BANGALORE METROPOLITAN TRANSPORT CORPORATION

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Presentation on
BMTCs initiatives of strengthening and improving bus services in Bangalore

By

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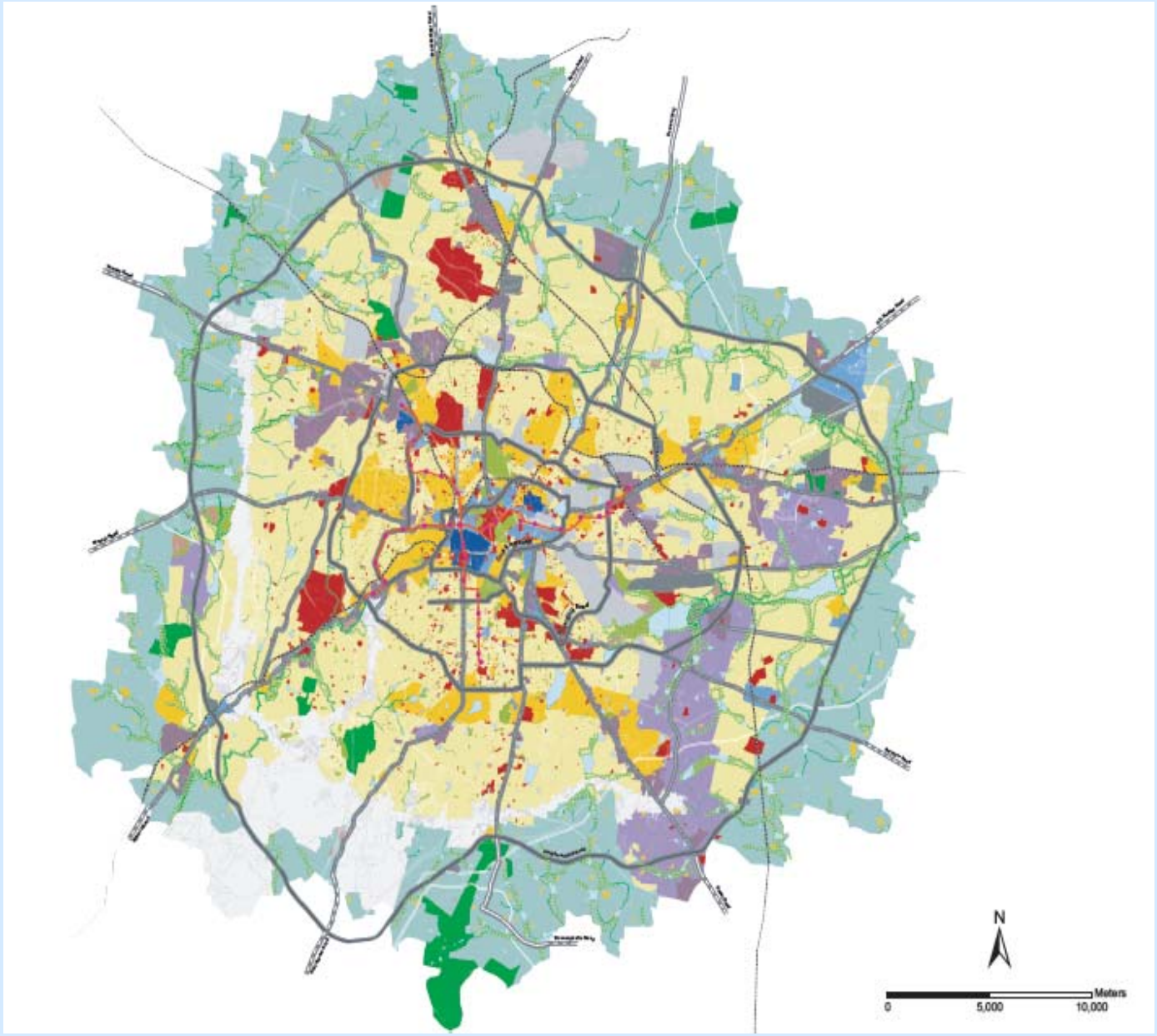
Presentation Structure

- Introduction: Transport in Bangalore & the Bangalore Metropolitan Transport Corporation (BMTC)
- On-going BMTC Initiatives to improve Bus service quality
- Going Forward: what does Bangalore & BMTC need to maintain and grow the share of public transport?
- General Thoughts : What do Indian Cities need to make Sustainable Transport a Reality?

Introduction:

Transport in Bangalore & the Bangalore Metropolitan Transport Corporation (BMTC)



