



**DMRC**

# **NEW INITIATIVES & DEVELOPMENTS**

Delhi Metro

<http://www.delhimetrorail.com>

# DELHI METRO RAIL CORPORATION

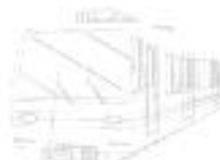
- Set up in May 1995 under the Indian Companies Act by Government Of India (GoI) & Government of National Capital Territory of Delhi (GNCTD) with 50% shareholding each.
- Delhi Metro Rail Corporation has the responsibility for Construction and Operations & Maintenance (O&M) of Metro.
- Operations being done under the Delhi Metro Railway (O&M) Act, 2002.



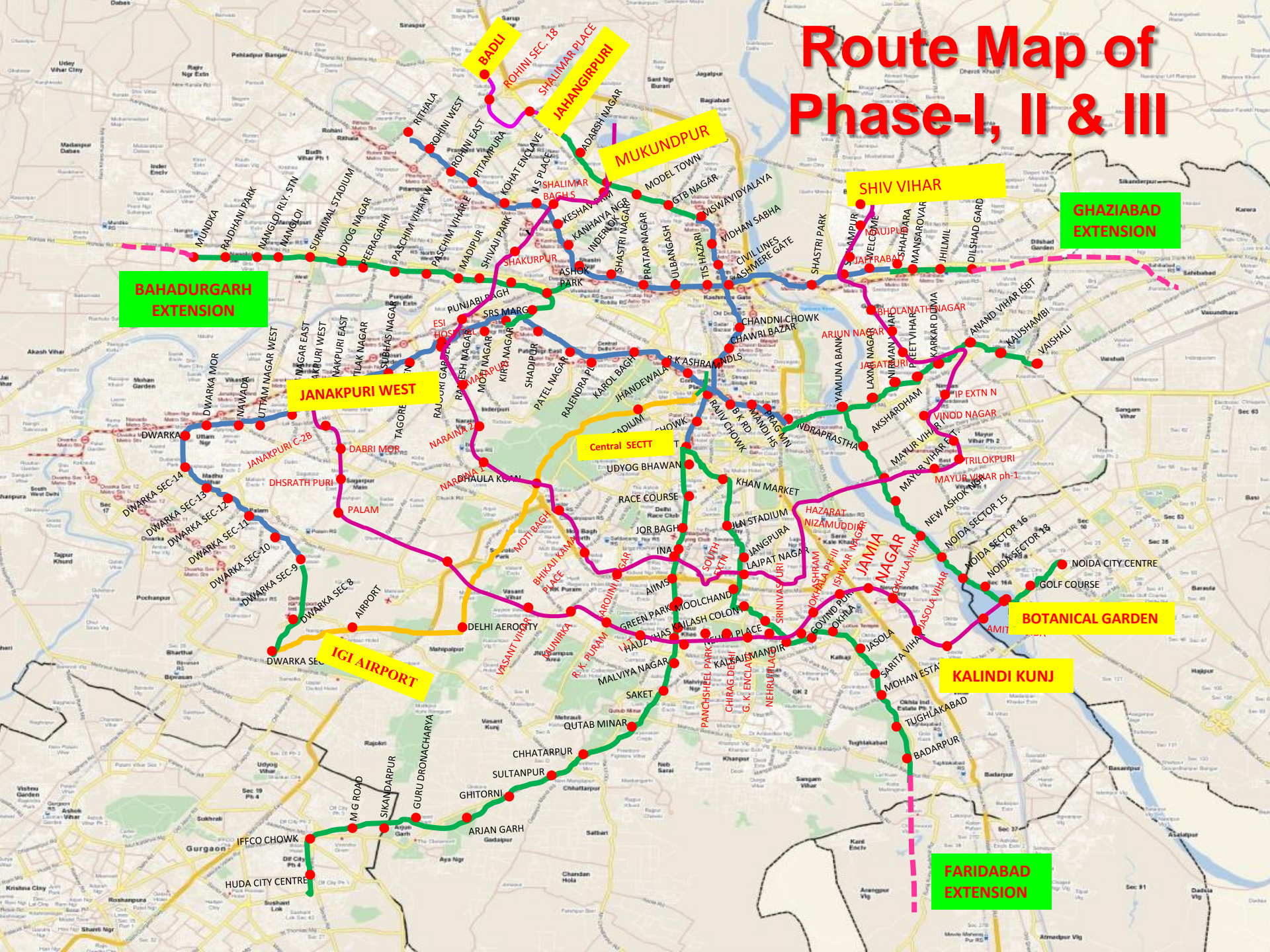
# DELHI METRO MASTER PLAN-2021

| PHASE      | KMS    | COST  | STATUS                      |
|------------|--------|---|-----------------------------|
| PHASE-I    | 65.10  | US \$ 2.4 Billion<br>Rs 10,891 (crore)                      | COMPLETED<br>(1997 to 2005) |
| PHASE-II * | 124.93 | US \$4.2 Billion<br>Rs 21,121 (crore)                       | COMPLETED<br>(2005-2010)    |
| PHASE-III  | 160.58 | US \$ 7.12 Billion<br>Rs 46,978 (crore)                     | UNDER<br>CONSTRUCTION       |
| PHASE-IV   | 103.93 | DPR under consideration of the Government<br>of Delhi & GOI |                             |
| TOTAL      | 454.54 |   |                             |

\*(including 22.7 Kms. Of Airport Express metro)



