



ReSoCart-ED

Recycling Solution for Non-Reusable Printer Cartridges
in Emerging and Developing Countries

67EXI5040



RAPID ASSESSMENT REPORT MALAYSIA November 2022

Supported by:



based on a decision of
the German Bundestag



Purpose / Goal / Approach

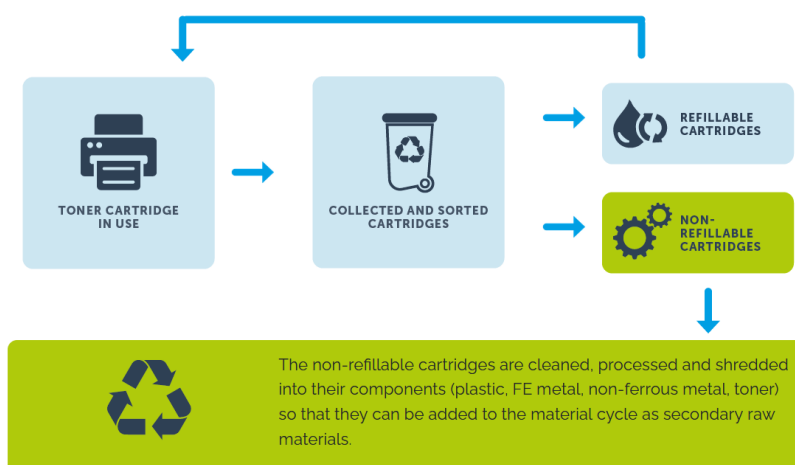
Developing and emerging countries, like Malaysia, are currently fast-growing markets for office printing products. This fact reflects in the very high consumption of toner cartridges for laser printers and copiers.

OEM cartridges can usually be refilled up to three times, even though this is usually not desired by the manufacturers at present. After this reuse, they reach the end of their service life. So-called “newbuild”, “compatible”, or “generic” toner cartridges from third-party manufacturers usually reach the end of their service life after a single use due to their simpler product design.

But even at the end-of-life stage of their life cycle, these cartridges still contain valuable raw materials, but also various pollutants. Conventional disposal methods, if available in the affected community, such as incineration or landfilling therefore merely ensure that these material fractions are treated in an environmentally sound manner at best, if not sent for regular domestic waste or uncontrolled dumping. Especially in Malaysia, many cartridges are, as one intermediate result, expected to end up in treatment facilities (incineration based) for scheduled waste. Both “regular” methods cause avoidable energy and resource consumption and, if not handled properly, significant pollution of soil, air, and water. From a sustainable point of view, it is therefore necessary to handle non-reusable toner cartridges appropriately to recycle valuable resources at the end of their life. However, recycling the plastics and metals contained in the cartridges is made difficult by the remaining toner dust in the cartridges. This can contaminate reusable materials, lead to health hazards when inhaled, and cause dust explosions during processing.

For these reasons, appropriate recycling techniques require expert knowledge which is hardly available or not yet established in developing and emerging countries. On the other hand, existing recycling techniques can be transferred and exported, to make them compatible with the existing conditions. Hence, this could solve the problem by contributing a valuable solution by improving the environmental situation in the target countries.

This project will study the feasibility of an economically viable solution for the disposal of toner cartridges in the target country Malaysia as a model for the ASEAN region. The main objective is to gain initial insights into feasibility that could lead to further steps, such as pilot plants in the target countries.



*Figure 1: Optimal Material Flow for Empty Toner Cartridges
Concept and visualisation: Umweltcluster Bayern*



Market Data

The Southeast Asian country of Malaysia consists of two parts. The western part is on the Malay Peninsula and the eastern part is located on the island of Borneo. Both parts are separated from each other by the South China Sea. West Malaysia borders Thailand to the north and Singapore, which is located on an offshore island, to the south. East Malaysia borders Indonesia to the south and the Sultanate of Brunei is enclosed by Malaysia to the north. Malaysia is a country rich in mineral resources and raw materials (like tin, rubber, palm oil, or petroleum). Since the beginning of the 1980s, there has been rapid industrial development. Economically and politically, Malaysia is considered one of the most stable countries in Southeast Asia, where the convergence of tradition and modernity, Islam, and capitalism is propagated. Through this reorientation, the country experienced a fundamental change from a previously majority agricultural state to a mechanized and capital-intensive industrial location with high development potential.ⁱ

