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THE POTENTIAL FOR A WASTE RAIL HAUL STRATEGY

1.0 BACKGROUND

With the rapid development of the road and highway network, railways in Malaysia have found it difficult to compete given the historical lack of investment and circuitous and slow routes followed by the rail network. In an effort to make railway travel more attractive and competitive, Keretapi Tanah Melayu Berhad (KTMB) has undertaken plans to change and expand the role of the railways. The on-going development of the double tracking and electrification of railway routes is carried out with the aim at increasing the railway capacity and speed. In addition, some work is being undertaken on rehabilitating and upgrading the main lines, and the railways are also seeking to expand their freight handling operations with the development of inland container depots and terminals.

Railways are widely perceived to have a number of advantages over other forms of transport, particularly in terms of their transport costs/tonne/km, energy consumption, environmental impact and safety.

1.1 Existing Railway Network

The present railway network in Peninsular Malaysia can be divided into two main sections, totalling 1669 km of railway route, which includes the electrified double track section in the Klang Valley: -

i. West Coast Line

The West Coast Line, which is the longest line, runs in the north-south direction between Johor Bahru and Padang Besar.

ii. East Coast Line

The East Cost Line runs in the east-west direction between Gemas in the west and Tumpat in the east.

In addition to these two major railway lines, there are also spur lines between KL and Port Klang, Bukit Mertajam and Butterworth. Both passenger and freight trains use these two spur lines.

There are also existing freight spur lines serving port and industrial areas. These include:

- Senai – Pelabuhan Tanjung Pelepas
- Port Dickson - Seremban
- Pelabuhan Klang – West Port
- Kuantan – Kerteh
- Mentakab – Kuantan

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1.2 Current Features of Train Operation

Based upon the discussion with KTMB, the existing rail lines, with the exception of the section between Rawang – Ipoh, have ample capacity to accommodate further increase in freight demand. The section between Rawang – Ipoh is currently identified as the only congested section due to the current on-going double tracking project. The double tracking project requires 10 hours per day to be allocated for the construction of the tracks, therefore only 14-hours per day are currently used for the operation of trains.

In terms of capacity, the single track section has a capacity of about 50 trains per day, however for the double track section, it has unlimited capacity with modern signalling systems and minimum headway of about 7 minutes.

The existing freight train has a hauling capacity between 1,000 tonnes and 1,200 tonnes depending upon the type of locomotive used. It has an average speed of 50 km/hour on the single-track section and 70 km/hour on the double track section, which is sufficient to ensure daily loading, transfer and unloading of waste.

1.3 Improvement and Expansion Plans

In its effort to modernize and make railway travel and transportation more attractive, KTMB is currently undertaking the double tracking and electrification railway routes together with modern signalling work. This project is aimed at increasing haulage capacity and enhancing operational safety for both freight and passenger services. The project involves upgrading of the existing railway infrastructure to cater for high-speed train operation with a maximum design speed of 160-180km/hour. All level crossings shall be replaced with graded crossings of either flyovers or underpasses. Installation of modern signalling, communication and electrification system will also be carried out.

The status and plan for the double tracking project are as follows:

No.	Section	Status	Expected Date of Completion
1.	Seremban – Rawang	Completed	-
2.	Rawang – Ipoh	On-going	2006
3.	Ipoh – Padang Besar	Planning	2008
4.	Seremban – Johor Bahru	Planning	2008

At present, there is no plan for the double tracking project for the East Coast Line between Gemas and Tumpat.

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1.4 Freight Handling

There are various types of wagons in common use to move freight. Wagons are either "customised" or general-purpose wagons. The former are specifically designed for carriage of specific type of cargo and are always owned by the customers. Examples of these are Cement and Petroleum wagons. Some of the common characteristics of general cargo wagons that are currently available are as follows:

i. Bogie Covered Goods - normally used for cargo needing protection from weather.

ii. Bogie Flat Low Sides - "open" wagons used for transporting cheap and bulky cargo such as granite stone. Motor vehicles may also be conveyed on these wagons.

iii. Bogie Container Flat - flat floored wagons used for carriage of containers.

