De-carbonization of Indian Railways:
Project plan (Phase I)

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Executive Summary

About 25% of worldwide CO₂ emissions are attributed to transport. Although India has the lowest rate of energy consumption per tonne-km for goods transported by rail, growths in population, GDP and electrification plans by the Indian Railways, will raise the figure. 71% of electricity is generated using coal currently, and hence increasing electrification of the railways will also add to the emissions due to Railways. It is envisaged that 80% of rail freight and 60% of passenger traffic will run on electric energy by 2031-32. The Indian Railways have already considered the importance of increasing the share of low-carbon renewable energy sources such as solar and wind in the total energy mix. The internal target is installing 1,000 MW of solar power and 150 MW of wind power by 2020; the Railways are even considering a long-term target of 10,000 MW of renewable energy by 2030.

This study is in three phases. In the first, the feasibility of complete de-carbonization is examined and attractive pathways under different scenarios examined for achieving this goal. This will be done by, 1) Estimating passenger and freight demand upto 2030-31 and identifying the potential gap in passenger and freight demand-supply, 2) Conversion of passenger and freight demand into energy demand. The CO₂ emissions attributed to Indian Railways is also calculated.

This report estimates the growth in passenger and freight demand in 2030-31, in three scenarios of GDP growth: optimistic, realistic and pessimistic. A four-step calculation was used to estimate energy required for passenger and freight transport. This involved estimation of in-vehicle electricity consumption, electricity energy consumed for hauling and electrical energy consumed in the hauling of non-suburban and suburban passenger transport. Estimation of future electrical traction in rail passenger and freight transport also included expected use of electric traction in hauling non-suburban passenger and freight transport. Based on these calculations, the electricity requirement of the Indian Railways has been projected till 2030-31: the first step in implementing the de-carbonization process.