The total area of Malaysia covers 330.290 km².ⁱⁱ Climatically, the country is classified in the tropical climate zone, without seasons.ⁱⁱⁱ The capital Kuala Lumpur is located in the western part. Other major cities are Seberang Perai, George Town, Ipoh, Petaling Jaya, Shah Alam, Iskander Puteri, Seremban, and Johor Bahru.^{iv}

The total population is 32,8 million^v with a population density of 99 per km².^{vi} Malaysia is a multi-ethnic nation with diverse ethnic, religious, and linguistic groups. The population is mainly composed of Malays, Chinese, Indians, and other indigenous Bumiputra groups.^{vii} Education is compulsory.^{viii} The population growth rate is 1,30 %.^{ix} The majority of the population (78%) lives in cities. The age structure is rather young^x, and the official language is Malay.

Politically, Malaysia is a constitutional elective monarchy and parliamentary democracy. The currency is the Malaysian ringgit (RM). The current economic development of the country is positive. The preliminary nominal GDP for 2021 was 1,544 billion RM and the estimates are 1,696 billion RM for 2022 and 1,834 billion RM for 2023. Hence, despite the global crises, an economic growth of 5.6 % is assumed for 2022. Accordingly, the employment situation in Malaysia is very good and with a preliminary value of 4.7 % in 2021 for the unemployment rate close to full employment. Inflation is also low at 2.5 % in 2021 and is expected to rise only moderately to 3 % in 2022.^{xi} One possible explanation for the country's high resilience to the current crises is that it produces natural gas and oil and is therefore not as strongly affected by the global rise in energy prices triggered by the war in Ukraine.

According to this, 32.2 % of the nominal gross value added was generated in the mining/industry sectors in 2020. The construction sector is responsible for 4.1 %. The service sectors of trade/restaurants/hotels account for 20.2 % and transport/logistics/communications for 9.8 %. The agriculture/forestry and fishing sectors generate 8,3%. The other sectors account for 25.4 %. Thus, a large part of the value added is generated in industry and mining, followed by the tertiary sector.^{xii}



Due to the high level of industrialization, the importance of the tertiary sector, and a positive forecast for economic growth, demand for printing and copying services are expected to increase. It can therefore be assumed that the consumption of toner cartridges will not decline in the foreseeable future.

Legal Framework



Figure 2: Visit at the Department of Environment (DOE) with the support of the German Chamber of Commerce, Malaysia, and GIZ Malaysia.

Photo: Umweltcluster Bayern

Due to the substances contained in toner cartridges that pose a significant hazard or risk to humans, plants, or animals as well as the environment (by color pigments), toner cartridges are defined as hazardous waste and thus fall under the waste category of Environment Quality (Scheduled Wastes) Regulations 2005. The Department of Environment (DOE) defines scheduled waste as follows:

“Scheduled waste is any waste that has hazardous characteristics that have the potential to negatively impact the public and the environment. A total of 77 types of scheduled waste are listed under the First Schedule, Environmental Quality (Scheduled Waste) Regulations 2005, and the management of such waste shall be in accordance with the provisions under the above Regulations.”^{xiii}

That means toner cartridges are classified under the Waste Code SW417: *“Waste of inks, paints, pigments, lacquer, dye or varnish”*.^{xiv}



Based on this classification, only licensed scheduled waste facilities/transporters are allowed to transport and handle waste toner cartridges. A list of these companies can be found on the DOE homepage.^{xv} Export or import of non-refillable waste cartridges is not possible or only possible under very strict conditions. The DOE website states:

“Scheduled waste is not allowed to be exported except:

- i) There is no recovery facility capable of processing the waste;*
- ii) Scheduled waste is exported not for disposal.”*

And:

“The Department of Environment does not allow any importation of scheduled waste unless the scheduled waste is used as raw material and it cannot be obtained locally.”^{xvi}

It was not yet possible, to get in close touch with the operators of the licensed scheduled waste facilities/transporters.

Due to these legal regulations, it is difficult to trace the material flow of the waste cartridges. Therefore, we would like to subcontract detailed research of the legal framework to a local actor. With the results of the research, we expect to give a better assessment of where we can step in with the ReSoCart-ED project in Malaysia.

DOE has presented the current activities as well in implementing an e-waste Regulation in Malaysia comparable with the product scope of the European WEEE I Directive (non-open scope, specially defined appliances). Part of the presentation was the information that the range and list of appliances should constantly be expanded and that for example printer cartridges could be an additional fraction to be addressed under the scope of the Malayan WEEE directive in the future.^{xvii}

Market Situation for Toner Cartridges

After several on-site meetings and the support of key stakeholders in Malaysia such as GIZ and the Department of Environment (DOE) as well as initial desktop research, no clear picture of the market situation for printer cartridges in Malaysia could be obtained in the course of the project so far.

