

Carriages Make Almost 30% Of Power Consumed Through Regenerative Braking System

Metro taps train's kinetic energy, prevents power from going waste

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As the snazzy train snakes its way out of the metro rail depot every day, it sets out to redefine transport system in the city. But do you know that the train generates nearly one-third of the power it consumes to run?

According to metro rail, a four-car train running nearly 400km a day can generate about 1,900 kilowatt-hour (units) of power. It will consume 6,300kWh to run that distance. The trains use regenerative braking system technology to generate power every time brakes are applied. The power is mostly used by the train in the same electrical section and what's left is fed back to metro rail's 33KV network.

"The power is used for lighting and running auxiliary systems on board," a metro rail official said. "In any transport system, fuel is the biggest expenditure. But the regenerative braking

system can reduce dependency on the Tamil Nadu Electricity Board grid. All our cars have traction system to generate power compared to EMUs where only the locomotive has the capability," the official said.

In a regenerative braking system, three-phase traction motors in trains act as generators whenever brakes are applied, turning the kinetic energy of the train into electrical energy that goes into the overhead lines.

At present, metro rail operates 13 trains across the 29km operational line on Koyambedu to Alandur, Little Mount to Airport and Nehru Park to Thirumangalam stretches, apart from running a direct service from Nehru Park to Airport every 30 minutes. By meeting 30% of power needs on its own, metro trains are cutting down carbon emissions as it reduces dependency on power supplied by TNEB which relies on fossil fuels.

Delhi Metro, operating for 15 years, was reported to have prevented emission of more than 90,000 tonnes of CO2 between 2004 and 2007 by using the regenerative braking systems and by becoming the first railway project in the world to be registered for carbon credits by the United Nations.

Metro rail also indirectly contributes to reducing carbon footprint as it takes four-wheelers and two-wheelers off the road. Experts estimate that every passenger using the metro instead of other mode of transport contributes to about 100gm of CO2 reduction for every 10km trip.

In addition, metro rail has also started installing solar panels to generate 6MW to further reduce its dependency on non-renewable sources of energy. For a start, it has installed panels with a 1MW capacity last year at its administrative

building in Koyambedu. It is expected to save ₹1.12 crore each year. The rest of the panels will be installed at 25 locations, including stations, and is expected to meet 90% of annual energy requirements.

Metro rail's power requirements do not end with running trains, however. An air-conditioned underground station needs 3,500 units a day to function. The same amount a train generates — 1,900 units — is enough to operate an elevated station. In an RTI response, metro rail said it paid about ₹8 per unit of power used. This means it spends about ₹28,000 a day to keep an underground station functioning and about ₹15,200 for an elevated station. "We requested the state government to give us subsidy for power consumption but we were given regular commercial rate. With solar energy, we can power some buildings, workshops and sheds, but major electricity requirement is for operation of trains for which we have to rely on other sources of power," an official said.



1,900kWh electricity generated through traction system by such a train per day

One train (4-car configuration) runs approximately 400km per day. The above figures are based on this distance

3,500 kWh consumed per day

by Tirumangalam underground station



13 trains are running at present (42 for entire phase-1)

44 trips are made in a day

Average distance a train covers **400km**



Metro trains to get energy-saving LED lights soon

TIMES NEWS NETWORK

Metro trains in the city will soon sport bright but energy-saving LED lights that could cut power consumption by almost half.

After installing LED lights in a metro train on trial basis, Chennai Metro Rail Limited has seen reduction in power consumption by 50% compared to fluorescent lights being used in other trains.

Metro rail officials said LED lighting would reduce cost of maintenance while providing brightly-lit interiors for commuters. "We will soon replace all fluorescent lights in the trains that are operational at present with energy-efficient LED lights," said a metro rail official.

Metro rail will require to run a fleet of 42 trains when the entire 45-km phase becomes operational. At present, it is operating 13 trains across the 28km that is functional.

Officials said LED lights consume 22.25kWh power compared to 45kWh used by fluorescent lights per train per day. "By using LED lights, we would be spending about ₹2 lakh for lighting one train in five years. That would be half of what we would spend on fluorescent lighting," an official said.

Since LED lights last for more hours, officials said they need not be replaced as frequently as normal lights.

Initially, metro rail had plans to install LED lights when the coaches were being made by Alstom at their factory in Sri City, Andhra Pradesh.

"They were supposed to install fluorescent lights as per the contract. But when we decided to change to LED lights, the cost worked out to be high. So we dropped the idea," an official said.

"Now we have found a local vendor who got us a prototype to try out for a lesser price," the official added.

The train which has been installed with LED lights will be monitored for a month.

Officials will check the functioning of all electrical and electronic systems before the lights are replaced in rest of the fleet.



13 elevated stations and 7 underground stations are operational

MONEY SPENT PER DAY*



(At ₹8 per unit) (*sans 1,900 units generated)

1.96 lakh for seven underground stations

2.54cr spent on power per month

1.97 lakh for 13 elevated stations

6.5 lakh spent to run 13 trains

“IN ANY TRANSPORT SYSTEM, FUEL IS THE BIGGEST EXPENDITURE. BUT THE REGENERATIVE BRAKING SYSTEM CAN REDUCE DEPENDENCY ON THE TAMIL NADU ELECTRICITY BOARD GRID METRO RAIL OFFICIAL