# Route Map of Phase-I, II & III



# DELHI METRO NETWORK (CURRENT)

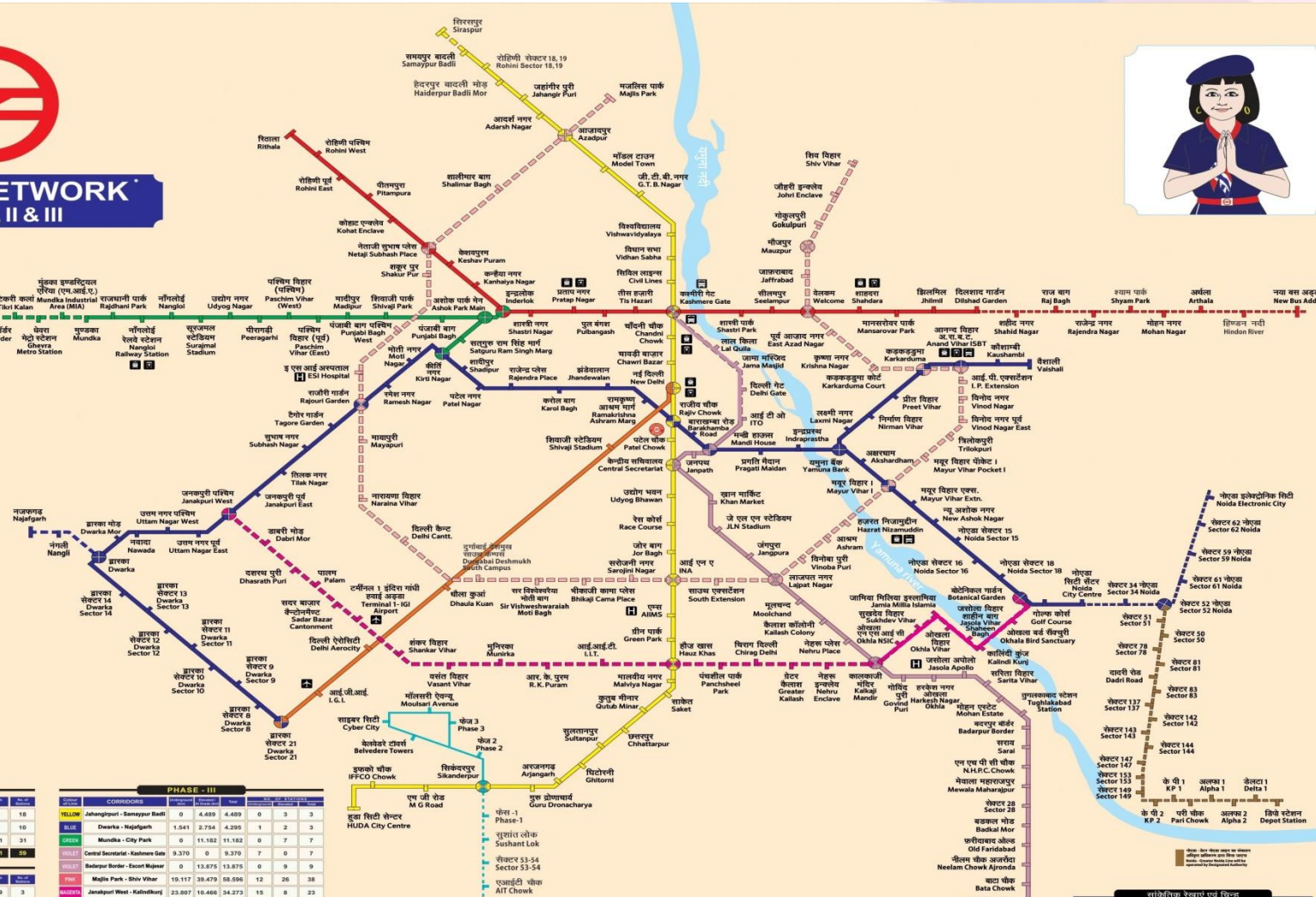
Phase-I: 65 Km  
Completion:2005

Phase-II: 124.93 Km  
Completion:2010

Phase-III:160.58 Km  
TGD Completion: 2018



## METRO NETWORK Phase I, II & III



| PHASE - I    |   |              |              |             |               |           |
|--------------|---|--------------|--------------|-------------|---------------|-----------|
| LINE         | CORRIDORS                               | Length (km)  | Station      | Year        | Year          | Year      |
| RED          | Bhadra - Ritola                         | 0            | 17.50        | 4.5         | 22            | 18        |
| YELLOW       | Vishwavidyalaya - Central Secretariat   | 11           | 0            | 0           | 11            | 10        |
| YELLOW       | Dwarka Sector 9 - Indraprastha          | 2.17         | 29.81        | 0           | 32.1          | 31        |
| <b>TOTAL</b> |   | <b>13.17</b> | <b>47.42</b> | <b>4.5</b>  | <b>42.1</b>   | <b>29</b> |
| PHASE - II   |   |              |              |             |               |           |
| LINE         | CORRIDORS                               | Length (km)  | Station      | Year        | Year          | Year      |
| RED          | Bhadra - Okhla Gardens                  | 0            | 3.09         | 0           | 3.09          | 3         |
| YELLOW       | Vishwavidyalaya - Jhansi Park           | 6.94         | 5.42         | 0           | 6.36          | 5         |
| YELLOW       | Central Secretariat - IASDA City Centre | 11.76        | 15.82        | 0           | 27.58         | 19        |
| YELLOW       | Indraprastha - Noida City Centre        | 0            | 12.90        | 2.17        | 15.07         | 11        |
| BLUE         | Yamuna Bank - Vasant                    | 0            | 8.74         | 0           | 8.74          | 7         |
| YELLOW       | Dwarka Sector 8 - Dwarka Sector 21      | 0.96         | 1.81         | 0           | 2.77          | 2         |
| GREEN        | Indokhla - Mundka                       | 0            | 15.15        | 0           | 15.15         | 14        |
| YELLOW       | Kirti Nagar - Badli                     | 0            | 3.31         | 0           | 3.31          | 2         |
| GREEN        | Asokh Park Main - Badli                 | 6.10         | 14.08        | 0           | 20.16         | 16        |
| GREEN        | Central Secretariat - Badli             | 15.13        | 7.97         | 0           | 22.70         | 6         |
| <b>TOTAL</b> |   | <b>34.89</b> | <b>47.47</b> | <b>2.17</b> | <b>124.93</b> | <b>65</b> |

| PHASE - III                      |   |               |                |                |           |            |
|----------------------------------|---|---------------|----------------|----------------|-----------|------------|
| LINE                             | CORRIDORS                                 | Length (km)   | Station        | Year           | Year      | Year       |
| YELLOW                           | Jahangpuri - Samaypur Badli               | 0             | 4.69           | 4.69           | 0         | 3          |
| GREEN                            | Dwarka - Najafgarh                        | 1.54          | 2.754          | 4.259          | 1         | 2          |
| GREEN                            | Munda - City Park                         | 0             | 11.82          | 11.82          | 0         | 7          |
| GREEN                            | Central Secretariat - Kalkaji Gate        | 0             | 3.370          | 3.370          | 0         | 7          |
| GREEN                            | Esart Majara - Esart Majara               | 0             | 13.875         | 13.875         | 0         | 9          |
| PINK                             | Majlis Park - Shiv Vihar                  | 10.117        | 38.473         | 58.596         | 12        | 26         |
| MAGENTA                          | Janakpuri West - Kalkaji Gate             | 23.807        | 16.466         | 34.273         | 18        | 23         |
| <b>TOTAL</b>                     |   | <b>53.935</b> | <b>82.245</b>  | <b>136.064</b> | <b>35</b> | <b>65</b>  |
| Additional Corridors PHASE - III |   |               |                |                |           |            |
| LINE                             | CORRIDORS                                 | Length (km)   | Station        | Year           | Year      | Year       |
| RED                              | Okhla Garden - New Bus Adda               | 0             | 5.800          | 5.800          | 0         | 8          |
| YELLOW                           | Jahangpuri Badli - Sirapour               | 0             | 1.057          | 1.057          | 0         | 1          |
| BLUE                             | Noida City Centre - Noida Electronic City | 0             | 6.675          | 6.675          | 0         | 6          |
| GREEN                            | Esart Majara - Ballabgarh                 | 0             | 3.200          | 3.200          | 0         | 2          |
| MAGENTA                          | Kalkaji Gate - Botanical Garden           | 0             | 3.962          | 3.962          | 0         | 2          |
| <b>TOTAL</b>                     |   | <b>20.694</b> | <b>28.694</b>  | <b>0</b>       | <b>19</b> | <b>19</b>  |
| <b>Grand Total</b>               |   | <b>124.93</b> | <b>160.574</b> | <b>35</b>      | <b>74</b> | <b>103</b> |

| Phase-I            | Phase-II           | Phase-III               |
|--------------------|--------------------|-------------------------|
| 20.23% Underground | 27.02% Underground | 33.5% Underground       |
| 72.85% Elevated    | 70.33% Elevated    | 66.5% Elevated/At Grade |
| 06.91% At Grade    | 01.73% At Grade    |                         |

**संकेतिक प्रतीक एवं प्रतीक Key to line and symbols**

| OPERATIONAL LINES   | UNDER CONSTRUCTION PHASE  | STATIONS  |
|---|---|---|
| <ul style="list-style-type: none"> <li>Red Line</li> <li>Green Line</li> <li>Blue Line</li> <li>Yellow Line</li> <li>Pink Line</li> <li>Magenta Line</li> <li>Dark Green Line</li> <li>Light Blue Line</li> <li>Metro Airport Line</li> </ul> | <ul style="list-style-type: none"> <li>Yellow Line</li> <li>Blue Line</li> <li>Pink Line</li> <li>Dark Green Line</li> <li>Light Blue Line</li> <li>Other Line</li> </ul> | <ul style="list-style-type: none"> <li>Red Line</li> <li>Green Line</li> <li>Blue Line</li> <li>Yellow Line</li> <li>Pink Line</li> <li>Magenta Line</li> <li>Dark Green Line</li> <li>Light Blue Line</li> <li>Metro Airport Line</li> <li>Other Line</li> </ul> |

# OPERATIONAL HIGHLIGHTS

## DMRC

- Network Length: **277 Km**
- Stations: **167 stations (by Line)**
- Average daily ridership: **2.6 million**
- Maximum ridership: **3.37 million (17<sup>th</sup> Aug'16)**
- Average train trips per day: **3,130**
- Total number of train cars: **1990**

## AIRPORT LINE

- Network Length: **22.7 Km (AEL)**
- Stations: **6 stations (by Line)**
- Average Ridership: **55,585**
- Maximum : **63,085 (25<sup>th</sup> Jan'18)**
- Average train trips per day: **177**
- Total number of train cars: **48**



