

METRO NEO



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WHY METRO NEO ?

- Rail based LRT, Tram, BRT and Rubber tyred metro system address traffic requirement between 5000-15000 PHPDT
- Peculiar requirement of Indian cities require an innovative and cost effective solution
- A study was made of the various systems to decide an India-centric solution.
- Metro neo is proposed combining the best features of all other systems.
- Proposed rolling stock already in operation.

WHAT IS METRO NEO ?

- Elevated or At-grade shared Right of Way (RoW)
- Rubber tyred bi-articulated electric coaches – quality at par with Metro
- The Metro Neo electric coaches shall run on
 - Electric overhead traction (750VDC) where the overhead wires are available
 - Can also run on internal battery where the OHE is not available
 - Can run on in-motion charging state while running on overhead wires and charging the battery.
- Guided coaches for passenger safety and also upgradable to LRT
- Small stations – Entry from footpath to platform through lift/link bridge
- Telecom network to connect coaches, provide ticketing and smart passenger information system.
- Proposed features of Metro Neo system are successfully running in various cities. Technology is available for more than 100 yrs.

WHAT IS METRO NEO

- Superior in terms of vibration, noise, acceleration and cost
- Braking capacity matching with other road vehicles due to rubber tyres thus attaining higher acceleration and deceleration rates (1.3m/s^2), lesser headway and more passenger safety.
- Shared right of way can be possible in narrow roads in Tier 2/3 Indian cities.
- The proposed Metro Neo system has many advantages due to its availability of the subsystem worldwide, adoptability of Metro Neo to the city, workability of the solution due to its faster execution in lesser cost and willingness of reputed manufacturers worldwide to supply the equipment for Metro Neo.
- To cater the PHPDT of 5000-12000 in tier 2/3 cities, these are cost effective transport solution to fill the gap between BRT and Metro Rail system. Metro Neo is most ideal solution for such traffic conditions.

ADDRESSING COST CHALLENGES

- No signalling system
- No AFC gates
- No track required
- No Bogie, No steel wheels
- Axle load of coaches reduced to 10 Ton
- Smaller stations
- Adoption of commercially available technology to reduce cost and time
- Smaller propulsion system

COMPARISON OF DIFFERENT PUBLIC TRANSPORT SYSTEMS

BRT system	Metro system (MRT)	Light Rail Transit	Electric coaches (Metro-Neo)
Higher acceleration, lesser headway	Dedicated RoW, lesser acceleration	dedicated RoW, lesser acceleration	higher acceleration, less headway
PHPDT upto 5000	PHPDT upto 20000	PHPDT upto 13000	PHPDT upto 10000
Passenger capacity of 12m bus = 80-90	Capacity of each car = 400	Capacity of one train = 310	Capacity of each 25m coach = 250
Average speed = 28kmph	Average speed = 35kmph	Average speed = 35kmph	Average speed = 30kmph
Length = 12m typical	Length of car = 21m	Length of one LRT train 43m	Length per coach = 18 – 25m
Cost of construction for dedicated BRT = 20Cr/KM	Dedicated elevated Metro = 250Cr/KM	Dedicated elevated LRT = 120Cr/KM	Dedicated elevated Metro –neo = 70Cr/KM
Completion time = 2-2.5 yrs	Completion time = 4 yrs	Completion time = 3 yrs	Completion time = 1.5-2 yrs