- Due to the domestic production of printer cartridges, the quantities placed on the market cannot be estimated via import data. What is clear is that all known OEM manufacturers are represented in Malaysia with their own subsidiaries or branches.
- Most OEMs have – at least according to their online communication and offers – established take-back programs for their toner cartridges in the country. It has not been possible to identify these programs in the field of users and stakeholders consulted during the visit.
- There are third-party take-back schemes, as the awareness of the market value for refillable cartridges is present. It was possible to get in touch with a locally used



WEEE collector that actively sells collected printer cartridges to an internationally well-recognized cartridge aggregator which is known as the significant cartridge collection / empty cartridge providing company in Malaysia. Several buyback initiatives have been identified online.

- It has been recognized that official retail chains offer refunds of up to 4 ringgit (approx. 1 EUR) as customer credit for the return of empty OEM cartridges. Besides the fact that this is for sure marketing driven, these cartridges must end up at certain facilities.
- Cartridge refilling is practiced at an industrial level in Malaysia. It is for example known that one of the biggest stakeholders for cartridge remanufacturing and production of “newbuilt” cartridges, China-based APEX Ninestar Group, is operating a manufacturing plant around Penang Province.
- Talks with some actors implicated, that toner cartridges currently – if not ending up officially in the special waste treatment companies or being traded as the empty cartridge for refilling – including export – would be ending up with certain plastic recycling facilities which are not yet identified.

Unfortunately, it cannot (yet) be fully understood what is actually happening, with empty, non-refillable toner cartridges after collecting them. OEMs, third-party retailers, and stakeholders from the waste sector are very reserved about that issue when being asked about it. High-level talks with local, country-wide active waste federations have not led to the impression that this topic is a considered one for active waste management companies – overall. The participants in a meeting with a local WEEE treatment plant – as identified



Figure 3: Laser printer with toner cartridge mistakenly disposed of in domestic waste.

Photo: Umweltcluster Bayern

in the further course specified on non-ferrous metals, less initial treatment of smaller devices such as printers, did implicate that almost no cartridges are showing up with their activities. However, in individual cases, it was observed that these cartridges went to local recycling companies, without it being possible to clarify whether they belonged to the official or the unofficial sector.

At present, however, it is still unclear whether the cartridges are mainly handled in the intended official manner or whether the majority of them are recycled unofficially and improperly due to their material value, or how often they end up illegally in domestic waste and are landfilled. These pathways, as well as the market volume and possible potentials, can only be determined in further studies with the support of local stakeholders and institutions.



Evaluation / Further Procedure

Malaysia's situation regarding toner cartridges is complex and access to the market unexpectedly proves to be very challenging. Although the Department of Environment (DOE), other organizations, and several research institutions the project team was able to involve with a presentation and scientific-driven talks on the topic, are showing interest in an end-of-life solution for toner cartridges, it remains difficult to move the project forward in Malaysia. Stakeholders, aggregators, and possible operators for a future solution have hardly been found or identified. As it proves, access to local networks and market is very difficult at this time from the outside perspective. Although locally established organizations such as GIZ do their best to support the project with local contacts and the organization of talks and meetings, it has not yet been possible to get in touch with the right actors. Compared to other countries such as Ghana, where existing programs such as the GIZ e-waste program focus on this issue, the local GIZ activities in Malaysia with its limited number of staff currently working on the ground in Malaysia can mainly bring valuable governmental, political, and scientific contacts. Less well established at present are the necessary contacts in the operational sectors, such as the recycling companies and scheduled waste treatment companies, which would be urgently needed for the success of the project. This makes the implementation of the project in Malaysia difficult.

Given these circumstances, the next step is to examine the extent to which we can improve the database and network situation through external assistance. Specifically, we are examining whether we can obtain subcontracts to determine the market situation, the legal situation, and above all, the disposal pathways for toner cartridges with reasonable effort in the circumstance of this project. If this proves not to be feasible, it will have to be examined whether the project can be implemented in Malaysia as intended, or whether a focus must be set on Ghana due to the tight time frame and the limited human and financial resources. Until then, everyone involved will also be kept informed about the progress of the project via the newsletter and the new website (www.resocart-ed.de) that will be launched in December 2022.

