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Government of India
Ministry of Housing and Urban Affairs

PCRA
पी. सी. आर. ए.
पेट्रोलियम संरक्षण अनुसंधान संघ

12th Urban Mobility India Conference & Expo 2019

Workshop on

Improving Fuel Efficiency of City Bus Services through ESMAP Approach in Select NURM Cities

Date 17.11.2019

By – Rakesh Agrawal
Dy. Director (Transport) -PCRA

ESMAP
Energy Sector Management Assistance Program

In This Workshop

- **Problem –** Fuel Efficiency is Not at Optimum Level in Many City Bus Service

- **Solution –** Fuel Efficiency Improvement Through Targeted Bus Maintenance and Targeted Driver Training (Methodology - ESMAP Approach)

- **Demonstration –** Fuel Saving at Depots Who Volunteered for this Program

National HQ – New Delhi

Northern Region –New Delhi

- Chandigarh
- Jaipur
- Lucknow
- Dehradun

Eastern Region – Kolkata

- Guwahati
- Bhubaneswar
- Patna
- Ranchi

Western Region - Mumbai

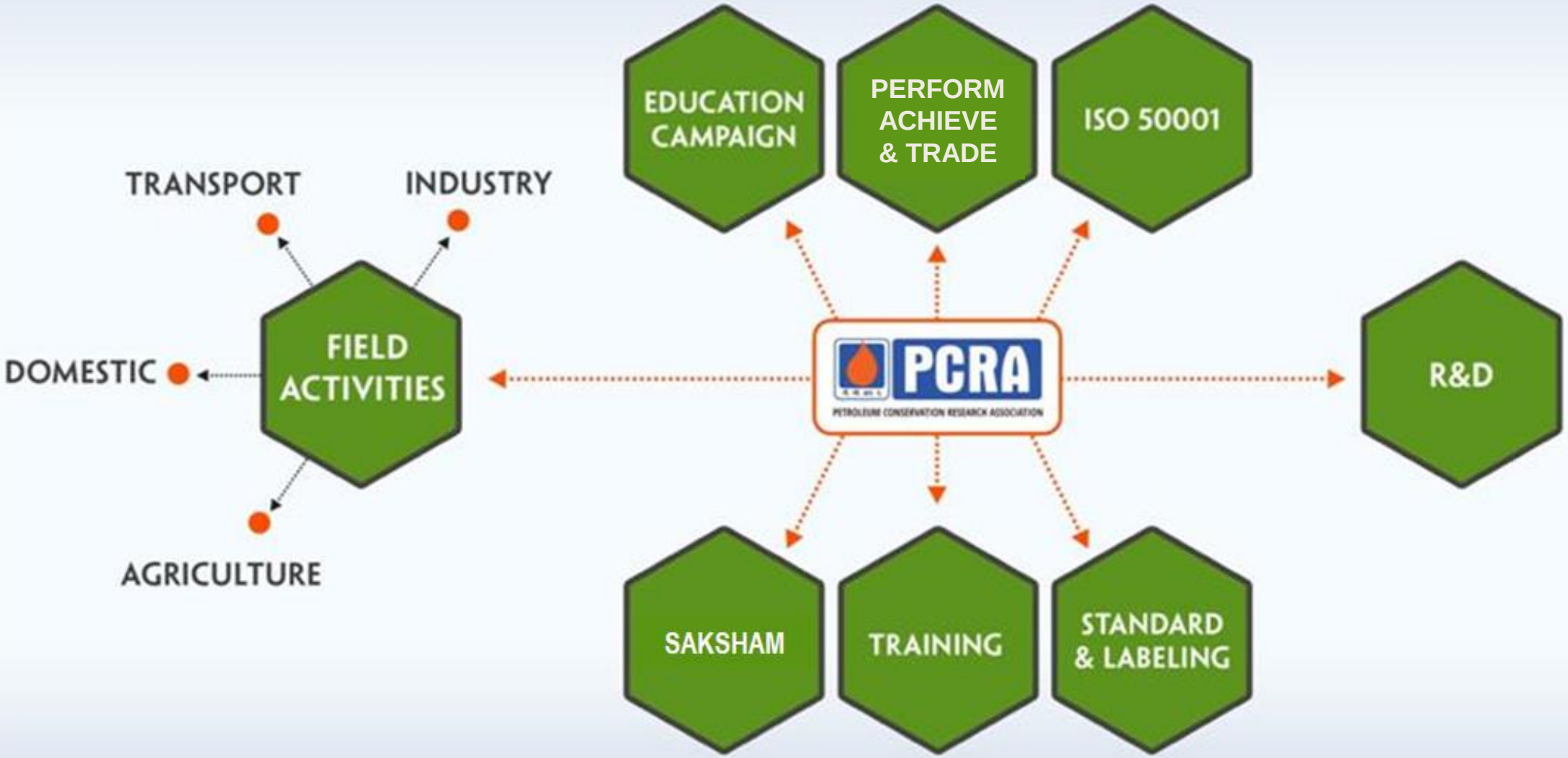
- Rajkot
- Ahmedabad
- Pune
- Nagpur
- Raipur
- Bhopal