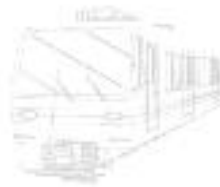
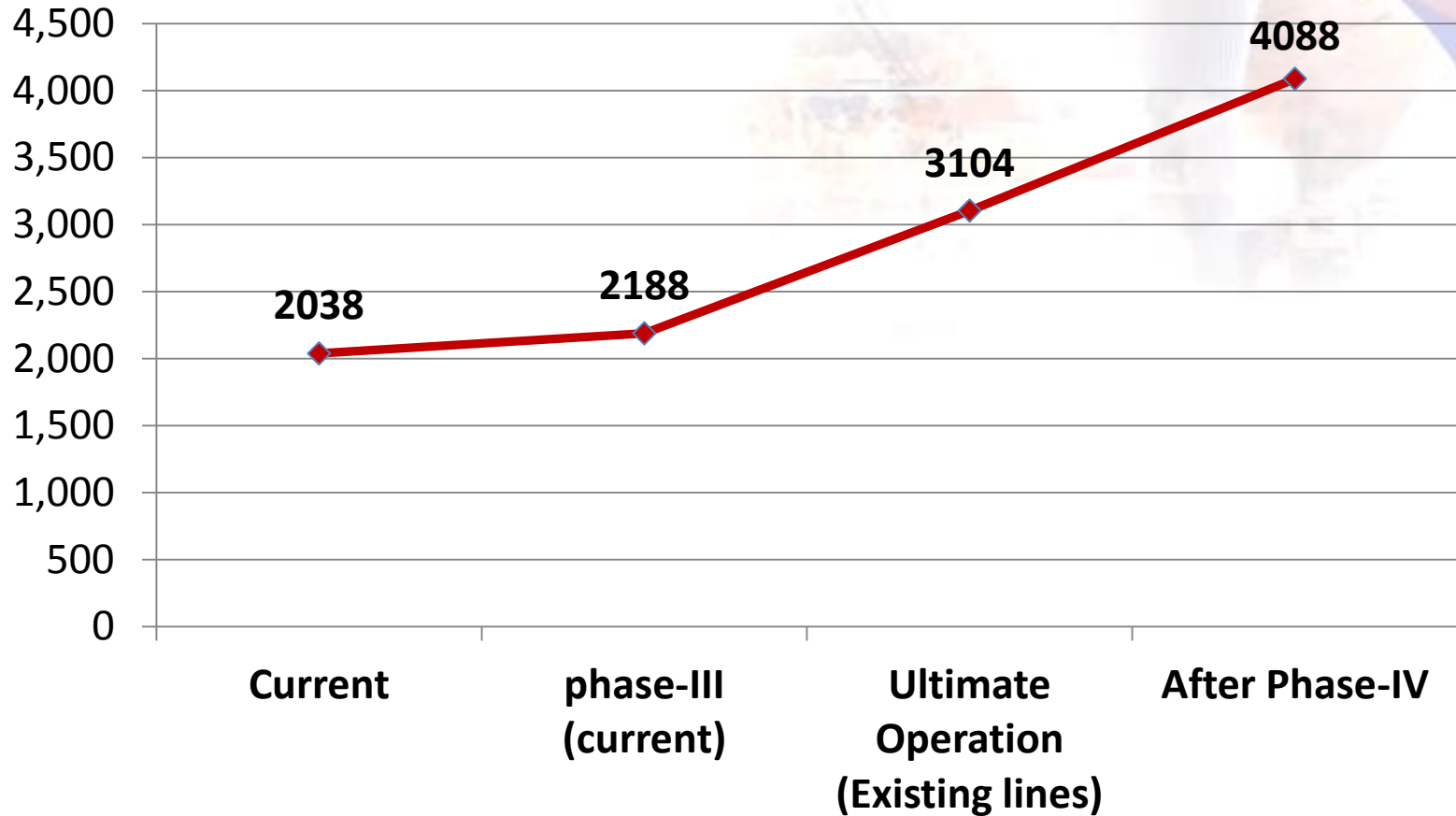


# **PASSENGER CONVENIENCE INITIATIVES**



# FLEET AUGMENTATION

No. of Coaches





# FEEDER BUS SERVICE

**Feeder Bus Service:** To provide first-last mile connectivity DMRC also operates Metro Feeder Bus service.

- Services initiated with 120 mini buses November 2007.
- Today, 242 buses operate on 44 routes.
- Feeder buses connect 54 metro stations.
- 0.2 million passengers use feeder buses on daily basis.



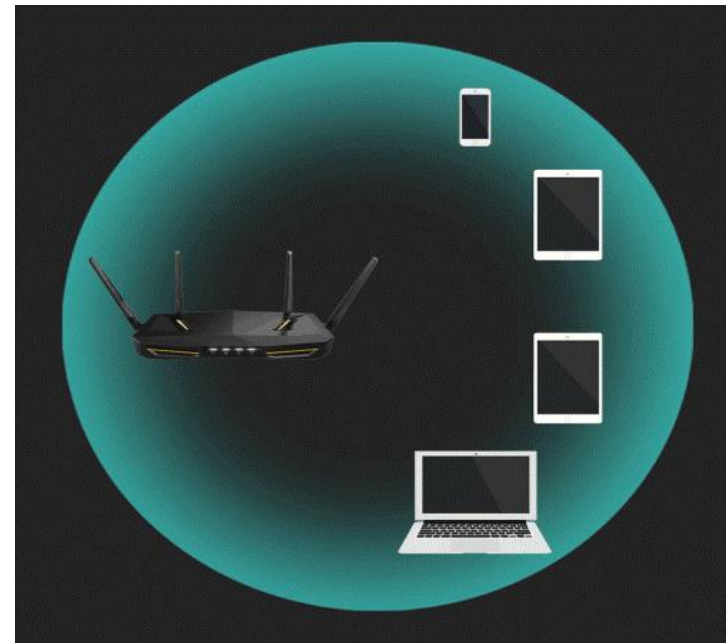
## Common mobility cards

which can be used in :

- Airport Express line
- Rapid Metro.
- DTC and DIMTS buses.

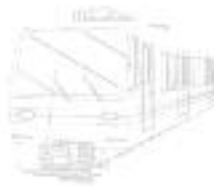
## Free Wi-Fi Facility at 60 stations

- All stations of phase-I & II will be covered soon.
- Wi-fi in trains of Airport Express Line on trial basis.



# INSTALLATION OF PLATFORM SCREEN DOORS

- All stations of Phase-III are being fitted with PSDs.
- For 6 highest footfall stations of Phase-II, the PSDs are in the process of retro fitment.



# TRAINS CLEANING AT TERMINAL STATIONS

## Trains cleaning at terminal stations during revenue hours:

- To maintain the cleanliness of trains on main lines during revenue.
- This initiative was started initially at 09 stations on trial basis for 3 months.





# STATION REMODELLING



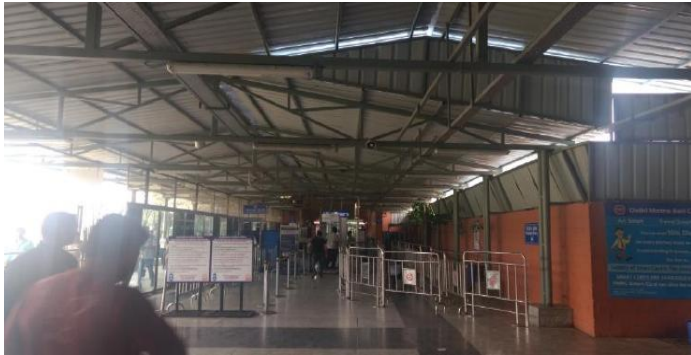
# ENHANCED PASSENGER EXPERIENCE

- *Remodelling of stations*

- Structural changes to streamline commuter flow.
- More escalators at some stations.
- The interchange streamlined and made directional.
- Remodelling work at 16 high ridership metro stations has been completed.



