Lucknow Metro shows the way for big savings, cut in carbon emission

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Energy efficiency measures undertaken by Lucknow Metro have not only helped the corporation save money but also in going green by preventing hazardous carbon emissions into the environment.

According to an assessment undertaken by UP Metro Rail Corporation Limited – the parent body of Metro rail projects in Lucknow, Kanpur and Agra – energy efficiency consciousness is helping Lucknow Metro save an estimated Rs 5 crore every year. TOI decodes:

LEVERAGING SOLAR POWER

Solar energy is the first pillar of this achievement. Lucknow Metro embraced Solar Energy System on RESCO model at the time of its commissioning in 2017. The Corporation built 1.32 MW capacity solar infrastructure to bring down its energy consumption as much as possible. The structure is visible at its Transportnagar depot, five metro stations, its administrative building and two substations.

According to industry standards, a 1 MW solar plant can generate an average of 10.5 lakh units of electricity every year. This means that a 1.32 MW capacity solar plant can generate about 13.2 lakh units of electricity per year. This translated into a generation of about 80 lakh units of electricity between Sep 2017 and Dec 2023.

A Central Electricity Authority emission factor says that one unit of electricity results in 0.92 grams of carbon emission. Applying the same factor on electricity generated at Lucknow Metro, one can say that an estimated 8,000 tonnes of CO2 carbon emissions were prevented from going into the environment.

RE-GENERATING ENERGY

Metro rail's regenerative braking system is Lucknow Metro's second source of monetary savings and carbon emission reduction. In this system of braking, electricity is generated while applying the brake and sent back to the pool for re-use.

At Lucknow Metro, for every 100 units consumed in running the metro rail, about 45 units are sent back to the pool for re-use. This also leads to energy conservation and reducing the corporation's carbon footprint.

The Lucknow Metro rail undertakes an average of 190 trips per day. At least 250 units of electricity are needed to run the train in a single trip. For 190 trips, the energy requirement is about 47,000 units per day. Of this, 45% or 20,000 units are sent back to the pool for re-use. This re-use of energy leads to a reduction of 18.4 tonnes of CO2 carbon emissions per day or 6716 tonnes of CO2 emission per year. In six years, at least 32000 tonnes of CO2 emission was prevented.

"When the benefits from two key sources of energy saving are combined, the impact is significant," said Sushil Kumar, managing director, UPMRC. The total electricity saved with the help of regenerative braking in six years added up to 4.3 crore units while the total electricity generated by solar in six years is 80 lakh units. Money saved in the process is Rs 5 crore per year while the total carbon emission reduced was over 40,000 tonnes.

BONUS SAVINGS FROM MODEL SHIFT

Officials at the UPMRC said that a significant chunk of carbon emission is prevented from going into the environment because of 'model shift', a term used to denote the change of people leaving their personal vehicles back home to use metro rail to commute.

The average footfall in Lucknow Metro is 80,000 which means that at least 30,000 vehicles are prevented from hitting the road every day because of metro rail. According to an estimate, if one person commutes 10-15 kilometres per day, at least one litre of fuel is saved which helps in avoiding carbon emission.

Data shows that 2.3kg of CO2 carbon emission is generated per litre of fuel. This translates into 184 tonnes of CO2 emissions avoided in a single day which would add up to at least 67000 tonnes of carbon emissions in a single year.

LUCKNOW PAVED WAY FOR KANPUR, AGRA

The MD said the success of Lucknow Metro and lessons learnt from it would be implemented in other places. "The model is being replicated in Kanpur where a 2 MW plant is being built along with the metro rail network. Similarly, in Agra, a 1 MW solar power plant is being built along with the station," he said.

In Kanpur, a twin line metro rail project is being developed. Prime Minister Narendra Modi inaugurated the start of commercial operations of Kanpur Metro on Dec 28, 2021. Likewise, Agra Metro project's priority corridor section was inaugurated by the PM on March 6, 2024.

The capacity of Lucknow Metro has also been scaled up with the addition of another 2 MW solar plant.

On Green Track

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- A **1.32 MW capacity** solar plant can generate about **13.2 lakh units** of **electricity per year**. This translated into a generation of about **80 lakh units** of **electricity between Sep 2017** and **Dec 2023**
- **Lucknow Metro** prevented an estimated **8,000 tonnes** of **CO2 carbon emissions** from going into the **environment**
- In **metro rail's regenerative braking system**, electricity is generated while applying the brake and sent back to the pool for re-use
- This re-use of energy leads to a reduction of **6716 tonnes** of **CO2 emission per year**. In **six years**, at least **32000 tonnes** of **CO2 emission** was prevented
- The average **footfall in Lucknow Metro** is **80,000** which means that at least **30,000 vehicles** are prevented from hitting the road every day

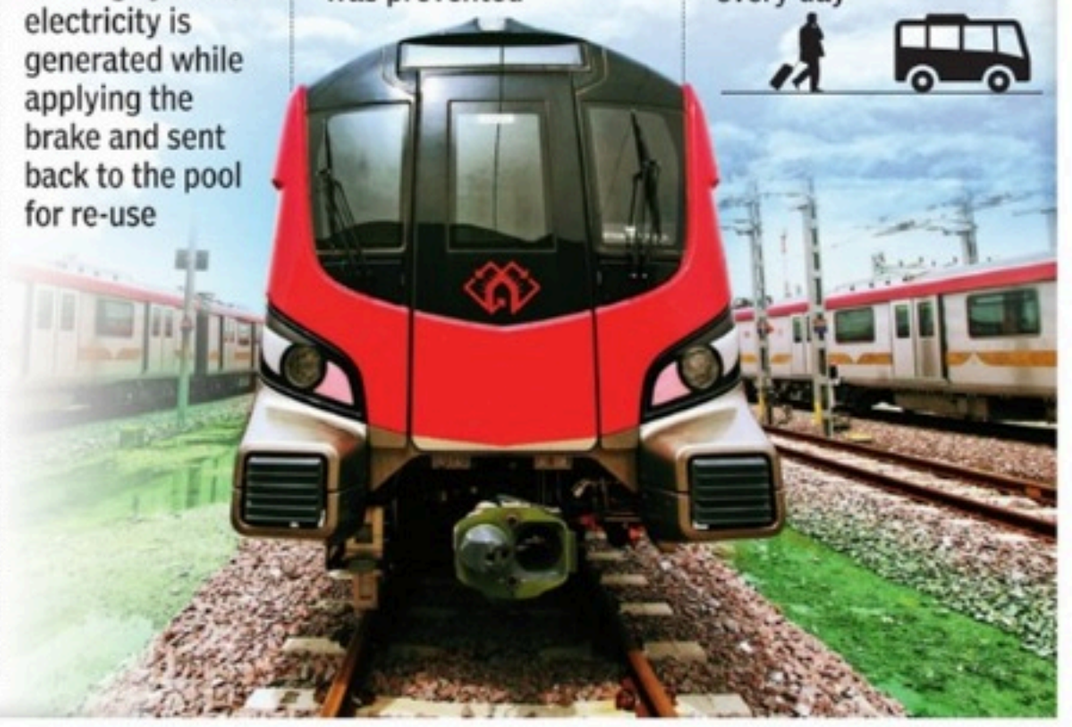

Photo: Shailvee Sharda

A view of solar panels in a section of Lucknow Metro

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> **SUSHIL KUMAR, MD, UPMRC**