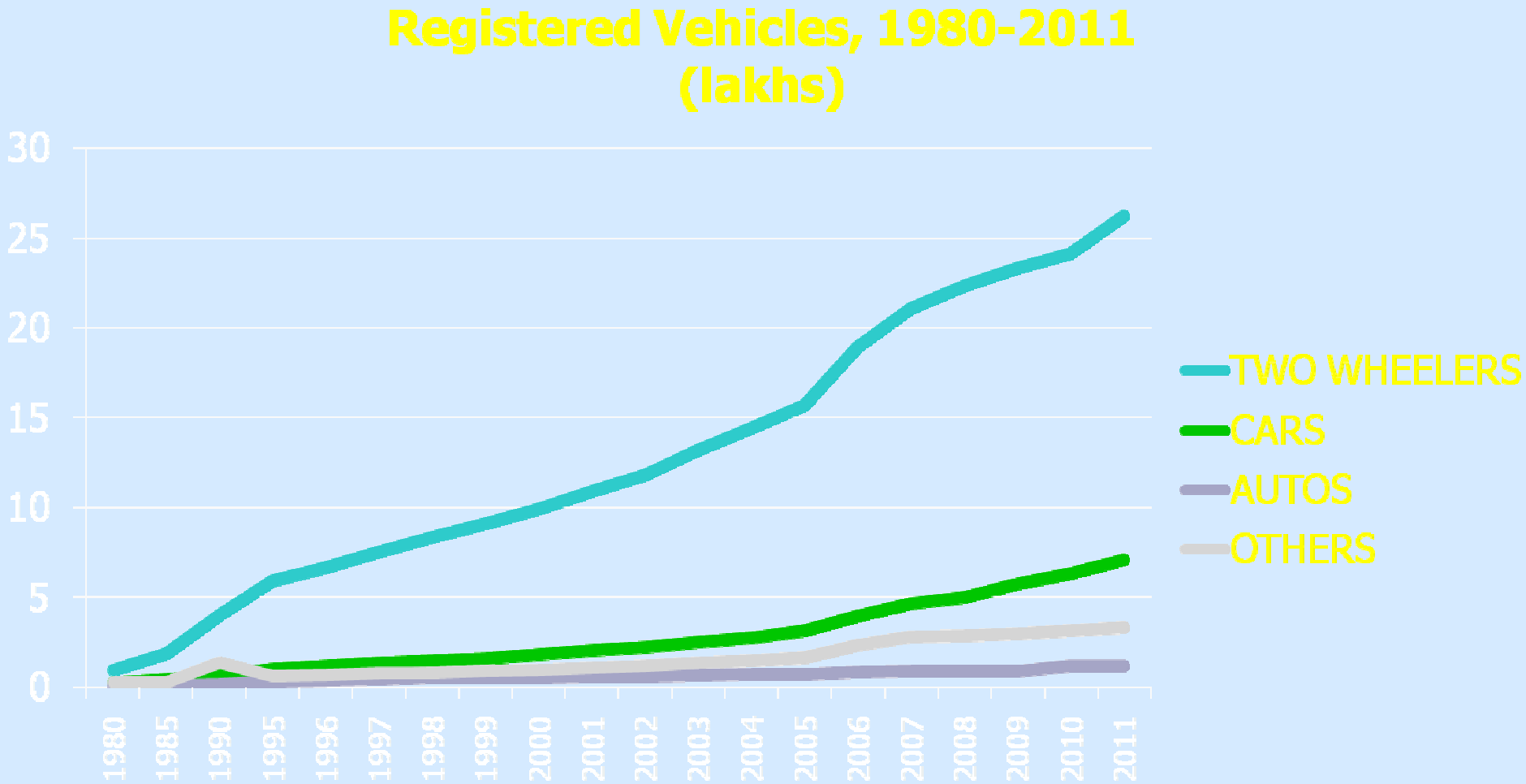
3rd Largest City in India

5th Largest Metropolitan Area

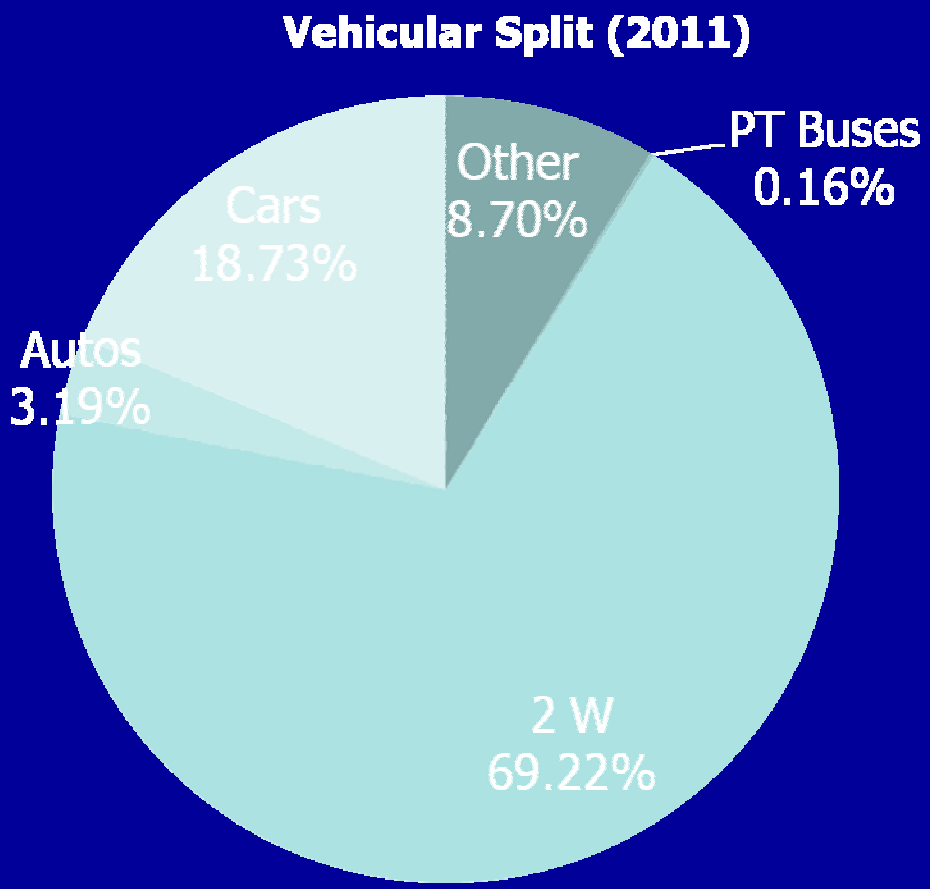
2011 Population: 8.5 Million (Metro Area)