# ENHANCED PASSENGER EXPERIENCE



# REMODELLING OF AFC GATES

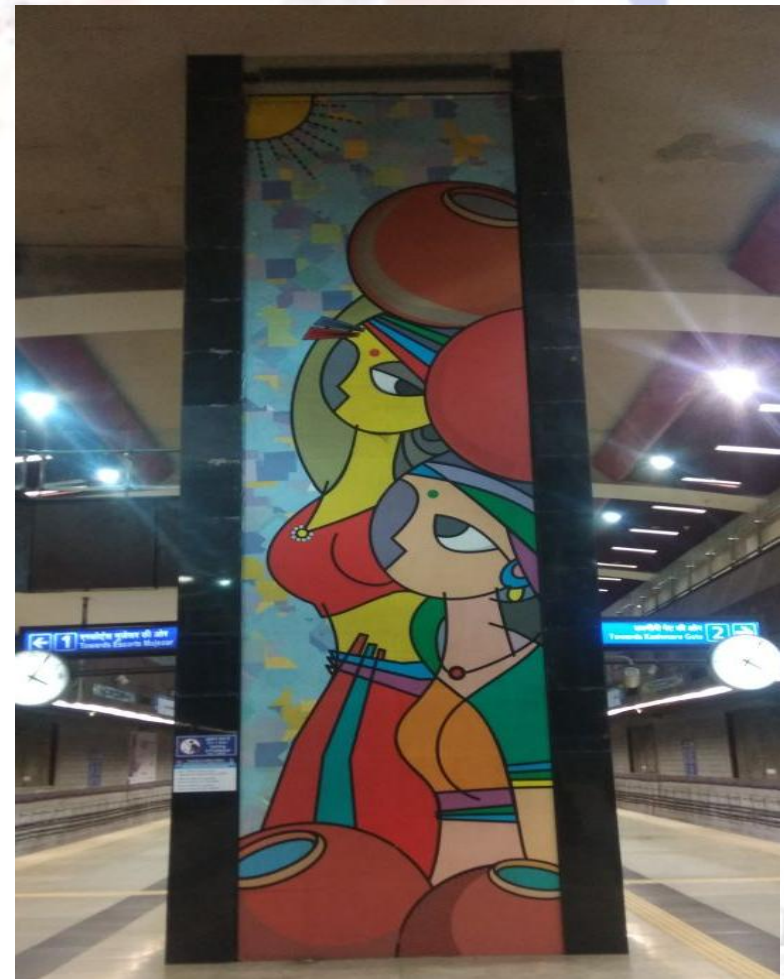
- 500 gates which are approximately 1/3rd of total gates have been converted to card only gates.
- As these gates have comparatively lesser failures, it enables smooth exits for commuters.
- “Normally open gates in **Heritage line (L6, Kashmere Gate to ITO)**
  - Reduces Power Consumption.
  - Increases Gates throughput.





# LIFT SHAFT ART WORK

- Art work in lift shafts of some of stations of Phase-2 and Phase-3.





# INDIGENIZATION INITIATIVES



# INITIATIVES FOR INDIGENIZATION OF SPARES



## • Development of items:

- Some train parts have been developed in house with the assistance of native manufacturers in accordance with **MAKE IN INDIA** policy of GOI.
- Parts are now being manufactured in India by domestic manufacturers.
- Quality of these parts is not compromised.
- These items are being cost effective by virtue of elimination of import duty.

Total items developed stock-wise till date have been tabulated below-

| Sr. No | Stock type | Total items developed till date |
|--------|------------|---------------------------------|
| 1      | RS1        | 113 Nos.                        |
| 2      | RS2        | 32 Nos.                         |
| 3      | RS3        | 45 Nos.                         |
| 4      | CAF        | 18 Nos.                         |
| Total  |            | 208 Nos.                        |



# INITIATIVES FOR INDIGENIZATION

## Modification in components

- Replacement of conventional PT of RS-1 trains & Airport line trains with Anti-Burst type PT.
- **Strengthening of Anti-Burst PT base in RS-2 trains:** In one of the incidence of PT failure, smoke entered into the saloon area due to weak PT base. To strengthen base of PT, Adopter plate of PT has been modified and an additional enclosure plate has been added with adopter plate.



Existing Adopter Plate



Modified Adopter Plate



Additional en-closer Plate

# INDIGENIZE MODIFICATIONS- TRACTION

## **Problem faced by Traction department**

Disconnections between the Buried Rail of the substation and copper cables were taking place frequently due to rusting, corrosion and *bi-metallic action in two dissimilar metals*.

## **Rectification measure undertaken**

*A new design for buried Earth Conductor was designed . In the new arrangement the cables are now securely connected to the Buried Earth Rail by Exothermic - CAD Welding in two similar metals.*



# INDIGENIZE MODIFICATIONS-TRACTION

## Problem faced by Traction department

Failure of Gas ATD due to leakage of gas which has caused disturbed OHE profile, resulting into poor dynamic behavior of OHE followed by entanglement of pantograph at turnout/cross-over.

## Rectification measure undertaken

- 1. Replaced Gas ATD by Pulley Type ATD*
- 2. To meet the low height of OHE masts at via duct, Compact Counter Weight were developed and used in place of existing long Counter Weights*