Southern Region – Chennai

- Bangalore
- Vishakhapatnam
- Kochi
- Coimbatore
- Hyderabad

PCRA ACTIVITIES

MAIN FOCUS ON DEMAND SIDE MANAGEMENT(DSM)



PCRA – Major Policy Initiatives

- Fuel Economy Norms for Passenger Cars
- Fuel Economy Norms for Light Medium and Heavy Commercial Vehicles
- Standard and Labelling Program for Agriculture Tractors
- Standard and Labelling Program for Tyres
- Mandatory Fuel Efficient Driver Training for the Heavy Duty Vehicle Driving License

About ESCBS Project

Global Environment Facility Funded- **Efficient & Sustainable City Bus Service (ESCBS) Project**- initiative of Ministry of Housing and Urban Affairs (MoHUA) with support of World Bank.

Component-Improving Fuel Economy of City Bus Services Using ESMAP Approach

65 Cities under NURM Project

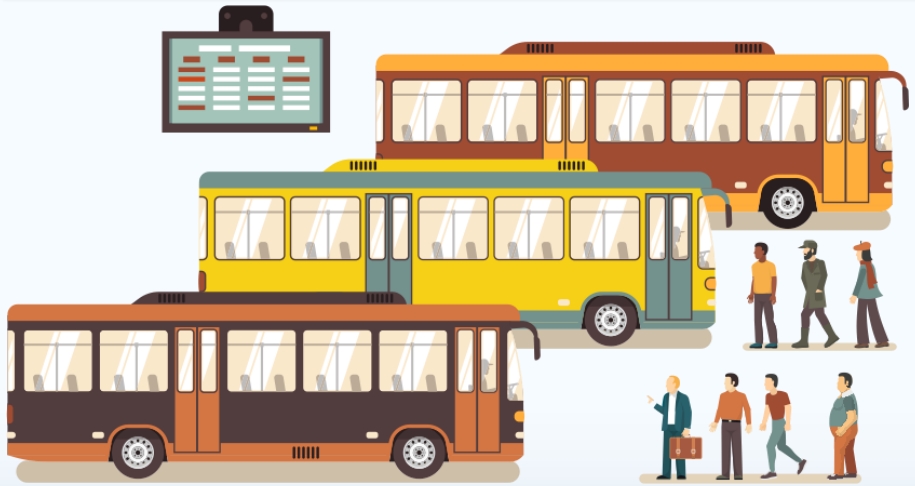
50% Cities covered under ESCBS project

34 depots Volunteered for Fuel Efficiency Program

Brief About PCRA Program

Number of Round – 2

Number of Depots – 15/18



Number of Buses – 2883

Number of Drivers – 5753

List of Bus Depots-Volunteered for Program

1. Rajghat-1 Depot, New Delhi
2. Vasant Vihar Depot, New Delhi
3. Rohini - II Depot, New Delhi
4. Gazipur Depot, New Delhi
5. Orange Street Depot, Nagpur
6. Market Yard Depot, Pune
7. Katraj Depot, Pune
8. Pune Station Depot, Pune
9. Rajiv Circle (BRTS) Depot, Indore
10. Khajrana Depot, Indore
11. Chandola Depot, Ahmedabad
12. Kolhapur Depot, Kolhapur
13. Amanaka Depot, Raipur
14. Pandari Depot, Raipur
15. Noonmati Depot, Guwahati
16. Kasba Depot, Kolkata
17. Tollygunj Depot, Kolkata
18. Sums Hospital Depot, Bhubaneswar

Zone-1

Zone-3

Program Objective

- **To Encourage** city bus fleet operators initiate and adopt fuel efficiency program based on the ESMAP Approach

- **To Share**
  - the experience regarding effectiveness of the ESMAP Approach
  - the potential or actual improvements that could be made to the ESMAP Approach.