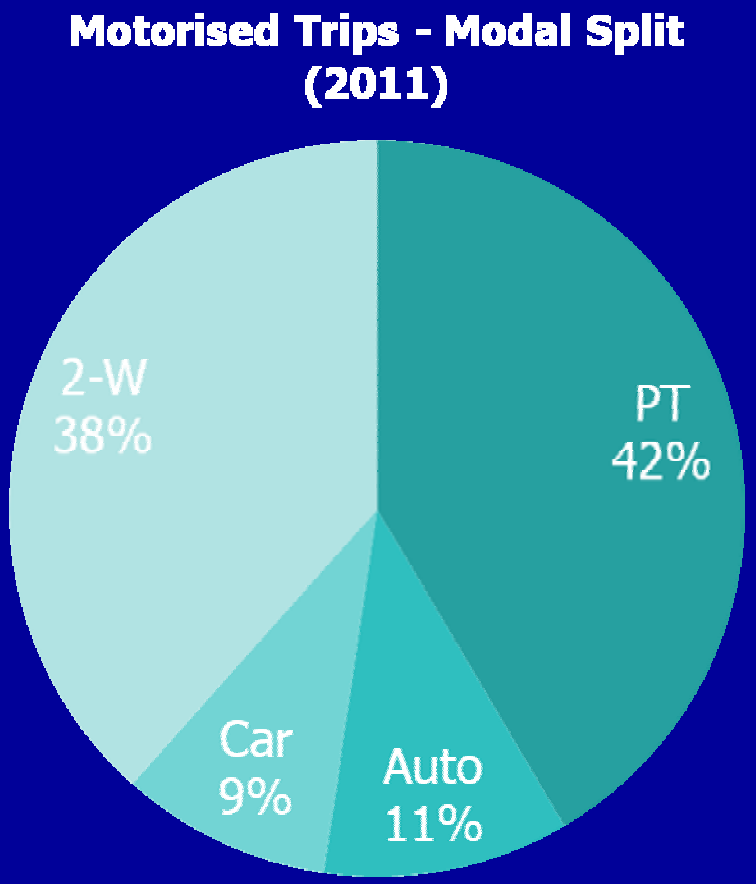
Population Growth (2001-2011): 65.2%

Transport in Bangalore



Bangalore City Transport Scenario



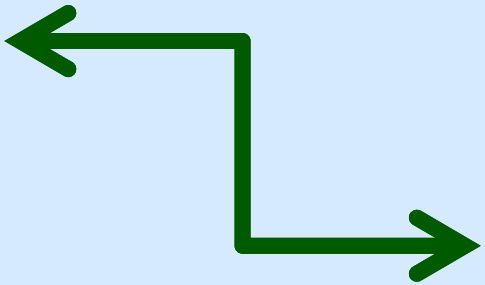


Sources: Bangalore Mobility Indicators 2011, Karnataka RTO

BMTC System Indicators

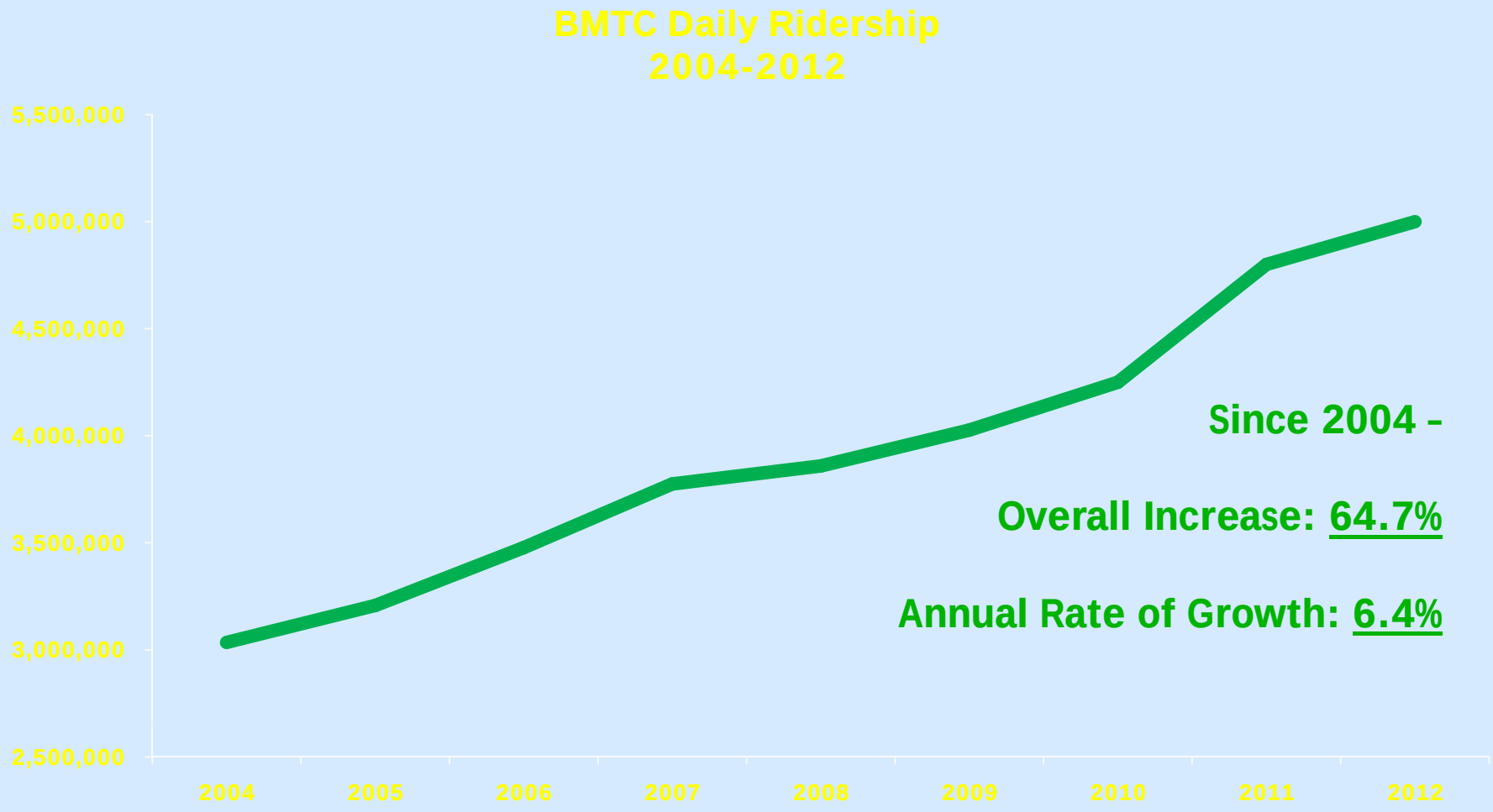
6,472 Buses (688 AC, 5655 Ordinary)

