# COMPLETION REPORT

Kuan Seng How
Universiti Tunku Abdul Rahman

## Comparative Study of Plastics Recycling in Japan and Malaysia: Current State, Challeges and Opportunities

The project entitled "Comparative study of plastics recycling in Japan and Malaysia: Current state, challenges and opportunities" was conducted to evaluate the current recycling scenario in Japan and Malaysia, identify challenges and propose opportunities for collaboration between the two countries in plastic recycling. Literature search was conducted and a set of nine criteria were employed to critically evaluate the policies and legislations of both countries. A total of eleven in-depth, semi-structured interviews were carried out with policy makers and industry stakeholders in Japan and thirteen in-depth, semi-structured interviews were carried out with counterparts in the Malaysian plastic recycling industry between July 2021 and July 2022. The project also resulted in a final year undergraduate thesis to evaluate the environmental impact of plastic recycling processes in Malaysia and Japan using Life Cycle Assessment (LCA).

Our work identified a number of barriers inhibiting sustainable plastic recycling in Malaysia such as management and logistics issues, lack of data pertaining to plastic recycling, lack of focus in implementation of plastic recycling law and lack of legislation targeted at illegal plastic import. Recommendations made to counter these issues are proposed as: the introduction of a central agency for plastic recycling, introduction of indicators and measurements for plastic recycling, introduction of industry-specific legislations, implementation of an efficient PAYT system, among others. In Japan, barriers currently faced in plastic recycling in Japan are identified as the rise of plastic waste, lack of incentive for recycling companies, high environmental load of waste processing, opposition to construction of waste treatment facility and lack of relevant information and data on plastic waste exports. Countering measures are proposed to lower the barriers mentioned such as the use of substitute material, making full use of chemical recycling to complement mechanical recycling, elaborate research on plastic recycling technologies, among others. Two strategies proposed to be jointly developed by both countries are enhancement of Extended Producer Responsibility (EPR) through a regional policy platform and collaboration in establishing joint Ecotowns. A regional policy platform between Japan and Southeast Asia is crucial to deal more efficiently with products and end-of-life items that are shipped across borders. Further cooperation can also be carried out by both countries in terms of the joint construction of EcoTowns where it is expected to see developments in elaborate data-sharing platforms and standardisation of recycling product criteria in the foreseeable future. Our LCA results showed that mechanical recycling in Japan yielded the lowest Global Warming Potential (GWP) values compared to incineration and liquefaction in Japan and landfill in Malaysia. Dumping plastic waste in landfills in Malaysia yielded the highest GWP compared to all scenarios in Japan respectively. Our results also show that when current energy sources are replaced with the solar energy, wind energy and hydroelectricity, the GWP values can be reduced up to 98.03% and Primary Energy Demand (PED) up to 60.44%. As for the landfill scenario in Malaysia, it is recommended that the landfill gas be used to produce energy to power the nearby residential and industrial areas.

Publication of the Results of Research Project:

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| Verbal Presentation (Date, Venue, Name of Conference, Title of Presentation, Presenter, etc.)<br>- |
| Thesis (Name of Journal and its Date, Title and Author of Thesis, etc.)<br>Clean Technologies and Environmental Policy, January 2022, Towards regional cooperation on sustainable plastic recycling: Comparative analysis of plastic waste recycling policies and legislations in Japan and Malaysia, Seng How Kuan, Foon Siang Low, Sylvia Chieng. (https://doi.org/10.1007/s10098-021-02263-0)<br>https://link.springer.com/article/10.1007/s10098-021-02263-0<br><br>Final Year Project Thesis, April 2022, Life Cycle Assessment (LCA) of Plastic Recycling Processes in Malaysia and Japan, Ren Sheng Tan (under the supervision of Dr Seng How Kuan).<br><br>Clean Technologies and Environmental Policy, October 2022, Contrasting stakeholders' perception on plastic recycling in Asia: Comparative analysis of Japan and Malaysia, Seng How Kuan, Foon Siang Low, Sylvia Chieng (in preparation).<br><br>Clean Technologies and Environmental Policy, December 2022, Life Cycle Assessment (LCA) of Plastic Recycling Processes in Malaysia and Japan, Seng How Kuan, Foon Siang Low, Sylvia Chieng (in preparation). |
| Book (Publisher and Date of the Book, Title and Author of the Book, etc.)<br>- |