PCRA Team

HoD Transport

Mr. Rajiv Khanna

3 Officers

Team Lead-North

Team Lead-West

Team Lead-East

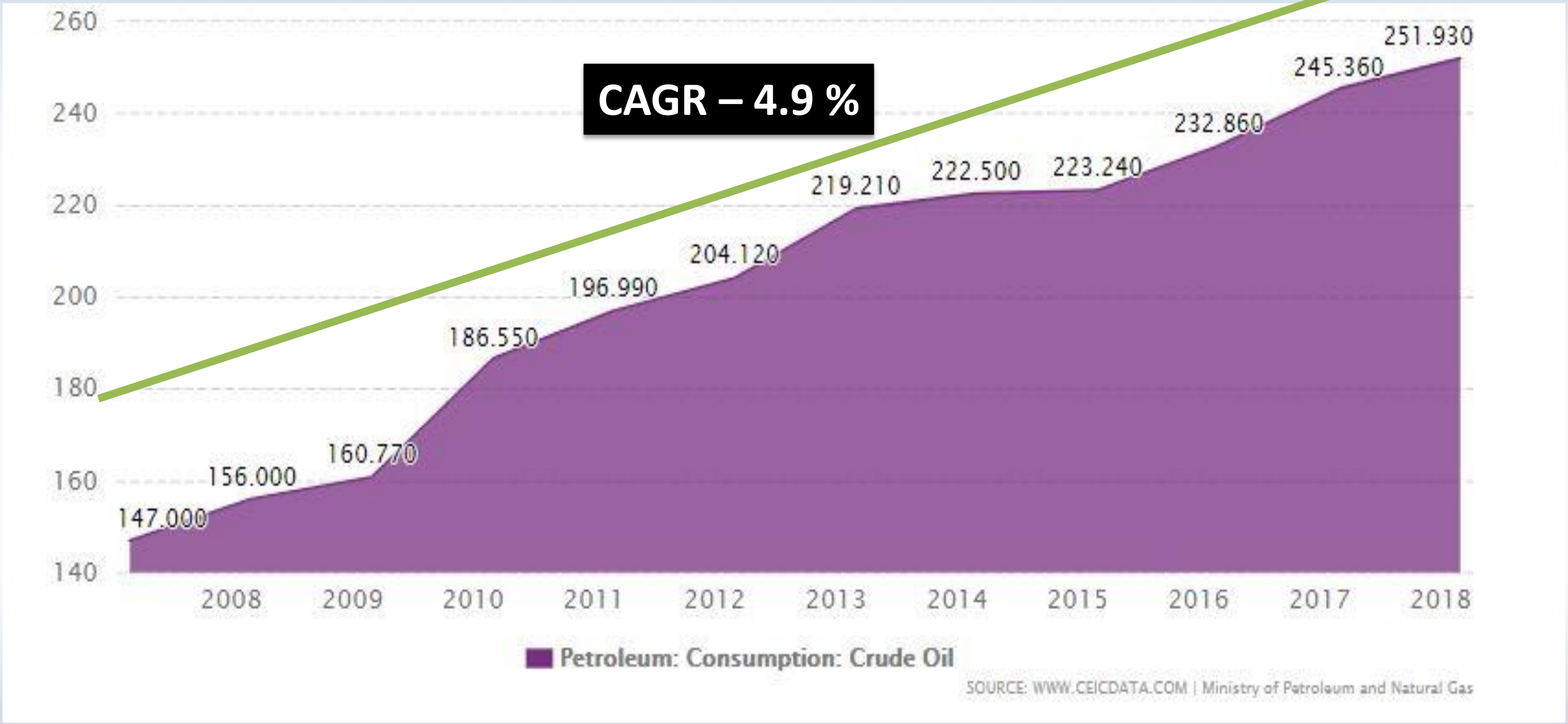
1 Officer
2 Bus Maintenance Engineer
2 Driver Trainer