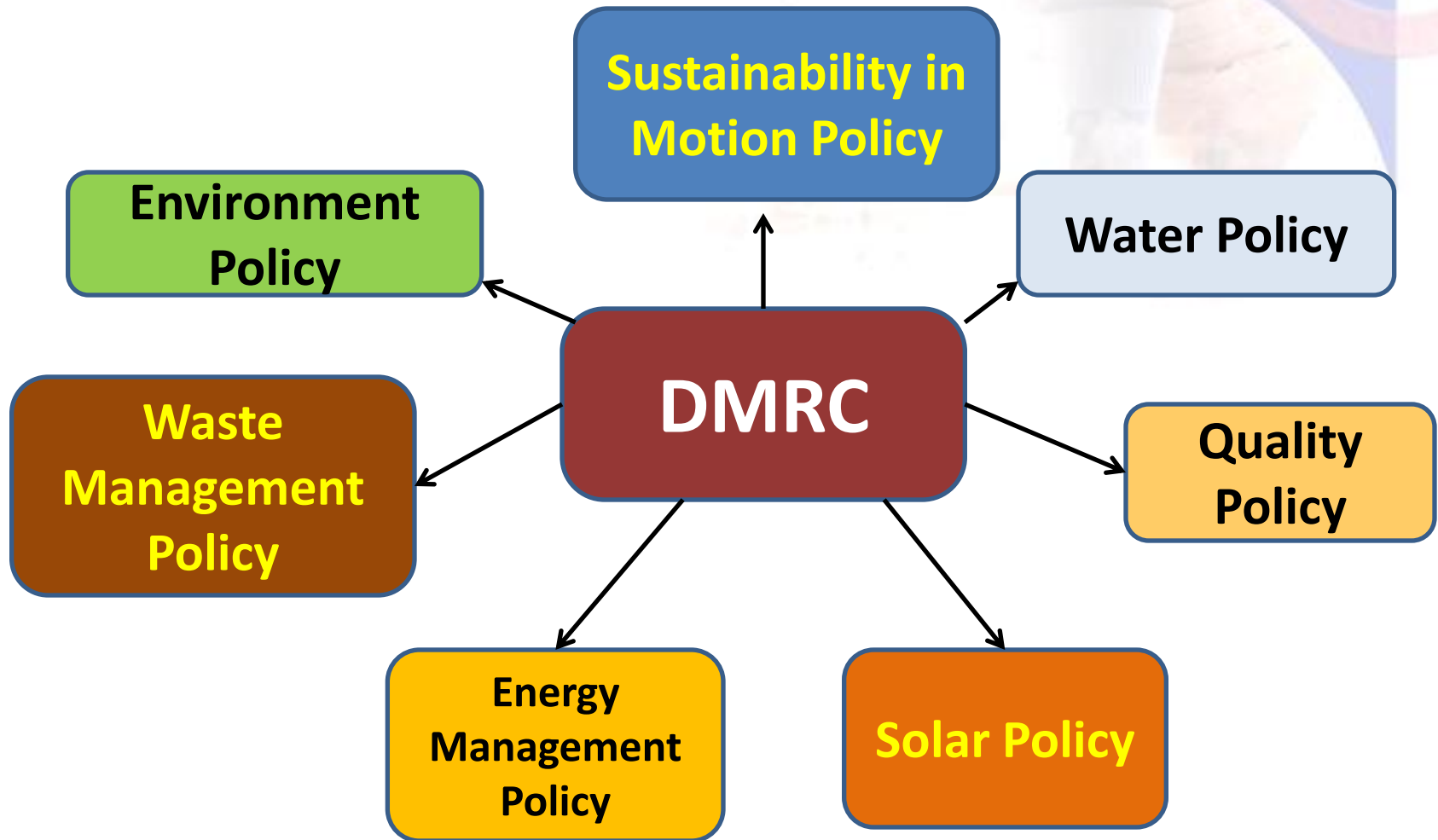




# SUSTAINABILITY INITIATIVES



# SUSTAINABILITY POLICIES OF DMRC







**DELHI METRO RAIL CORPORATION LIMITED**  
**दिल्ली मेट्रो रेल कॉर्पोरेशन लिमिटेड**

## सौर्य नीति

दिल्ली मेट्रो रेल कॉर्पोरेशन (डीएमआरसी), राष्ट्रीय सौर्य मिशन के उद्देश्यों को ध्यान में रखते हुए, पूरी तरह से लगातार स्थापित करने और ग्रीन हाउस गैस के उत्सर्जन और जलवायु परिवर्तन से संबंधित प्रभावों को कम करने के लिए सौर्य ऊर्जा का निरंतर उपयोग को बढ़ावा देने के लिए प्रतिबद्ध है।

तदनुसार, पर्यावरण अनुकूल और स्वच्छ ऊर्जा को बढ़ावा देने की खोज में, संगठन के रूप में जहाँ तक संभव हो, अपनी सभी गतिविधियों में सौर्य ऊर्जा के उपयोग के लिए प्रोत्साहित रहेंगे।

डीएमआरसी का प्रयास रहेगा कि:

- अपनी ऊर्जा जरूरतों को पूरा करने और जीवाश्म ईंधन पर निर्भरता कम करने के लिए एक दीर्घकालिक स्थायी समाधान हो।
- अपने संगठन में कुल बिजली की खपत में नवीकरणीय ऊर्जा की हिस्सेदारी बढ़ाने के उद्देश्य से अगले तीन वर्षों में गैर कर्षण प्रयोजनों के लिए 20 मेगावाट सौर्य ऊर्जा का उत्पादन हो।
- एक उपयुक्त निवेश माहौल बने जिससे क्लीन डेवलपमेंट मैकेनिज्म (सीडीएम) और अक्षय ऊर्जा प्रमाणपत्र (आरईसी) का लाभ उठाया जा सके।

यह सौर्य नीति, संगठन के ऊर्जा प्रबंधन नीति के साथ संयोजन के रूप में पढ़ी जाएगी। डीएमआरसी सौर्य ऊर्जा से संबंधित सभी स्थानीय और राष्ट्रीय कानून का पालन करेगी।

**मंगू सिंह**  
**प्रबंध निदेशक**

तिथि : 16 जुलाई 2014  
स्थान : नई दिल्ली



## SOLAR POLICY

Delhi Metro Rail Corporation (DMRC), in keeping with the objectives of National Solar Mission, is fully committed to proactively establishing and promoting sustained use of Solar Energy to reduce green house gas emissions and related impacts of climate change.

Accordingly, in pursuit of promoting green and clean power, the organization will encourage the use of Solar Energy in all its activities, as far as possible.

DMRC shall strive to:

- Seek a long term sustainable solution to meet its energy needs and reduce dependency on fossil fuels.
- Increase the share of renewable energy in its overall power consumption, in-house, by generating 20 MW of solar power for non-traction purposes, in next three years.
- Put in place an appropriate investment climate, that could leverage the Clean Development Mechanism (CDM) and Renewable Energy Certificate (REC).

This policy shall be read in conjunction with the organization's Energy Management Policy. DMRC shall comply with all local and national legislation related to solar energy.

**Mangu Singh**

**Mangu Singh**  
Managing Director

16th July 2014  
New Delhi

# SOLAR INITIATIVES TAKEN BY DMRC

- The energy cost of DMRC is around 35% of the total operating cost.
- DMRC has gone in a big way for “roof-top solar”.
- DMRC has commissioned 20 MW roof-top solar power plants and it is targeted to achieve 50 MW by 2021. As of now, DMRC consumes 150 MW.
- In the model adopted by DMRC, the CAPEX & OPEX for roof-top solar power plants are incurred by a bidder selected through an open competitive bidding.
- PPA (Power Purchase Agreement) is entered into for a period of 25 years between DMRC & bidder.
- The levelised cost of roof-top solar power is on an average cheaper by 10-15% compared to the current rates payable to the energy supply companies.

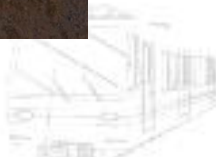
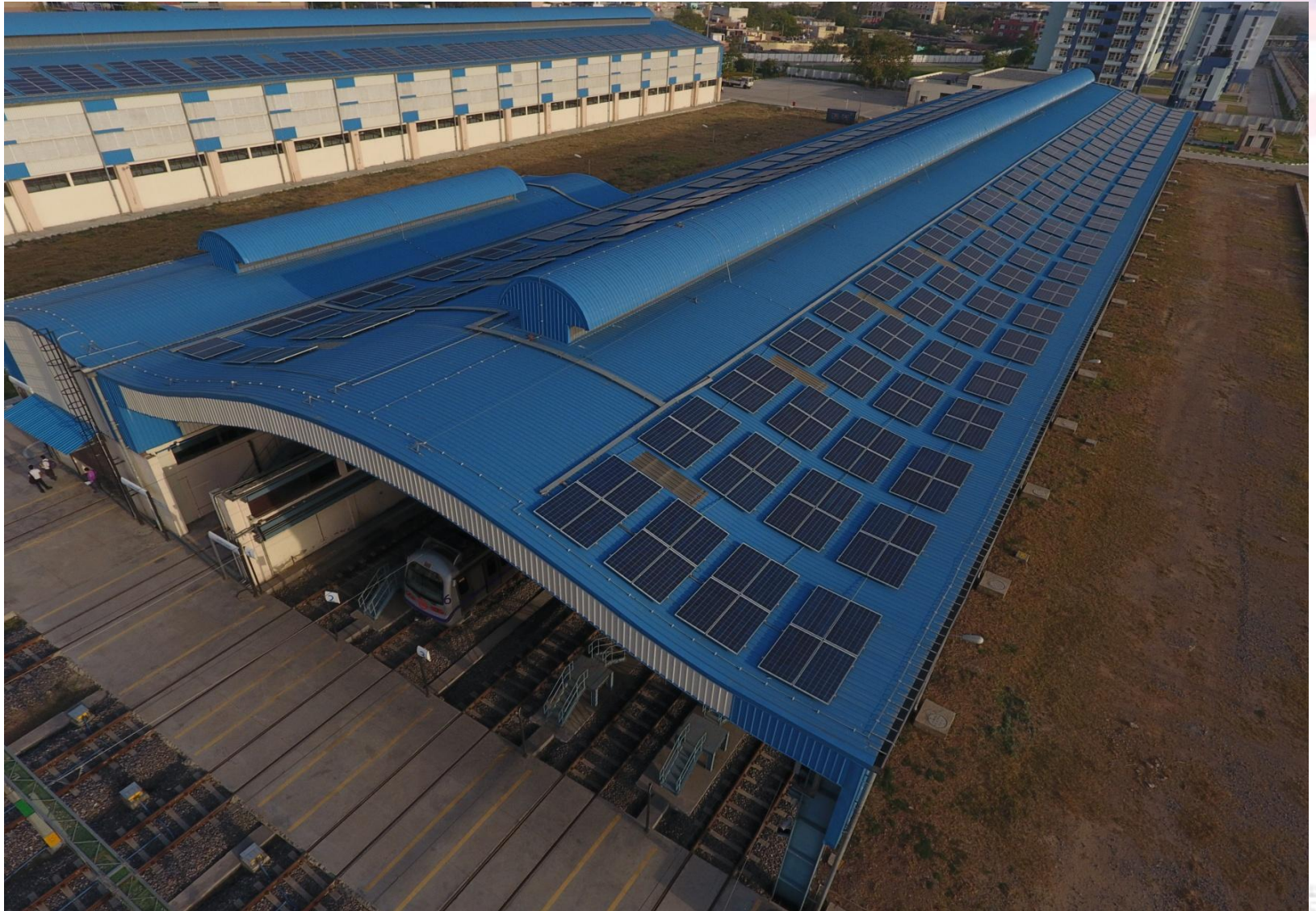