4.9 Million Passengers Daily

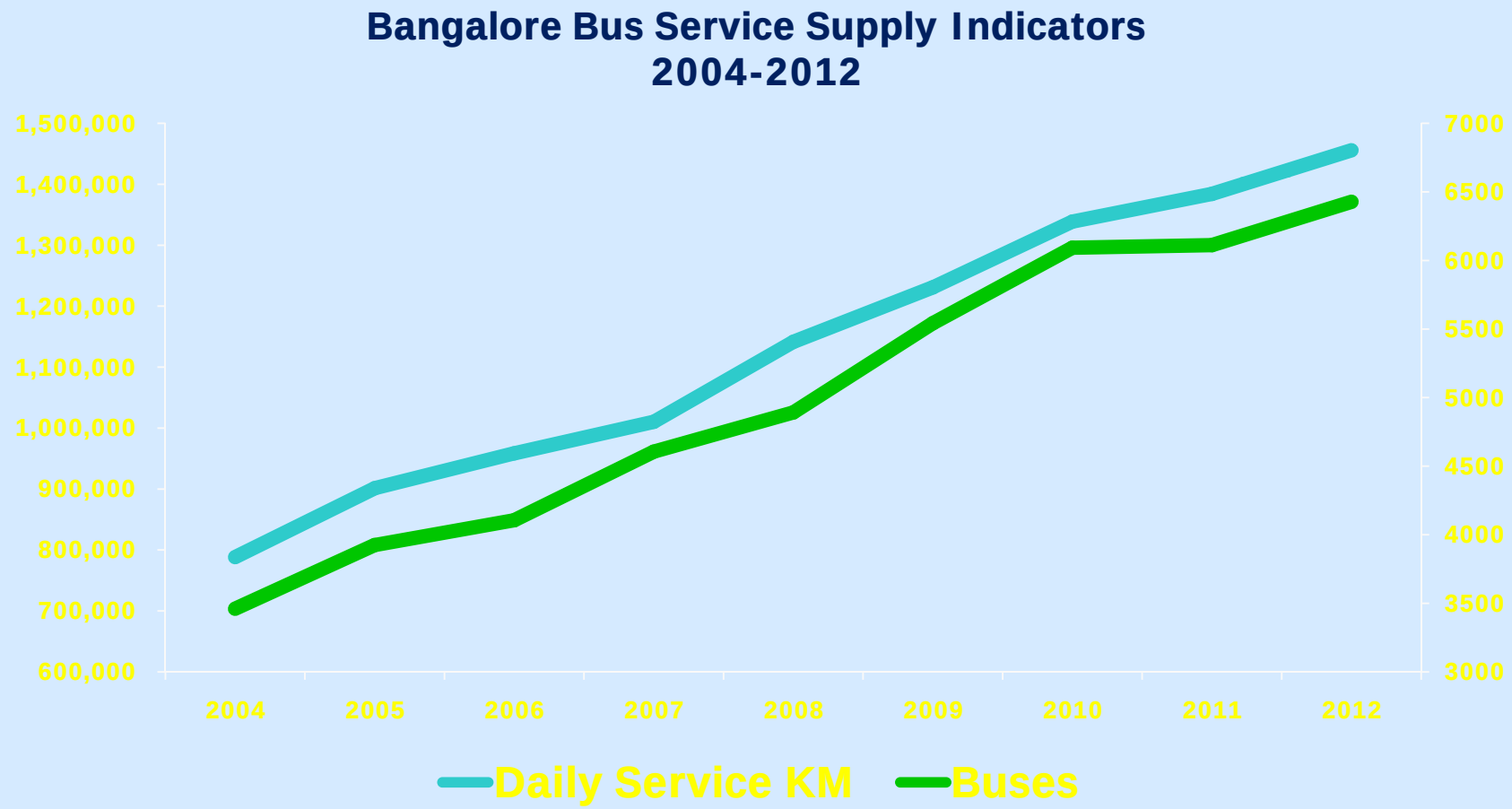


2,398 Routes

BMTC Performance



Dramatic Increase in Service Supply



Differentiated Services

Ordinary services

Vajra services

Pushpak services

Volvo BS-IV services

Atal Sarige services

Suvarna services

Grid Route services

Hospital Special services

Womens services

Bangalore rounds services

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Traffic and Transit Management Centres (TTMCs) Under JNNURM Scheme

- BMTC is the first urban transport organization to get JNNURM funding for a national pilot project for an innovative idea called TTMC

- 10 TTMCs have been built and are operational in Bangalore

Examples of BMTC Experience-

Traffic and Transit Management Centres (TTMCs)

Developments on BMTC Land that include Bus Service Support Infrastructure as well as Commercial Complexes

Concept of TTMC

- To meet some of the objectives of the National Urban Transport Policy.
- To Provide an integrated transportation facility with adequate facilities and amenities to cater to the requirements of all user groups.
- To encourage use of public transport through provision of park and ride facilities in the bus terminal.
- Smooth flow of all types of traffic to and from the terminal such that there is no congestion/disturbance caused to traffic along the main road.
- To create a mixed-use development with shopping, malls and other commercial activity, to enable people to fulfill all these needs through using bus transport

Facilities at T T M Cs

- Bus terminal
  - Bus bays
  - Platforms
  - Seating & lighting
  - Public conveniences
  - Information systems
  - Safety and security
- Bus maintenance depot
  - Maintenance bays,
  - washing platform
  - Bus parking
  - Services and Utilities
  - Fuel filling station
  - Amenities for crew
- Passenger amenities
  - Bangalore One centers
  - Other citizen amenity centers
  - ATMs
  - Daily needs shopping
- Park and Ride facilities

TTMC - SAVINGS

- The Economic IRR of TTMCs
  - Economic IRR will include the economic benefits due to:
    - Economic value of time savings for passengers, due to reduced travel time as a result of smoother traffic flow through TTMC rather than through congested junction and bus stop.
    - Economic value of fuel savings to BMTC, due to reduced fuel usage as a result of smoother flow of traffic through TTMC, less idle time at congested junction and on-road bus stop, and reduced travel distance.