4 Officer
7 Bus Maintenance Engineer
7 Driver Trainer

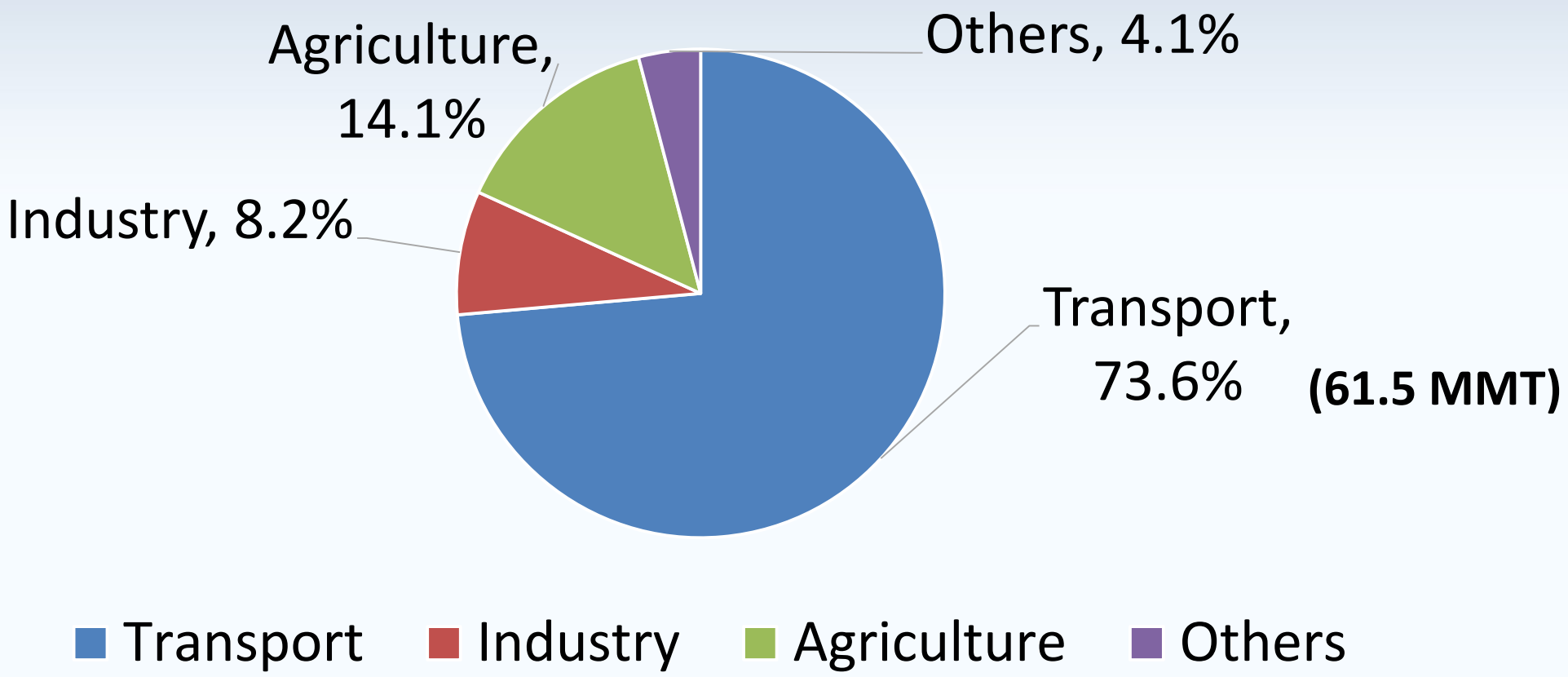
3 Officer
3 Bus Maintenance Engineer
4 Driver Trainer

Why Fuel Efficiency ?