# SOLAR INITIATIVES TAKEN BY DMRC

- 1<sup>st</sup> ever solar powered metro corridor (Faridabad Metro Corridor):
  - The Badarpur – Escorts Mujesar (Faridabad) stretch of DMRC, an extension of the currently operational Violet line (Line–6) has been implemented as a Green Corridor.
  - This Green Metro corridor is powered by solar power of capacity of about 2 MW (including Ajrona Metro Depot) with a host of eco-friendly features such as solar panels, rain water harvesting and sewage treatment plants.
  - Due to these green initiatives, all these stations have been awarded “Platinum rating” by the Indian Green Building Council.



# SOLAR INITIATIVES TAKEN BY DMRC



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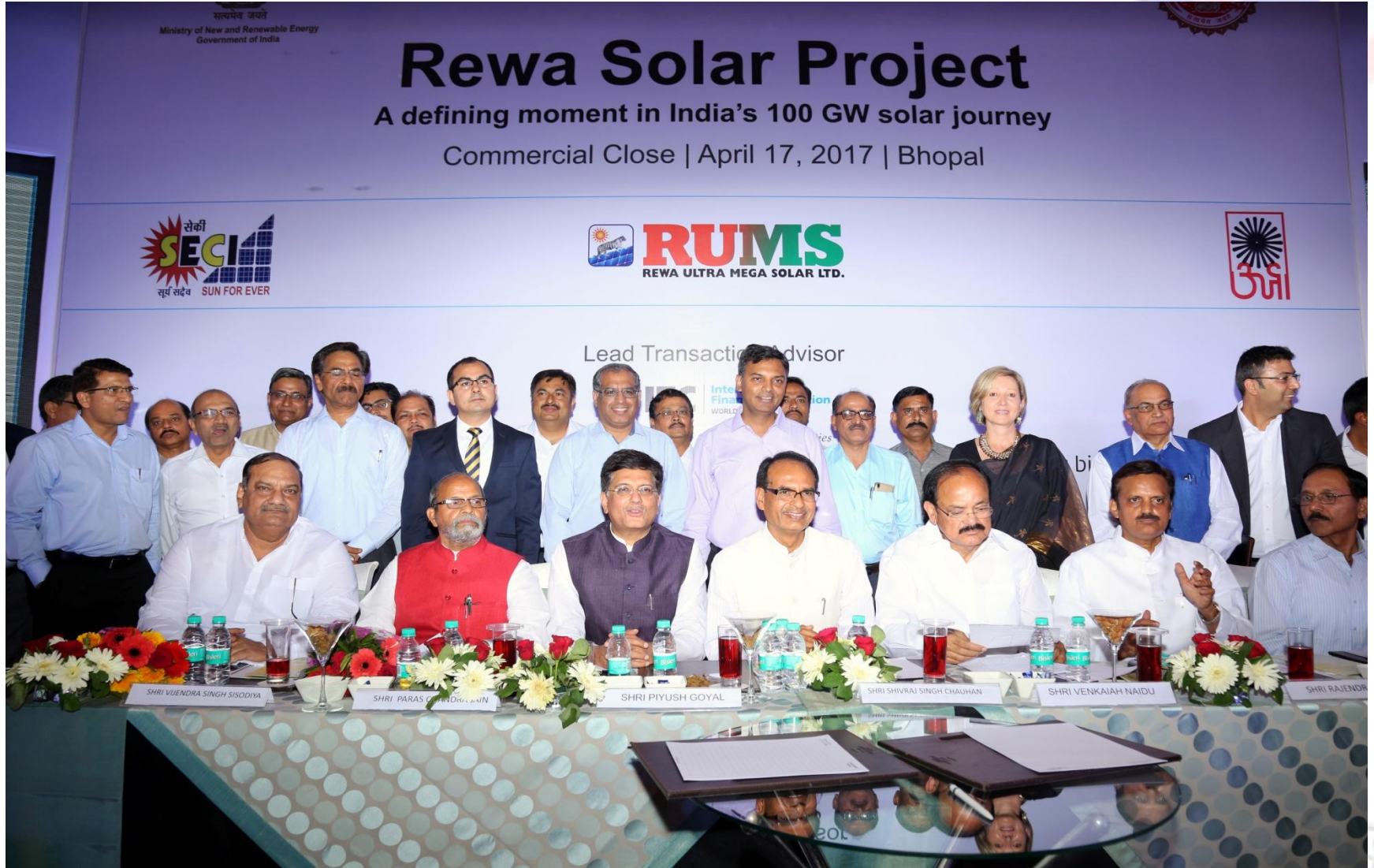


# SOLAR INITIATIVES TAKEN BY DMRC

- DMRC has entered into a PPA to source power (350 million units annually) from “off-site” solar plant (REWA Ultra Solar Mega Plant). This will meet a requirement of 100 MW.
- The levelised price of the off-site solar power is cheaper by about 25% compared to the current rates payable to the energy supply companies.
- Thus, solar power (roof-top as well as offsite) has tremendous potential for savings in operating expenses and thereby enhancing financial sustainability of the metro system.
- Besides being cheaper, the solar power is also a green power and will go a long way in mitigation of greenhouse gas emissions.



# SOLAR INITIATIVES TAKEN BY DMRC



# CARBON CREDIT AND OTHER GREEN INITIATIVES

- DMRC is the 1<sup>st</sup> metro system to earn carbon credits under the Clean Development Mechanism (CDM) by UNFCCC. The projects approved are as under:
  - **Regenerative Braking:** for 10 year period (2007-2017), the estimated emission reductions are 411,600 tCO<sub>2</sub> equivalent.
  - **Modal Shift:** For a seven year crediting period commencing June 2011, the estimated annual average emission reductions are 526,043 tCO<sub>2</sub> equivalent.
  - **MRTS PoA:** This project will pave the way for the upcoming metros in India to earn carbon credits by demonstrating CO<sub>2</sub> reductions and earn carbon credits.
  - **Solar PV Project:** The roof-top solar power plants installed by DMRC are eligible for CER's for 18506 tCO<sub>2</sub> equivalent.



# CARBON CREDIT AND OTHER GREEN INITIATIVES

- Two energy efficiency projects that have been registered under the **Gold Standard**. These demonstrate the continual improvements done in energy consumption at Phase-II and Phase-III stations of DMRC.
- To cater to first-last mile connectivity, DMRC has recently entered into an agreement with a service provider for making available e-vehicles (called e-richshaws). The key features of this service are as under:
  - Being battery operated, these are environment friendly.
  - Equipped with CCTV & GPS.
  - Passengers can book a seat through an app.







# PARK & RIDE FACILITIES AT METRO STATIONS

- Parking facility is provided at 85 stations.
- Mechanized multilevel parking at 3 stations (New Delhi, Rohini West and Janakpuri West).
- Mechanized parking is operational at Rohini Sector-18/19.
- DMRC, in collaboration with Delhi cycles and a sponsor provides free cycle service from Vishwavidyalaya metro station.
- Provision of rented bicycle facility at 16 stations as of now.