Transport of waste by rail will require a significant investment in a customised rolling stock. Various customised designs and configurations are used for waste transfer schemes in Europe, USA and Australia, including adapted RORO containers, horizontal and vertical fed ISO containers and self discharging hopper type carriages. Rail transfer operations guidance is currently in preparation in the EU as are a number of trials on rail handling equipment.

A typical European operation would comprise of waste being compacted into standard 20ft x 8ftx 8ft modified ISO containers then loaded on to 60ft rail container-flat-wagons. Standard loading is 13 tonnes per 20ft box with 3 boxes to a wagon. Typical payloads are 700 to 1000 tonnes. Some countries use 40ft containers as standard with higher and lower payloads.

The dramatic urbanisation, population and waste growth predicted for Malaysia over the duration of the concession period means that advantage should be taken to develop regional waste treatment facilities served by the necessary road and rail infrastructure at the early stages of the planning process.

In general a multi-modal transport strategy that incorporates rail is in keeping with the development of large scale treatment and disposal facilities enabling the Government to benefit from the resultant economies of scale, but will necessitate large budgets for up front capital expenditure for infrastructure.

2.0 COSTS OF INFRASTRUCTURE AND COMMERCIAL CONSIDERATIONS

2.1 Infrastructure Cost

The transportation of solid waste using trains may involve or require construction of new railway lines (i.e. spur line). Estimates of infrastructure costs are based on discussions with KTMB. Costs are usually divided into four main categories i.e. civil engineering, signal & telecommunication, station equipment and traction & rolling stock.

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Based upon the information from KTMB, the cost of building a railway track is RM1 million per kilometre. This cost excludes telecommunication and station equipment costs. In developing a waste management infrastructure we must also consider the cost of developing transfer stations and mobile plant and equipment at the point of loading and discharge. The analysis therefore makes several assumptions:

- Excess capacity will exist in the updated rail system.
- Optimum payload is 700 - 1000 tonnes per trip.
- The option exists to use the rail system for back loads of recyclate and vitrified ash from the thermal treatment facilities.
- Optimum speed is 50km/h allowing for daily transfer of waste.
- New line costs at landfill railhead (max. 20km).
- Capital costs and operational costs for the regional landfill railheads will be comparable to that of a similar size transfer stations.
- New line costs at MRF/Transfer Stations treating in excess of 700 t/day (max. 5km).

2.2 Operating Costs

The current price from KTMB for transporting materials by train is RM0.06 - RM0.08 per tonne per kilometre. International experience suggests operating costs associated with rail transfer of waste is around RM0.20 – RM0.40 per tonne per km before sales tax.

2.3 Financial Justification

The cost of transferring waste via road in Malaysia has been estimated at RM20/tonne. The multi-modal rail option has been calculated on the basis of 11 transfer stations including MRFs handling more than 700 tonnes per day rail-hauling waste to a regional landfill. The cost of transferring waste via rail in Malaysia is estimated at RM8/tonne. However, this does not include for the necessary capital expenditure of 250 flatbed wagons and 1500 20ft containers (including 10% spares) to handle around 18,000 tonnes of waste per day on the basis of 36 train movements averaging a payload of 1000 tonnes.

The <u>recommended option utilising road haulage</u> (Option B) was used in order to undertake a direct cost comparison between:

1. **road only option, and**

2. **road/rail option.**

For the road/rail option the total capital costs (2003-2020) for provision of railheads is estimated at RM6 billion, with a further RM12 billion required for haulage and provision of treatment facilities. Thus the total capital cost for (recommended) Option B with road/rail and 3 regional landfills is approximately RM18 billion, some RM4.5 billion more than Option B utilising road haul only.