TTMC - SAVINGS

- Economic Value of Time Saved per Passenger

Economic Value of Travel Time Saved	
Bus Trips Through TTMC	5392 trips
Minutes saved per Bus Trip	2 min
Total Hours Saved Per Day by Buses	179.73 hours
Total Full Days (Equivalent per Year)	300 days
Total Hours Saved Per Annum by Buses	53,920 hours
Average Passengers Per Bus Trip through TTMC	50 Passengers
Total Time Saved per Annum by Passengers	26,96,000 hours
Average Wage per Hour	40 Rs./hour
Total Value of Time Saved (per Annum)	Rs. 10,78,40,000

TTMC - SAVINGS

- Economic Value of Fuel Saved by BMTC

Diesel Saved	
Bus Trips Through TTMC	5392 trips
Minutes saved per Bus Trip	2 min
Total Hours Saved Per Day by Buses	179.73 hours
Total Full Days (Equivalent per Year)	300 days
Total Hours Saved Per Annum by Buses	53,920 hours
Diesel burned per idle hour	1.09 litres/hour
Total Diesel Saved	58,773 litres
Average Cost of Diesel	52 Rs./litre
Total Value of Diesel Saved	Rs. 30,56,196.00

TTMC - SAVINGS

- Economic IRR (including travel time saving of passengers and fuel savings to BMTC)
  - Cost: Rs 103.78 Crore
  - Annual Commercial Revenue: Rs 1.49 Crore
  - Annual Value of Time Saving for Pax: Rs 10.78 Crore
  - Annual Value of Fuel Saving to BMTC: Rs 0.27 Crore
  - Total Annual Economic Benefit: Rs. 12.54 Crore

TTMC - SAVINGS

- Additional Benefits:
- Reduction in Greenhouse gases due to reduced travel distance and time of BMTC buses, as a result of smoother traffic flow in and out of TTMC
- Total estimated Greenhouse Gas reduction:

  154 Tons of CO_2 per year.

This is the savings from the operations of BMTC buses alone. Additional savings are also there due to reduced congestion experienced by other vehicles, as well as mode shift to BMTC buses from private vehicles

TTMC - SAVINGS

- Economic IRR (including travel time saving of passengers and fuel savings to BMTC)
  - Cost: Rs 89.5 Crore
  - Annual Commercial Revenue: Rs 2.54 Crore
  - Annual Value of Time Saving for Pax: Rs 3.27 Crore
  - Annual Value of Fuel Saving to BMTC: Rs 0.44 Crore
  - Total Annual Economic Benefit: Rs. 6.25 Crore

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TTMC Jayanagar 4th BLOCK
Project Cost : Rs. 12.90 Crore
Date of Commission:31.8.2009.

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TTMC, Kengeri,
Project Cost : Rs. 30.47 Crore
Completed on 10th Jul 2010

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TTMC Banneraghatta

Project Cost : Rs. 5.50 Crore

Completed on 29th, Aug 2010

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TTMC Shantinagar

Project Cost : Rs. 108.50 Crore

Completed on 23rd Sep 2010

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TTMC Whitefield

Project Cost : Rs. 37.30 Crore, Completed in January-2011.

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TTMC Koramangala

Project Cost : Rs. 66.20 Crore
Completed in Feb-2011.

TTMC Domlur

Project Cost : Rs. 17.55 Crore
Completed in March-2010.

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TTMC Yeshwanthpur
Project Cost : Rs. 92.00 Crore
Completed in May-2011.

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TTMC, Banashankari
Project Cost : Rs. 33.10 Crore
Completed on 04-12-2011

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TTMC Vijayanagar
Project Cost : Rs.58.10 Crore
Completed in March-2011

On – going BMTC Initiatives to improve Bus service Quality

On-going Initiatives

- Intelligent Transport Systems for BMTC
  GPS based bus tracking and performance monitoring Passenger Information Systems at bus shelters

- Additional investments in TTMCs and Terminals

- Route Rationalisation & Service Quality Improvement

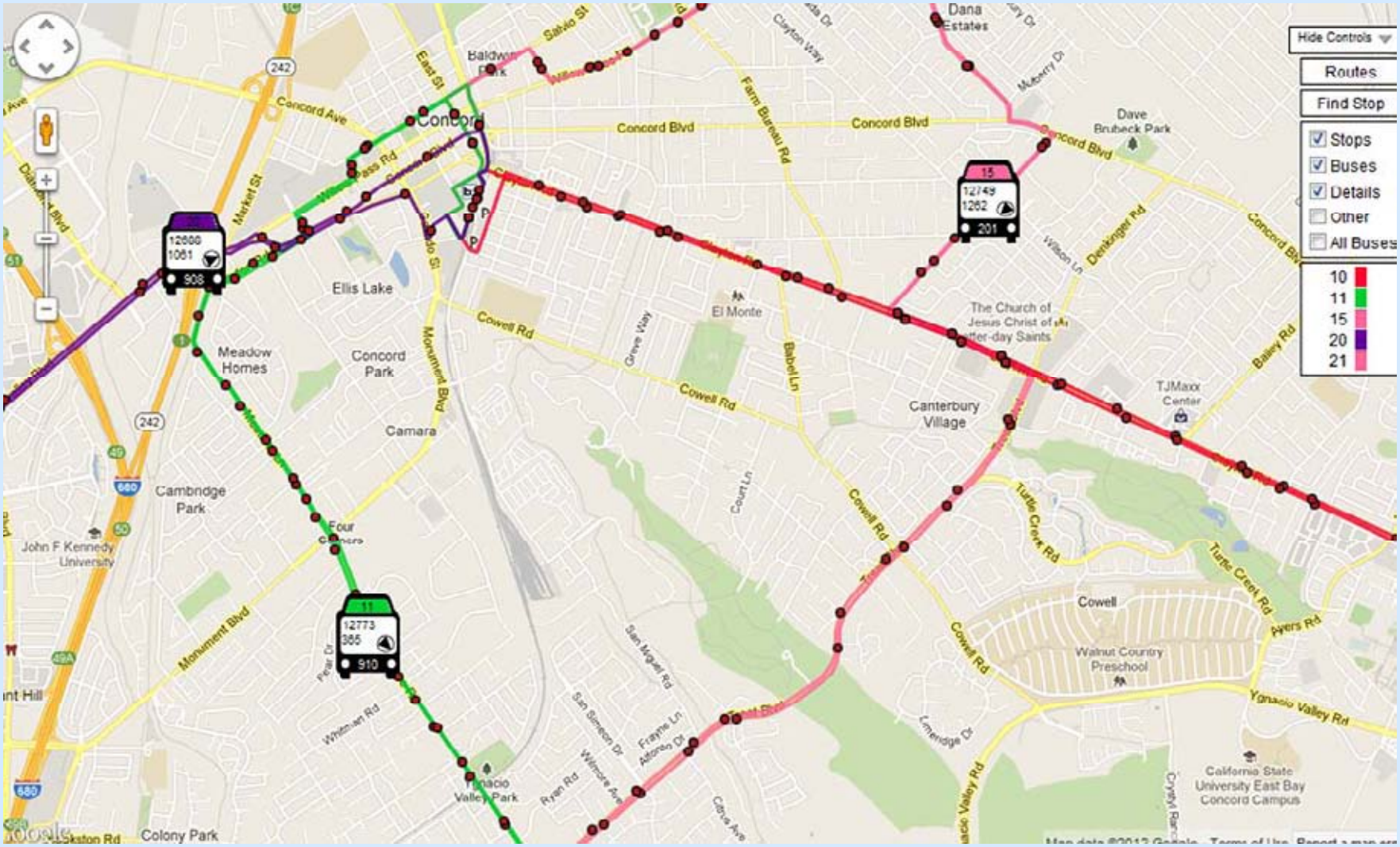
- Ethanol Blended with Diesel for reducing Emission.