India's Petroleum Consumption



Diesel Consumption – End Use Sector Wise

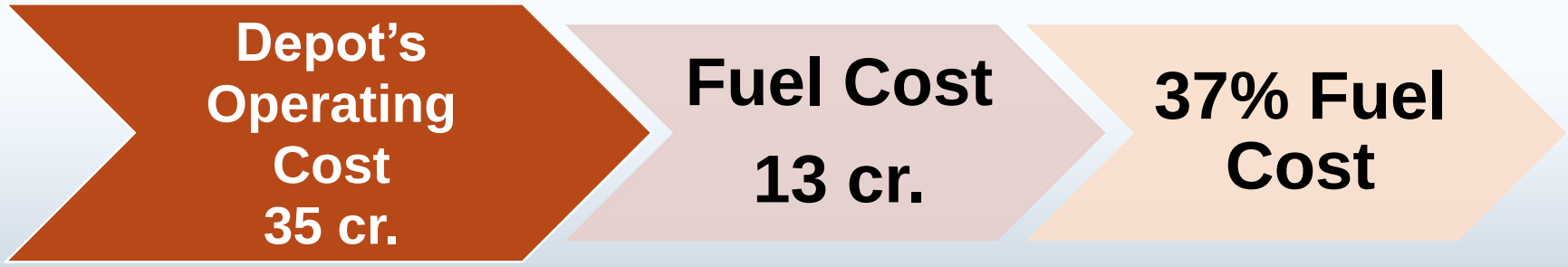


Total Diesel Consumption (2018-19)- 83.5 MMT

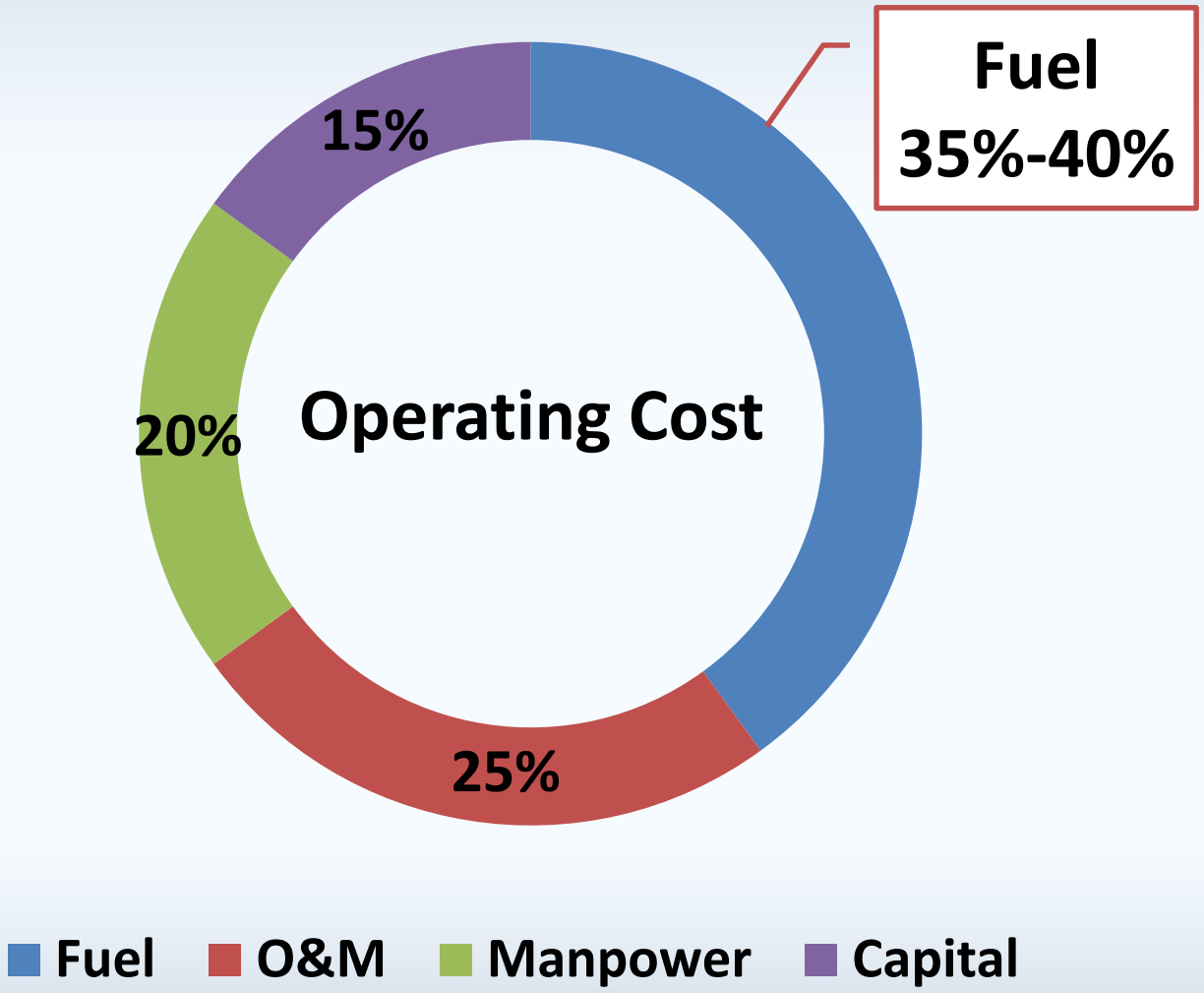
Source: PPAC- Nielsen Report

Typical Cost of Fuel for a Depot with 100 Bus

- Number of Bus = 100
