor (e.g. recycling shops on road sides), which is slightly less than that in 2017. Meanwhile, 20% of the companies were registered on uncovered sites. Some recyclables collectors/ recyclers (nearly 4%) were registered on residential buildings (e.g. mobile

collectors without any office or storage premises), while most of them were small-sized companies with less than 10 employees.

23. According to the surveyed recycling companies, the majority of recyclables were from: (i) local waste producers (85%) (ii) local upstream recycling operators (8%) and (iii) importers (7%).
24. There were six types of channels for collecting local recyclables. Among the surveyed recycling companies, 31% of them collected recyclables from individual commercial and industrial (C&I) producers, followed by scavengers (26%), domestic and C&I waste from property management companies (PMC) (17%), individual domestic waste producers (15%), construction sites (10%) and through government contracts (1%).
25. The two major collection modes in the recycling industry are delivery from waste producers (68%) and collection at source in person (30%). Sources for direct collection of recyclables mainly include scavengers and property management companies of housing estates and C&I premises, but can also be from construction sites, cleansing companies, individual commercial companies (including restaurants, hotels, publishers, supermarkets, etc.), schools, or even via online platforms. Other modes to obtain recyclables include collecting from third parties (1%), e.g. traders, re-processors/recyclers, government waste management contractors, non-government organisations and single block buildings, etc. and direct purchasing from mobile collection vehicles (1%).
26. According to the exportation figures of recyclables from the report of Census and Statistics Department in 2018, less than half of recyclables by weight were delivered to Mainland China, followed by other Southeast Asian regions such as Vietnam, Taiwan and Indonesia. When compared with the exportation figures of recyclables in 2013, the proportion of recyclables being exported to Mainland China continuously dropped from 67.8% to 43% in 2018. The proportion of exporting recyclables to the above Southeast Asian regions generally increased during the same period. This implies that the implementation of Green Fence Operation and other recently imposed import restriction measures by Mainland China have significantly changed the export market landscape of local recyclables.
27. Among the 158 local recycling companies surveyed, respondents considered that high land cost and inadequate land for recycling industry (59%) and high labour cost (50%) were the major unfavorable factors for local recycling industry.
28. According to the survey result in 2018, obtaining Recycling Fund for more staff recruitment (48% of the surveyed companies) was the most desirable support needed by the industry. Among different types of operating cost for the business, labour cost (38.5%) and rental/land cost (33.7%) collectively accounted for around two third of the overall cost. Around one fifth of overall cost was logistic cost. In general, although the rental and land cost was not the biggest part of the total operating cost, insufficient land resources available for the recycling industry still influence their decisions on the types of recyclables to be collected/recycled.

29. Regarding Mainland China's tightening policies on import of recyclables, 92% of the recyclers have heard of these policies and 84% of them expressed that their business had been affected by such policies. Among those recycling companies influenced by the tightened import policies of Mainland China on recyclables, most of them (80%) claimed that the decreased price of recyclables was the biggest impact. Around 41% and 8% of affected recycling companies recruited more labour and deployed more facilities respectively, due to more procedures involved to ensure the quality of recycled semi-products/products (e.g. pellets, flakes) would be able to meet import requirements. There were also 23% of recycling companies having altered their export destination of recyclables from Mainland China to other regions (e.g. Southeast Asia, South Asia) due to prohibited types of recyclables under tightening import policies of Mainland China.
30. Through desktop research and interviews with stakeholders, several bottlenecks and limitations of the local recycling industry have been revealed, which include the quality of semi-products, low value-added recycled products, manpower shortage, high land cost and inadequate land for recycling operations, low recycling rate and improper sorting of recyclables, etc. To address these bottlenecks and limitations, the Recycling Fund launched a series of enhancement measures in 2019, such as a new rental subsidy scheme, increasing maximum upfront payment amount, and extending rental expense under Enterprise Support Programme, etc.