Metro neo is ideally suited for tier 2/3 cities

SHORT LIST OF CITIES WHERE TROLLEYBUS IS IN OPERATION

- A**
- [Ancona](#)
 - [Arnhem](#)
- B**
- [Beijing](#)
 - [Bergen](#)
 - [Bern](#)
 - [Biel/Bienne](#)
 - [Bologna](#)
 - [Greater Boston](#)
 - [Brest, Belarus](#)
 - [Burgas](#)
- C**
- [Cagliari](#)
 - [Chieti](#)
 - [Chişinău](#)
 - [Coimbra](#)
 - [Córdoba](#)
- D**
- [Dayton](#)
 - [Dushanbe](#)
- E**
- [Eberswalde](#)
 - [Esslingen am Neckar](#)
- F**
- [Fribourg](#)
- G**
- [Geneva](#)
 - [Genoa](#)
 - [Guadalajara](#)
 - [Gdynia](#)
- J**
- [Jinan](#)
- K**
- [Kryvyi Rih](#)
- L**
- Fonds**
- [La Spezia](#)
 - [Lausanne](#)
 - [Lecce](#)
 - [Leeds](#)
 - [Limoges](#)
 - [Lucerne](#)
 - [Lyon](#)
- M**
- [Mariánské Lázně](#)
 - [Mendoza](#)
 - [Mexico City](#)
 - [Milan](#)
 - [Minsk](#)
 - [Modena](#)
 - [Montreux/Vevey](#)
 - [Mosgortrans](#)
- N**
- [Naples](#)
 - [Neuchâtel](#)
- P**
- [Parma](#)
 - [Philadelphia](#)
 - [Prague](#)
 - [Pyongyang](#)
- Q**
- [Quito](#)
- R**
- [Rīgas Satiksmē](#)
 - [Rimini](#)
 - [Rome](#)
 - [Rosario](#)
 - [Ruse](#)
- S**
- [Saint-Étienne](#)
 - [Salzburg](#)
 - [San Francisco](#)
 - [Sanremo](#)
 - [Santos](#)
 - [São Paulo](#)
 - [Schaffhausen](#)
 - [Seattle](#)
 - [Shanghai](#)
 - [Sofia](#)
 - [Solingen](#)
 - [St. Gallen](#)
 - [Stara Zagora](#)
 - [St Petersburg](#)
- T**
- [Tehran](#)
 - [Belgrade](#)
 - [Tychy](#)
- U**
- [Ulaanbaatar](#)
 - [Urgench](#)
- V**
- [Valparaíso](#)
 - [Vancouver](#)
 - [Varna](#)
 - [Vaslui](#)
 - [Vilnius](#)
- W**
- [Winterthur](#)
- Y**
- [Yerevan](#)
- Z**
- [Zürich](#)

COMMERCIAL AVAILABILITY OF SYSTEM

- Astra Bus, Romania
- Belkommunmash, Belarus
- VDL Berkhof, Netherlands
- Bogdan, Ukraine
- DesignLine, New Zealand
- DINA, Mexico
- Dongfeng Yangtse, China
- Eletra Industrial Ltda, Brazil
- ELBO, Greece
- Foton Motor, China
- Fiat Group, Italy
- ZIU, Uritsky, Russia
- Škoda Electric, Czech Republic
- Solaris Bus & Coach Czech Republic
- Trans-Alfa (VMZ), Russia
- Trolza, Russia
- Ursus, Poland
- Van Hool, Belgium
- Volvo Buses, Sweden
- Youngman, China
- Yutong, China
- LAZ, Ukraine
- MAN_SE, Germany
- Materfer, Argentina
- Mercedes-Benz, Germany
- MAZ, Belarus
- New Flyer Industries or Flyer Industries, Canada/USA
- Scania AB, Sweden
- Iveco (Irisbus by Škoda)
- Hess, Switzerland
- LiAZ, Russia
- Zhongtong Bus, China

TROLLEYBUSES IN ZURICH, SWITZERLAND

- Running total fleet of 114 buses over 54KM (6 lines) on 600VDC trolley lines with 7-8 min headway on at grade shared right of way
- Successfully operating since 1939 with avg annual ridership of >55million
- 31nos bi-articulated 25m buses and 83nos articulated 18m buses of HESS make
- 71 nos Hess make buses running on dual mode (Overhead traction + battery)
- 3 bus maintenance depots



GUIDED BUSES IN BRISTOL

- Also called as Metro Bus, spread on 3 lines over 52KM opened on May 2018
- The guidance to bus is provided by side wheels attached to axles running along the kerb (Concrete kerb or steel kerb) on dedicated right of way (except on crossings)
- Double decker Scania buses are in operation. Both biogas buses and electric buses operate in this corridor
- No overhead traction system is provided
- Total cost of project = 230mil pounds