*“The earth, the land and the water are not an inheritance from our forefathers but on loan from our children. So, we have to hand over to them at least as it was handed over to us”*

***- Mahatma Gandhi***

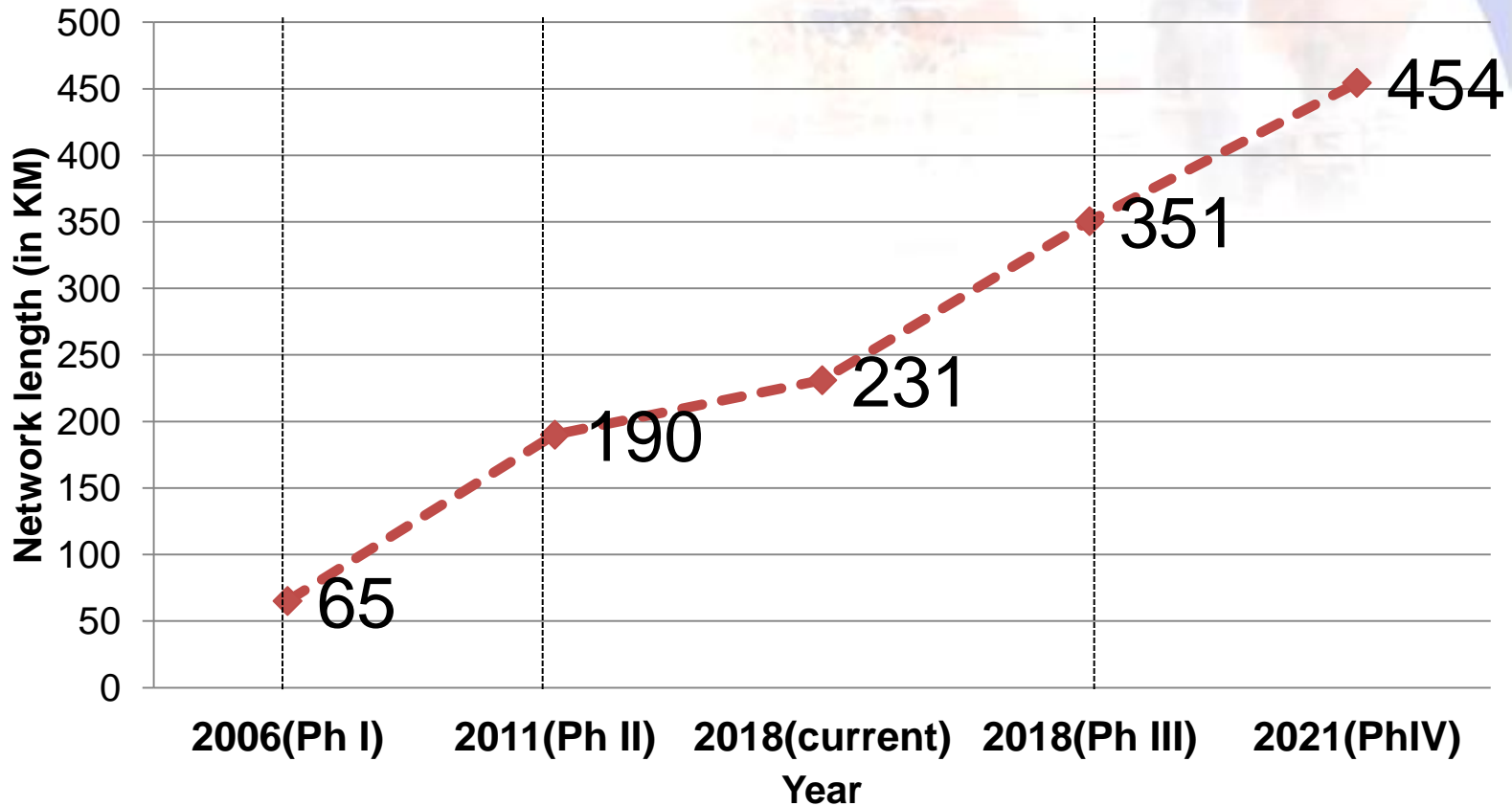


**Thank You  
for  
Giving an opportunity  
for sharing our views**

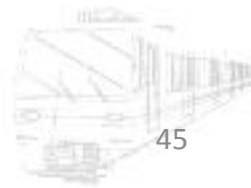


# NETWORK EXPANSION

In 2021 (Ph IV) Network length is projected to increase by 597% over the year 2006 (Ph I)

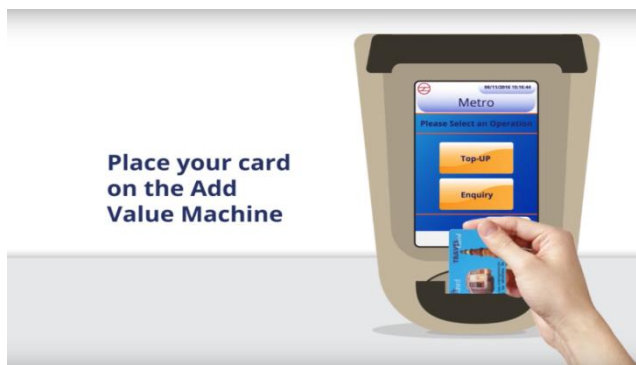


**Phase-III will be completed in 2018**



# PROMOTION OF DIGITAL TRANSACTIONS

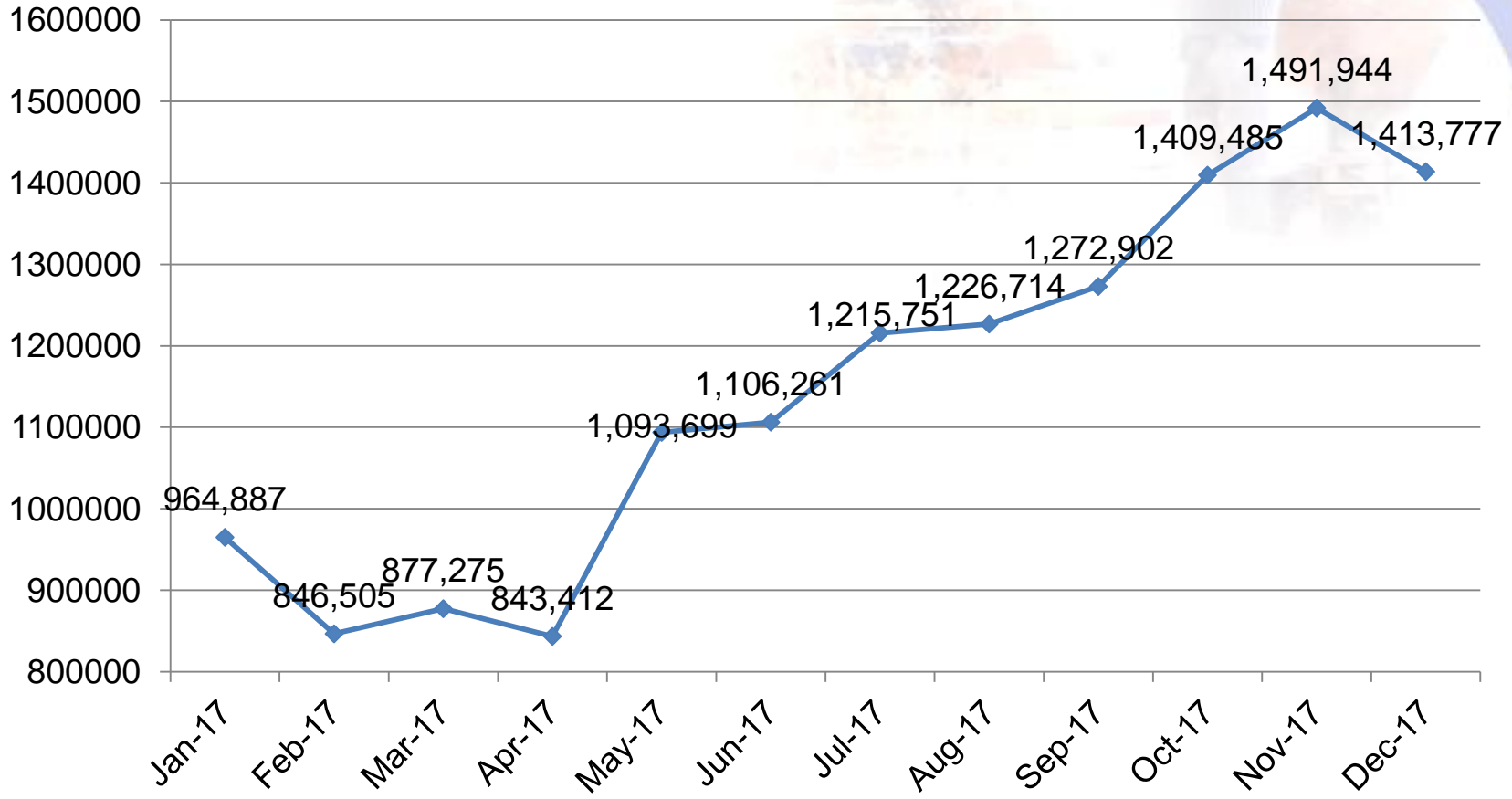
- 400 nos. of Point of Sale machines at Ticket counters & 300 nos. of Point of Sale machines installed in TVMs.
- Increase of approx 32 % transactions through POS w.r.t last year.
- Auto top up facilities for smart card at all stations.
- 400 nos. Bharat QR Code is made available at all stations for digital payment.
- Online Recharge of smart card through e-wallet Zipcash added to the system in addition to already available methods( ICICI Bank, PayTM)