- Depot's Total km Run = 350 Days x 200 km x 100 Bus = 70 lac km per year
- Depot's Fuel Consumption = 70 lac km/3.5 kmpl = 20 lac liter
- Depot's Operating Cost/km = 50 INR
- Fuel Cost/Liter = 65 INR



Typical Operating Cost of City Bus Service



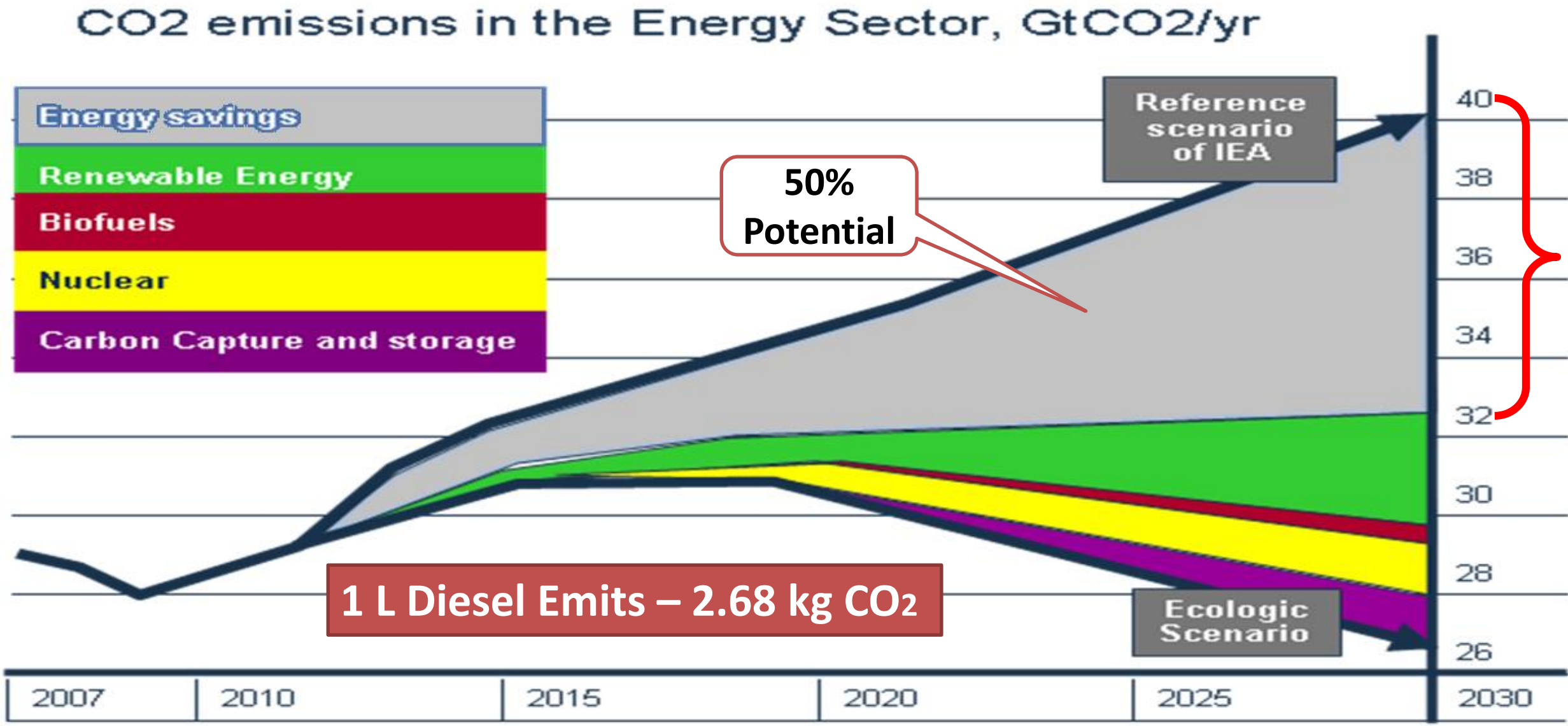
Operating cost breakup ?

