# Study on the $CO_2$ reduction effect through development of End-of-Life railway vehicle recovery treatment system

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## 1. Introduction

Since railway consumes less energy and has lower $CO_2$ emissions than other modes of transportation, it is recognized as highly sustainable and environmentally friendly transportation mode. However, the railway industry is currently being challenged to improve its sustainability, not only in operation, but in manufacturing and disposal of old equipment. Railway vehicles have a lower recovery rate than road vehicle. This is mainly due to the difficulty of applying eco-design method, recovery-conscious design, to railway vehicle compared to the car. Moreover, the facility is not available. To meet the recent requirement of sustainability and low carbon and green growth, this project is to establish a recovery system for various railway vehicles in South Korea. This project will run from 2010 to 2015. The ultimate goal is to improve the sustainable level of the railway industry for whole life cycle performing at the end of life stage. The successful indicators will be measured and presented as recovery rate of railway, amount of waste landfill, virgin material acquisition minimization and finally total amount of $CO_2$ emission reduction.

## 2. Methodology

The first step was to collect data on the number of railway car bodies produced from 1984-1999, and to forecast the waste that will be produced from 2009-2024. Numerous railway industry resources were consulted in order to produce a chart of main parts and their materials. In the next step, existing end of life treatment systems, particularly those used in the automobile industry, were investigated. The biggest challenge was to convince the top management level of the project's importance. In order to do this, detailed data, including the effect on the environment and the economic benefits, were presented. The current recycling rate was also compared to that of other countries. In addition, the advantages and disadvantage of implementing the recovery system were addressed. We showed that it is technically feasible to meet our goal. In addition, we emphasized that a recovery system will not only be beneficial to the environment and reduce waste, but it will also benefit the economy, as the market is heavily dependent on railway transport.

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## 3. Results

The concept of recovery system is similar to the automobile industry but more sizeable and complex. Ansan city, located at the west side of Korea, is the possible site for this recovery system. The recovery system will cover the collection, dismantling, shredding and reuse of each material of end-of-life railway vehicle. An outline of the facilities connecting devices is presented in Fig.1. Railway vehicles are first collected and then transferred to removal stage. At this stage, contaminated and hazardous substances including liquid substances are removed. Coach, windows, doors, seat and other interior are systematically disassembled. All dismantle materials are again treated to prevent contamination rising from previous stage. Subsequently, each part and material is treated by specifically technique. All material results are collected in separate containers and warehouse and further transport to material recycling plant.

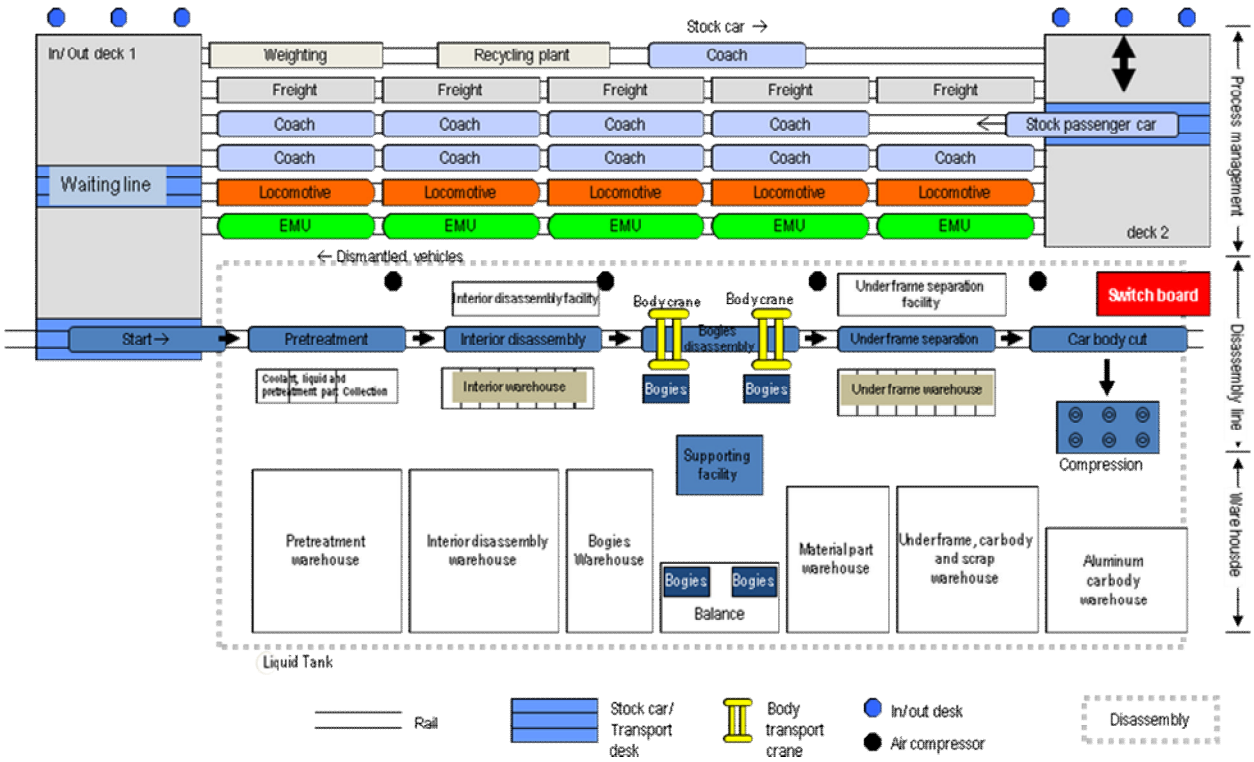


Figure 1 Outline of recovery system for railway vehicle

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Figure 2 Possible location of recovery system plant

## 4. Conclusion

The introduction of recovery system for railway vehicles that will be located in Ansan city is meant for sustainable purpose to increase the recovery rate of railway industry. From the current research, we have developed a railway vehicle-recovery system. The conceptual design of this facility is to flow railway vehicle through the system. Consequently, material dismantled will transfer to recycling plant.

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