# GROWTH IN DIGITAL TRANSACTION

## Digital Transaction Count\*

In Last one year digital transaction has increased by 46.52%



\*: Includes Netbanking, through Credit / Debit card, Paytm, Zipcash, Auto Topup, TVM POS, BHARAT QR Code, Tom POS

# AWARDS & RECOGNISATION

- **Asia Pacific Region Network Award**

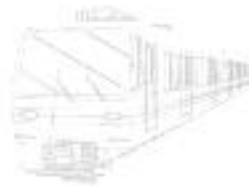
Awarded by World Green Building Council for demonstrating “Business Leadership in Sustainability”.



- **NDTV Award**

ITO Metro Station conferred NDTV award in “**Environment Friendly - Public Space**” category on 27th Feb’ 2017.

- **YES BANK NATURAL CAPITAL AWARDS:-** DMRC conferred with the prestigious YES Bank Natural Capital Awards; organization's commitment to drive environmental sustainability practice and initiative (Prakriti Eco-park Project)





# AWARDS & RECOGNISATION



- **First Prize** for “Installation of highest cumulative capacity of grid connected solar rooftop plants in the country amongst the Public Sector Undertakings” by **Association of Renewable Energy Agencies of States (AREAS)** .
- **“National Excellence Award – 2016”** under “All India Public Sector Undertaking category” for Roof Top solar power projects during National Workshop organized by MNRE.

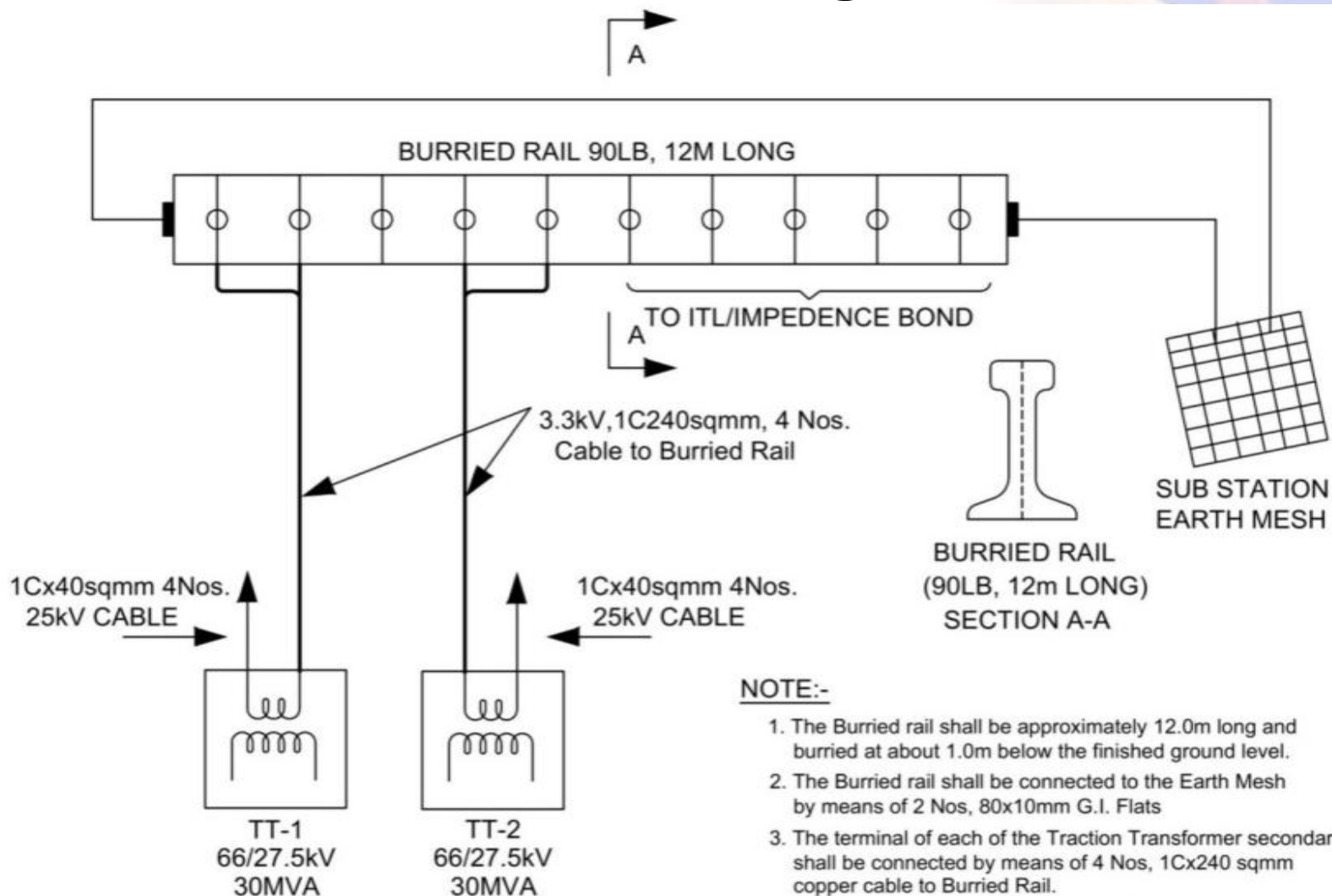


# STOCK-WISE LIST OF SOME IMPORTANT ITEMS DEVELOPED

| S. No | Items developed  | Stock                 | Remarks   |
|-------|--|-----------------------|---|
| 1     | Various type of gaskets for all stocks.                    | RS1, RS2, RS3 and CAF | Door centre rubber gaskets, bellow gasket for transformer, battery box cover gasket etc.  |
| 2     | Various type of LED lights to replace conventional lights. | RS1, RS2 & RS3        | Development of saloon lights, console lights, headlights and gangway lights have been done, to replace conventional type of lights. |
| 3     | Various hardware items.                                    | RS1, RS2, RS3 and CAF | Items such as nuts, bolts, washers, springs, screws, bushes, liners etc have been developed.  |
| 4     | Various type of air filters.                               | RS1, RS2, RS3 and CAF | Pneumatic filters and HVAC air filters have been developed.   |
| 5     | Various type of PCBs.                                      | RS1, RS2, RS3 and CAF | Headlight & marker light PCBs and GDU interface PCB have been developed.  |
| 6     | Dynamic route map.   | RS13                  | Dynamic route map is under development.   |
| 7     | Various type of Hoses.                                     | RS1                   | Various hose pipes for pneumatic equipments and HVACs have been developed.  |

# INNOVATIVE MEASURE-2 (TRACTION)

## Burried Earth Rail – Old arrangement



### NOTE:-

1. The Burried rail shall be approximately 12.0m long and buried at about 1.0m below the finished ground level.
2. The Burried rail shall be connected to the Earth Mesh by means of 2 Nos, 80x10mm G.I. Flats
3. The terminal of each of the Traction Transformer secondary shall be connected by means of 4 Nos, 1Cx240 sqmm copper cable to Burried Rail.
4. Termination at Burried rail towards OHE are under scope of Scope of BE 4&5 contractor.

# INNOVATIVE MEASURE-2 (TRACTION)

## Buried Earth Conductor – New Arrangement

