

# TECHNOLOGY FACTSHEET

## ELECTRIFICATION OF THE EXISTING RAILWAY SYSTEM<sup>1</sup>

- 1. Sector:** Transport
- 2. Introduction:** Transport sector is a major GHG emitting sector in Sri Lanka. About 60% of the air pollution (especially in Colombo City) comes from this sector (AirMAC, 2009). The main way of transportation is through the road network, which is supplemented by rail, air, and water transport means. Out of passenger transport, buses carry about 50% and railways carry about 4% of the passengers, while the rest of the passengers are carried by the other modes (Jayaweera, 2011). Road transport accounts for about 96% of passenger transportation and 99% of freight transportation (Jayaweera, 2011). Currently, the transport sector in Sri Lanka utilizes petroleum-based fossil fuels, leading to significant amounts of CO<sub>2</sub> and other GHG emissions (e.g. N<sub>2</sub>O, CH<sub>4</sub>) considered under the United Nations Framework Convention on Climate Change (UNFCCC) and Kyoto Protocol. Technology transfer, defined as the flow of experience, know-how and equipment between and within countries, is one of the priorities under the United Nations Framework Convention on Climate Change (UNFCCC). Technology needs assessment (TNA) is a key element of the technology transfer, and is carried out with the intention of moving towards cleaner, less GHG emitting technologies.
- 3. Technology name:** Electrification of the existing railway system
- 4. Technology characteristics:** Electrification of the existing railway system, at least part of it, will save both energy and the maintenance cost, while providing sustainable transport. The diesel powered electricity generator in the existing trains that drive the motors connected to the wheels, remain idle most of the time, except when running at steady speed. When the train is electrified through the grid, there is no such wastage of fuel and when the train brakes or decelerates, the motors will transform to generators, producing electricity, which will be returned to the grid for later use. In electrification of the railway system, the existing railway tracks could be used (with zero voltage) with electricity provided through overhead lines (25 kilovolt) drawn above the railway lines and loops (IESL, 2008).
- 5. Country specific/ applicability:** The electric trains become more efficient and beneficial with the higher frequency of use; thus more busy sectors with a large number of passengers and frequent trips would get the highest benefit out of electrification.
- 6. Status of the technology in the country and its future market potential:** The existing railway network in the country is ~1500 km long. The railway network in Sri Lanka was initially built and used only for transporting export plantation products, and with increasing population and traffic needs, rail transport became more passenger oriented. Currently the existing trains are diesel powered, and electrification of one sector of the railway network has been proposed by IESL (2008).

---

<sup>1</sup> This fact sheet has been extracted from TNA Report – Mitigation for Sri Lanka. You can access the complete report from the TNA project website <http://tech-action.org/>

## **7. Barriers: -**

## **8. Benefits**

### **a. Socioeconomic:**

- Better, smooth, and more sustainable transport
- Reduced noise and pollution
- Lowered energy requirement and cost
- Lower maintenance cost
- Higher acceleration and speed and reduced travel time per unit distance
- More passengers moving towards rail transport, thus reducing the congestion on roads
- Higher energy use efficiency
- Electric traction gives higher power-to-weight ratio compared to diesel power

### **b. Environmental**

- No exhaust fumes.
- Lower GHG emission and reduced environmental pollution

## **9. Operations: -**

**10. Costs:** Initial investment cost could be high. However, this cost could be reduced by using the existing railway tracks with electricity provided through overhead lines drawn above the railway lines and loops.

## **11. References**

- AirMAC 2009. Clean Air 2015. Air Resource Management Center. Ministry of Environment & Natural Resources, Sri Lanka
- IESL (The Institute of Engineers, Sri Lanka), 2008. A proposal for railway electrification. IESL.
- Jayaweera, D.S. 2011. Analysis on effectiveness of fiscal strategies introduced on hybrid vehicles and market response- policy reforms on clean air. Presentation at the Center for Science and Environment Conference, India, held on September 28-29,2011