Key Findings of Section IV – Market Study on Major Types of Recyclables

31. This Study reviewed the past, current and potential exporting markets for 11 types of recyclables, including waste paper, waste plastics, waste ferrous metals, waste non-ferrous metals, WEEE, used clothes/ textiles, wood/ yard waste, waste glass, waste rubber tyres, food waste and UCO. In 2018, waste paper, waste plastics, waste ferrous metals and waste non-ferrous metals accounted for over 90% of the exported recyclables. Most of Hong Kong's recyclables were exported within Asia. The top five regions for Hong Kong's recyclables export in terms of weight were, in descending order: Mainland China, Vietnam, Taiwan, Indonesia and India. Recyclables might be bulk in size (e.g. waste plastics, waste textiles) and heavy in weight (e.g. waste metals, waste glass, waste paper), of which these elements had effects on the shipping and transportation cost. As such, recyclables were mainly traded regionally rather than globally.
32. In 2018, Mainland China was the major exporting market of waste paper and waste non-ferrous metals. Vietnam was the major market of waste ferrous metals and scraps, which had about 51% share of all ferrous metal waste and scraps. Thailand was the major market of waste plastics and shared over 50% of waste plastics exported from Hong Kong. Taiwan was the major market of food waste products. For used cooking oil (UCO), Spain was the major market which had around 38% share. For waste glass, the major market has shifted from Thailand to India.
33. During the whole year of 2018, the unit trading price of waste paper from Hong Kong increased from HK\$1,500 per tonne at the beginning of the year to over HK\$2,400 per

tonne at the end. However, during the first quarter of 2019, the price trend dropped to around HK\$1,300 per tonne, which was close to the lowest price in the past 8 years. Regarding waste plastics, the unit trading price fluctuated throughout the past 5 years between around HK\$1,500 and HK\$3,700 per tonne, and has been mainly retained between HK\$1,500 and HK\$2,500 since early 2018. Between the mid-2018 and mid-2019, the unit trading price of aluminium and copper scraps decreased by 10.6% and 14.2% respectively; but for waste ferrous metals, the unit trading price increased from HK\$2,000 to HK\$4,000 per tonne in the same period.

34. Mainland China has been a major export market of Hong Kong's recyclables. As a result of the implementation of Green Fence Operation and other imposed import restriction measures since 2013, interception of waste has been stepped up. In order to prohibit the import of hazardous solid waste and solid waste with strong concern from the public, Mainland China announced the “Implementation Plan for Prohibiting the Entry of Foreign Garbage and Advancing the Reform of the Solid Waste Import Administration System” (「關於禁止洋垃圾入境推進固體廢物進口管理制度改革實施方案」) in April 2017. In July 2017, Mainland China further submitted a revision of import waste policy to the World Trade Organisation (WTO), which prohibited the import of 24 types of municipal solid waste, including highly polluted solid waste, waste plastics, un-sorted waste paper etc. In April 2018, the Mainland Authority announced the further prohibition of another 32 types of imported waste by 31 December 2018 and 31 December 2019 respectively. Another announcement published by the State Council of the People’s Republic of China will restrict the import of 8 types of waste metals from July 2019, including waste ferrous metals, waste steel and waste copper, etc.
35. In September 2016, Vietnam published the Decree No. 134/2016/ND-CP on tax exemption regulations on specified proportion of scrap in the production of export products. The regulation stated that “surplus imported scrap, waste and raw materials and supplies actually imported under processing contracts are exempted from import duty tax when they are sold for domestic consumption, but must be declared and paid Value Added Tax, excise tax, and environmental protection tax (if any) to the Customs authorities”. Thus, the export price to Vietnam has been increasing recently. Traders need to apply for a Certificate of Eligibility granted by the Government where the trader’s production is originated, for scraps to be imported into the country.
36. India restricts the import of hazardous wastes and other wastes except waste for recycling, recovery, reuse and co-processing for re-utilisation. Import/export of hazardous and other waste must be submitted through online application to the Ministry of Environment, Forest and Climate Change, Government of India, for their review. Importers must have an Importer License issued by the Regional Authority of Director General of Foreign Trade.