RUBBER TYRED METRO IN BUSAN, SOUTH KOREA

- Busan Metro line 4 operating on rubber tyred metro services with pneumatic tires on concrete track over 12KM on 750VDC third rail with 4 min headway on elevated and underground sections with dedicated right of way
- Successfully operating since 2011 with avg annual ridership of > 31million
- 2onos Woojin Industrial system make 6 car coaches are running on Busan Metro Bangong line with driverless signalling system
- 1 major coach maintenance depot for rubber tyred coaches



THANK YOU

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GUIDANCE SYSTEM IN METRO NEO

- A mass rapid transport system that can provide last mile connectivity. There are four types of guidance systems prevailing in rubber tyred coaches around the world

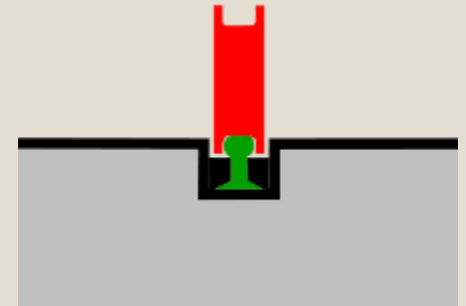
- Rail guidance (central or side rail)

Guided by central rail embedded in the road.

A wheel connected to the axle of the bus runs along the rail providing central guidance.

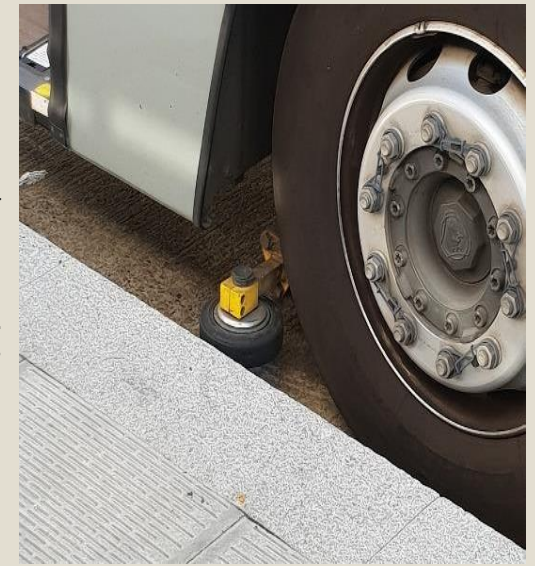
Heavy wear & tear, derailment issues at

Curves, maintenance issues



GUIDANCE SYSTEM IN METRO NEO

- Magnetic guidance (Magnet under the road): This system is based on magnet or sensor buried under the road which guides the vehicle movement. This system has also been used in France and Korea but now discontinued
- Optical guidance: A camera in front of the vehicle scans the bands of paint on the ground representing the reference path. The signals obtained are processed on an onboard computer to determine the speed and path. Expensive and may not be reliable
- **Kerb guidance: Small guide wheels are attached to the axles and are guided by vertical curves on either side of the lane. These guide wheels push the steering mechanism of the bus to keep it on centralized path. Less maintenance issues**



METRO –NEO COST ESTIMATE

(Rs Cr)

S. No.	Item	Metro Neo (cost/KM)
1	Landf	0
2	Alignment and Formation	28.7
3	Station Buildings	4.5
4	Maintenance Depot	1.6
5	P-Way for main line, depot and depot connectivity	0.0
6	Traction & power supply	3.3
7	Telecommunication	1.6
8	Environment and R&R	0.2
9	Misc. Utilities, road works, Topographic Surveys, Geotechnical Investigation, signage's, Environmental protection and traffic management etc.	0.6
10	Capital Expenditure on Security including civil and EM works	0.2
11	Rolling Stock	7.5
12	Total of all items except Land	48.0
13	General Charges incl. Design charges @ 5% on all items except land	2.4
14	Contingencies @ 3 %on all items except land	1.4
Gross Total including Contingencies (excluding Land Cost)		51.9
Central GST		4.7
State GST		4.7
Gross Total including GST		61.4

COST PER KM FOR METRO-NEO IS Rs 62 CR (excl. Land cost)