- Passenger Information system PC Based interactive touch screen – KIOSKS Machine for TTMCs and Bus Stations.

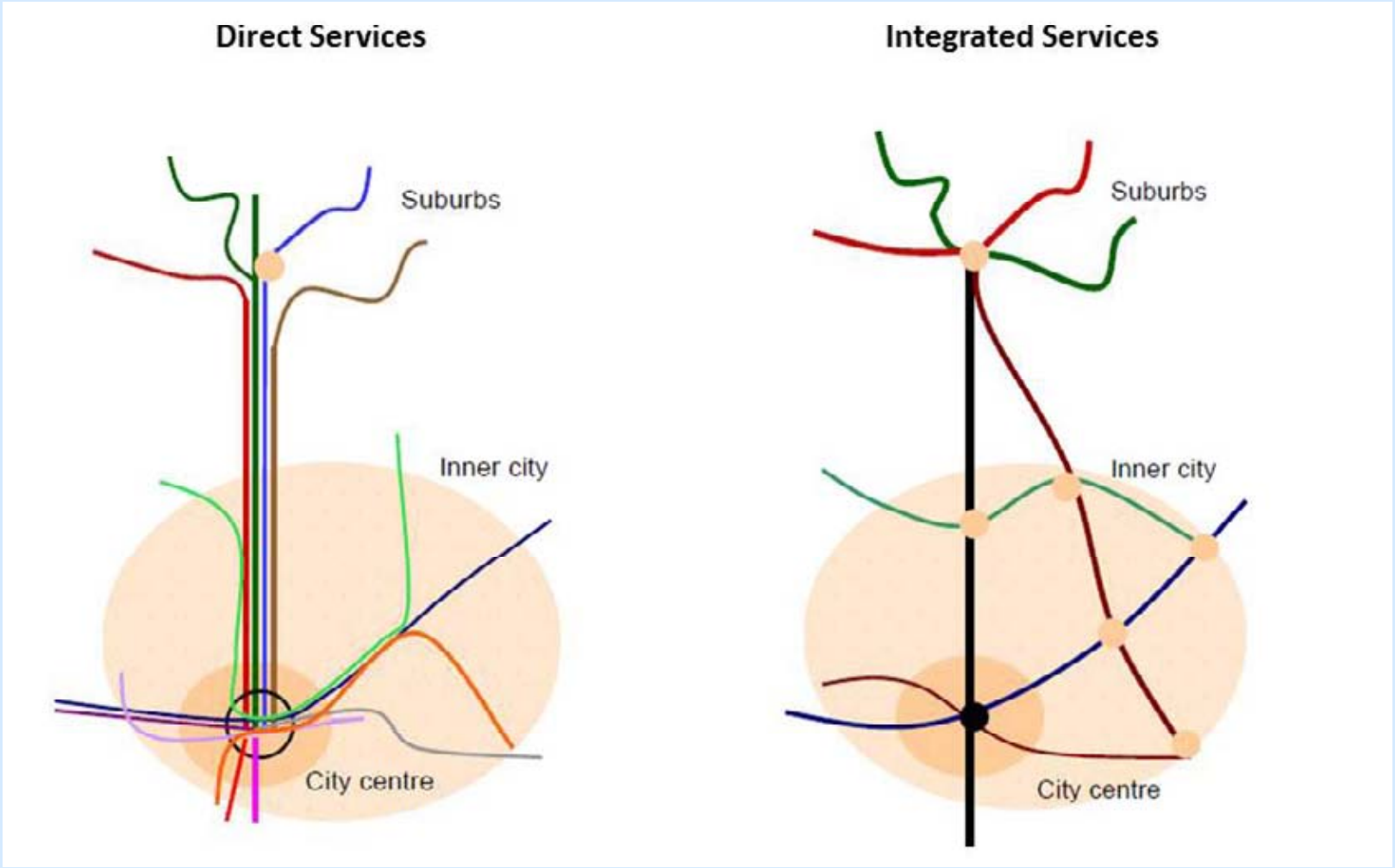
- Induction of CNG Buses – Preparedness of BMTC.

- Induction of CC Camera Surveillance System.