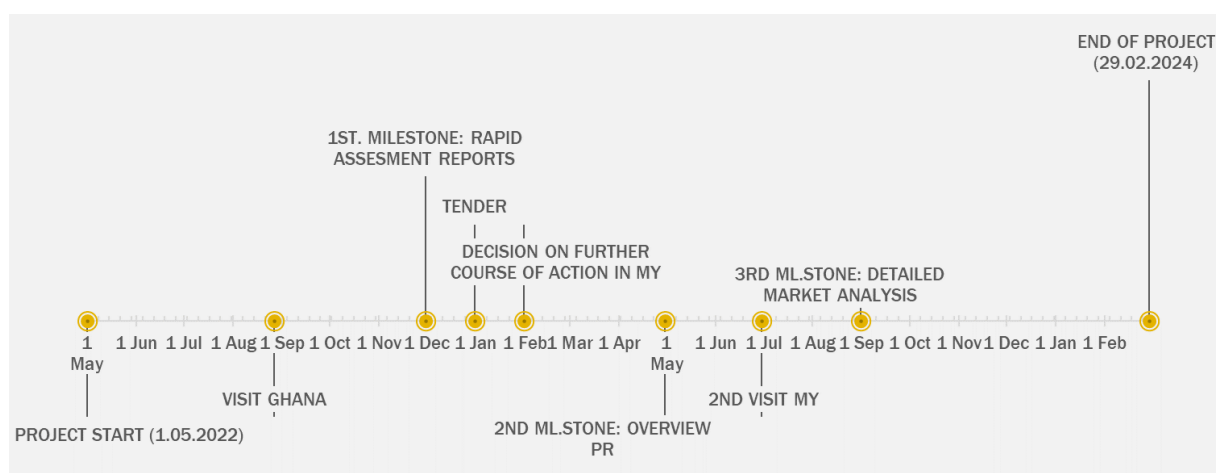


Figure 4: Project Timeline Malaysia



List of sources

- ⁱ <https://www.cia.gov/the-world-factbook/countries/malaysia/#economy>, (2022), 29.11.2022
- ⁱⁱ https://web.archive.org/web/20131114015856/http://www.statistics.gov.my/portal/download_Handbook/files/BKKP/Buku_Maklumat_Perangkaan_2012.pdf, (2012), page 22, 29.11.2022
- ⁱⁱⁱ <https://climateknowledgeportal.worldbank.org/country/malaysia/climate-data-historical>, (2020), 29.11.2022
- ^{iv} <https://worldpopulationreview.com/countries/malaysia-population>, (2022), 29.11.2022
- ^v <https://data.worldbank.org/country/malaysia>, (2021), 29.11.2022
- ^{vi} https://www.dosm.gov.my/v1/index.php?r=column/cthemByCat&cat=155&bul_id=ZjJOS-npJR21sQWVUcUp6ODRudm5JZz09&menu_id=L0pheU43NWJwRWVSZklWdzQ4TlhUUT09, (2021), 29.11.2022
- ^{vii} <https://www.worldatlas.com/articles/ethnic-groups-of-malaysia.html>, (2019), 29.11.2022
- ^{viii} <https://uis.unesco.org/en/country/my>, (2021), 29.11.2022
- ^{ix} <https://data.worldbank.org/country/malaysia>, (2021), 29.11.2022
- ^x <https://data.worldbank.org/country/malaysia>, (2021), 29.11.2022
- ^{xi} https://www.gtai.de/resource/blob/21308/be5fe788cf53a376c0d071a055a821b0/GTAI-Wirtschaftsdaten_Mai_2022_Malaysia.pdf, (2022), page 1, 29.11.2022
- ^{xii} https://www.gtai.de/resource/blob/21308/be5fe788cf53a376c0d071a055a821b0/GTAI-Wirtschaftsdaten_Mai_2022_Malaysia.pdf, (2022), page 2, 29.11.2022
- ^{xiii} <https://www.doe.gov.my/en/scheduled-waste-information>, (2022), 29.11.2022
- ^{xiv} <https://pentasflora.com/scheduled-waste-management/list-of-scheduled-waste-codes/>, (2020), 29.11.2022
- ^{xv} <https://eswis.doe.gov.my/facilityList.aspx>, (2019), 29.11.2022
- ^{xvi} <https://www.doe.gov.my/en/scheduled-waste-information>, (2022), 29.11.2022
- ^{xvii} <https://ewaste.doe.gov.my/>, (2022), 29.11.2022