Conclusion & Recommendations

37. Most interviewees expressed that the major difficulties of collecting recycled paper/plastic in Hong Kong are inadequate quantity of recyclables in the market, weakness in source

separation/clean recycling and insufficient land for industrial use. They believed that manufacturing recycled paper/plastics products in Hong Kong is not profitable due to high operational cost in Hong Kong and keen competition from Mainland China, which are also the major constraints. They considered that there were no advantages for setting up recycled paper/plastic products manufacturing facility in Hong Kong.

38. Based on the views and comments of interviewed stakeholders on the feasibility of manufacturing recycled paper/plastic products, the following measures are recommended under the current framework of Recycling Fund regarding the applicant's eligibility, disbursement arrangement and funding aspect:

- a. To relax the experience requirement of at least 1 year involved in recycling operation so that other industries can establish recycling plant to manufacture recycled product through the funding support;
- b. To increase the upfront payment for allowing better cash flow on new equipment investment; and
- c. To support the land rental expenses.

39. In Mainland China, Taiwan, Japan, Singapore and the UK, waste furniture recycling are controlled by local legislations related to waste management. These Governments encourage the reuse and recycling of waste furniture through the disposal charge. Some Governments also provide free platform and network for local residents to donate and recycle their used furniture.

40. To promote waste furniture recycling business in Hong Kong, Government could consider the following recommendations:

- a. To invite and support non-profit-distributing organisations (NPOs) to conduct business/technology demonstration projects related to waste furniture recycling to identify business opportunities, models and up-to-date technologies for recycling waste furniture in Hong Kong;
- b. To support second hand shops which handle waste/used furniture for reuse after processing (e.g. repairing, refurbishing, etc.) and upcycling by funding their labour cost, rental and transportation cost; and
- c. To support organisations like non-government organisations (NGOs) and charities to set up platform or network for lining up waste producers and waste handlers such as collectors/recyclers/second hand shops/charities to reuse, donate and upcycle waste/used furniture.

41. Bottleneck in relation to manpower shortage is still the key limitation for the recycling industry. The low value of recycled products, the continuous strengthening and implementing the Green Fence Operation and other recently imposed import restriction measures of Mainland China have constrained Hong Kong's export of recyclables.

42. With regard to the market situation of recyclables in Hong Kong, over 90% of the local recyclables exported are waste paper, waste plastics, waste ferrous metals and waste non-ferrous metals. In 2018, the top five export destinations of Hong Kong's recyclables in

terms of weight were, in descending order: Mainland China, Vietnam, Taiwan, Indonesia and India. About half of the recyclables (about 0.8 million tonnes) generated in Hong Kong were exported to Mainland China. Mainland China was still the major market of waste paper and waste non-ferrous metals. While Vietnam was the major market of waste ferrous metals and scraps, which took more than 50% of all waste ferrous metals and scraps. Malaysia and Korea were the second and third markets of waste non-ferrous metals. Taiwan was the major market of food waste. For UCO, the major market was Spain and the major market for waste glass was India.

43. Owing to the public's strong concern, Mainland China announced the "Implementation Plan for Prohibiting the Entry of Foreign Garbage and Advancing the Reform of the Solid Waste Import Administration System" (「關於禁止洋垃圾入境推進固體廢物進口管理制度改革實施方案」) in April 2017 to prohibit the import of hazardous solid waste. In July 2017, the Mainland further submitted a revision of import waste policy to the WTO, which prohibited the import of 24 types of municipal solid waste, including highly polluted solid waste, waste plastics, un-sorted waste paper, etc. In April 2018, the Mainland Authority announced the further prohibition of 32 types of imported waste by 31 December 2018 and 31 December 2019 respectively. Another announcement published by the State Council of the People's Republic of China would restrict the import of 8 types of waste metals from July 2019, including waste ferrous metals, waste steel and waste copper.
44. To address these bottlenecks and limitations, the Recycling Fund launched a series of enhancement measures in 2019, which have been published in the discussion paper for Legislation Council Panel on Environmental Affairs "Proposed enhancement measures to the Recycling Fund" LC Paper No. CB(1)922/18-19(03) and the Information Note for Finance Committee "Enhancement Measures to the Recycling Fund" FCRI(2019-20)8.

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