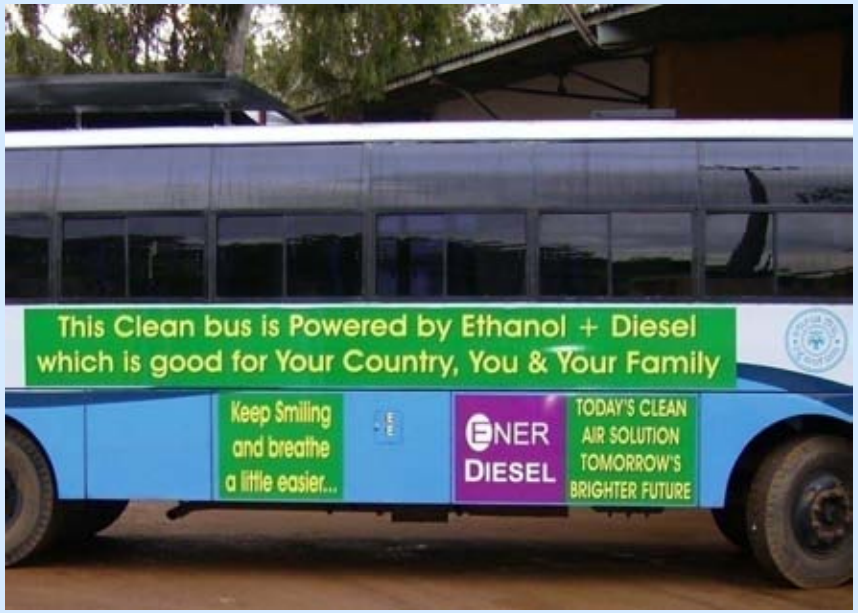
ITS: GPS based bus tracking



Route Rationalisation



Structure



Why Ethanol- Diesel Blend
What is Ethanol Diesel blend
Emission reductions using Ethanol /Bio Diesel
Advantages
C D M Benefits

INDIAN TRANSPORT EMISSION SCENARIO

- Transport sector accounts for 25% energy consumption
  - 12-15% of GHG emission
  - Apart from CO2 substantial amounts of other pollutants such as SPM, HC, NOx and CO are also emitted
  - Expected growth in the sector poses a serious threat to climate change

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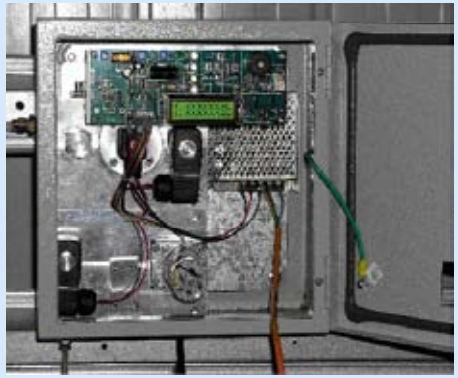
What is Ethanol Diesel?

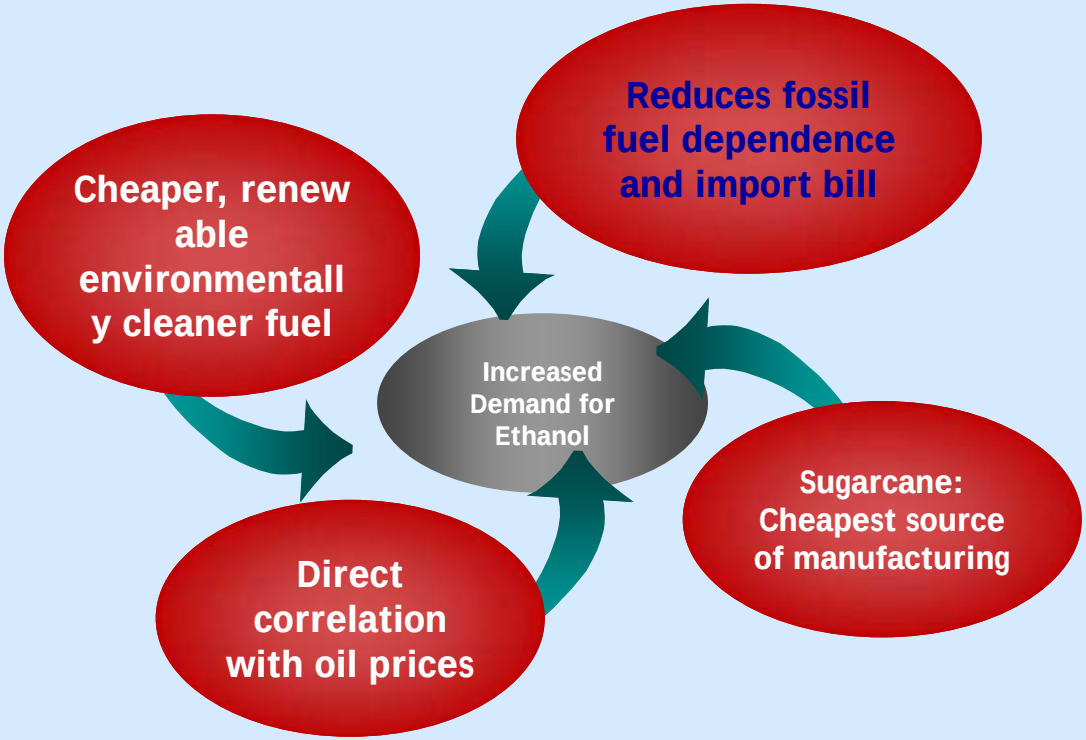
A premium ethanol diesel fuel blend with:

> 7.7 vol% Fuel Ethanol
> 0.5 vol% Multi Patented Proprietary Additive
> 91.8 vol% Regular Diesel
> Enhanced Lubricity
> Improved Cetane
> Improved Corrosion Resistance
> Outstanding Static Properties
> Compatible with High Sulphur Diesel, Low Sulphur Diesel, Biodiesel and ULSD
> Less polluting
> Excellent response
> No Power/Torque loss

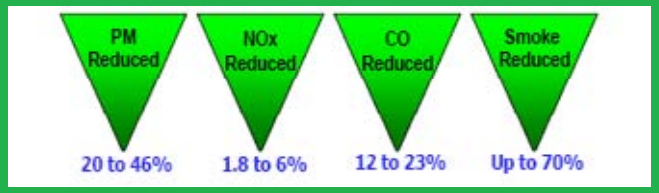
On site diesel ethanol blending facility

- Computerised blending equipment offers high accuracy and homogenous blending of all components – fully automatic. No need for human intervention





Reduction of pollutants



Visibly cleaner air

> Ethanol Diesel substantially reduces:

- **White smoke caused by incomplete combustion during ignition of cold engines**

- **Black smoke composed of carbon particles containing oil**

BMTC Ethanol Diesel Evaluation

- Computerised Blending Equipment and ethanol storage tank installed
- Ethanol diesel blend is extremely clear and stable
- Instant effect on reducing black & white smoke emissions
- No material compatibility issues
- Engines are observed to be running as normal
- Stage 1 of a 3 Stage emission reduction programme by Energenics

KIOSK Machine

Scope

- Individual route maps (JPEG format) is demonstrated at the respective bus stations, TTMCs which is helpful to find required information quickly.

- Map is at International standard customized corporation Passenger information system. The map include the roads, highways, Ring roads, main road names, main area names, main bus stations and TTMCs etc..

- Software includes an indicators for identifying the direction, and allow for collecting, merging, formatting and updating of data. Visualization and formatting of page ,cartography and output file creation.

➢Advantages Of KIOSKS:-

➢Route Maps – KISOKS shows on screen route maps so that user can see the route the bus will take.

➢Route Planner **-** This is a facility where but a user can enter their journey starting location and their end destination and the information point suggest the bus or busses that the customer needs to catch in order to reach their destination.

➢Customer Survey **-** The kiosks can monitor customer satisfaction of the bus station and bus services with an on screen customer survey. All the complete surveys have their data stored and the details of the data can access from a computer so that the results can be analysed.

➢Fares display: KIOSK allows the Passengers to view the display of fares from the location to the destination.

Display of KIOSK Machines

Compressed Natural Gas (CNG)

- **Induction of CNG Buses**:-
- CNG is dispensed to vehicles at maximum 200 kg/cm2g pressure.
- CNG is colourless, odourless, Non-toxic and lighter than air, the dead weight of HSD filled in buses could be reduced considerably thereby the load on the buses is reduced.
- CNG is environmental friendly, compared to conventional type of fuel and hence a better alternate and safer fuel.
- CNG is cheaper for automobile application.
- CNG improves fuel efficiency.
- CNG has high auto ignition temperature (540°C)

Natural Gas

- Mixture of hydrocarbons (predominantly methane)
- Specific gravity : 0.65 – 0.71 w.r.t air.
- Gross Calorific value : 9500 – 10000 Kcal/SCM
- Flammability Limit : 4 – 14 % by volume in air.
- Auto ignition temperature : 540 degree Centigrade.
- Flame temperature : 1790 degree Centigrade

CNG is the least Polluting

(gm/100km)

FUEL/EMISSIONS	CO2	UHC	CO	NOx	SOx	PM
PETROL	22,000	85	634	78	8.3	1.1
DIESEL	21,000	21	106	108	21	12.5
CNG	16,275	5.6	22.2	25.8	0.15	0.29

Tata CNG Bus

Volvo City Bus CNG

Closed Circuit Camera:

- **Scope**
- Each bus will have 2 Closed Circuit Camera and one mobile digital video recorder and other accessories.
- CC Camera Surveillance system will cover all locations of bus saloon area.
- CC Camera Surveillance system have minimum 48 hrs continuous recording (video)facility.
- CC Camera is provided with mobile digital video recorders (MDVRs).

ADVANTAGES OF CC CAMERA

- Tracks all reported incidents and evidence in case of incidents reported.
- Data stored at multiple locations for reported incidents.
- Acts as a major deterrent for criminals.
- Increases safety of staff and passengers
- At the minimum provides a perception f safety
- Monitoring other routing activity
  - Occupancy, Closing and opening of doors, Parking at Bus bay.
- The advantages of CCTV cameras is, if a crime is committed the culprit will be eventually caught.
- Recording is another advantage in future for back up of images.
- Security personnel can easily monitor all activities within range of the cameras, and clearly note any suspicious or unauthorized behaviour, while getting a clear image of the person engaged in the activities.

Display of Dome type cameras

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BIG TRUNK SERVICES-16/09/2013

COMMUTERS BENEFITS:-

- Direction oriented services is being implemented for the first time by BMTC.
- High frequency Trunk Services.
- Reduces travel time.
- Increased simplicity.
- Improved commuter experience for 80000, passengers daily.
- Reduction in waiting time.
- Implementation beginning on Hosur Road – a major arterial corridor.

Details of EPKM earned by the newly initiated BIG Trunk Service

Sl.No	Route No	EPKM (Rs.)
01.	3A	From 32.37 to 38.15
02.	3C	From 27.08 to 40.61
03.	3E	From 28.99 to 42.06

Note: 1) KBS-3E (KBS to Electronic City)
2) KBS-3C (KBS to Chandapura)
3) KBS-3A (KBS to Attibele).

Going Forward:

What does Bangalore & BMTC need to maintain and grow the share of public transport?

Going Forward

Investments required can be categorised as:

1. Fleet:
Bus fleet will require continued replacement and expansion, to ensure an adequate number of buses are available but also that they are of high enough quality

2. Support Infrastructure:
This includes passenger terminals and bus shelters, but also depots, workshops and other 'operator-side' infrastructure

3. ITS for bus services:
Advancements in technology need to be leveraged to improve public transport: 'Regular' ITS systems must be implemented immediately, but also software for bus scheduling, internal processes etc

Going Forward

- In the long run, however, private vehicle ownership is likely to continue to increase and congestion will increasingly negatively affect bus services

- It is clear that **bus priority** will need to be developed to maintain high service quality and standards

- This can take many forms - bus lanes, signal priority, dedicated corridors, BRT and so on - and the 'right' solution for any given area will depend on local context

- But the concept of bus priority itself needs to move to the top of the Public Transport Investment agenda

General Thoughts:

What do Indian cities need to make Sustainable Transport a reality?

1. Multimodal Mobility

Commuter options in London

2. Intermodal Connectivity

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3. Integration of Land Use and Transport

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4. Disincentives for Private Vehicle Use


Thank You