Fuel –

- Single Largest Cost Item
- Price Volatility Significantly Affect Budget

Therefore Fuel Efficiency is Very Important in City Bus Service

Potential of Energy Conservation in CO_2 Emission Reduction



Major Benefits of Fuel Saving-City Bus Service

Long Term Sustainability

- Reduced Fuel Consumption
- Reduced Operating Cost

Improved Air Quality

- Reduced Level of Air Pollutant (e.g. PMx, NOx)
- Reduced Green House Gas (GHG) Emissions

Short Term Benefit

- Cost Saving

Global Experience- ESMAP Approach

2000- 2003

Edmonton, Canada

- 1,000 buses
- Fuel-saving training program for all drivers
  - *Fuel economy improved 5.5%*

2001- 2002

Jakarta, Indonesia

- Improved inspection program for engines, exhaust
  - *Fuel economy improved 5%*
- Trained drivers on fuel-saving operating practices
  - *Fuel economy improved an added 10%*

2011

Hyderabad, India

- Targeted maintenance of 10% low-performing buses
  - *Fuel economy improvement of 4-5%*
- Targeted training of 5% low-performing drivers
  - *Fuel economy improvement of 6-8%*

ESMAP Approach for Improving Fuel Efficiency in City Bus Services

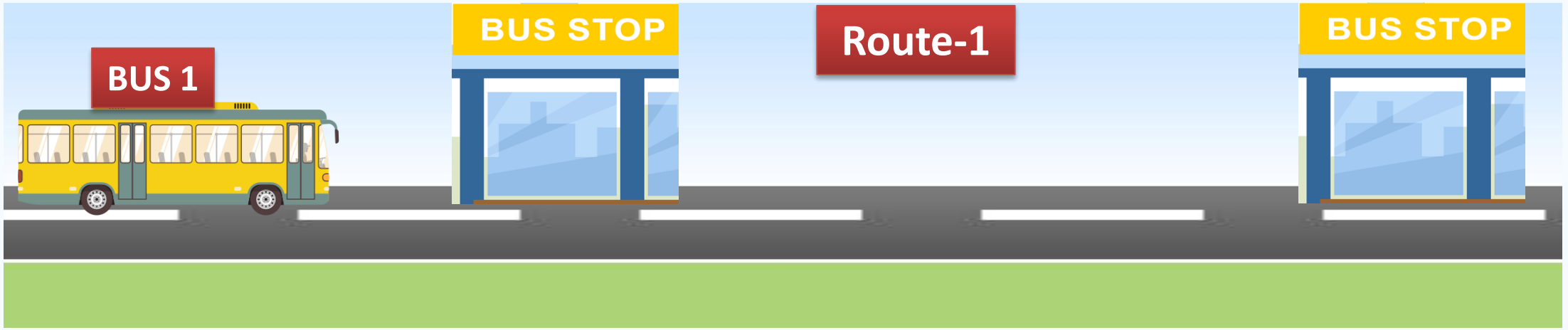
Factors Affecting Fuel Consumption

Route Characteristics	• Speed, Number of Stops, Traffic Condition • Passenger Load, Terrain (Plane or Hilly) etc.
Bus Characteristics	• Engine HP, Bus Size, Transmission Type • Use of Air-conditioning, Age of Fleet etc.
Bus Maintenance	• Facility, Spare Availability, Quality and Periodicity, Preventive Maintenance
Driving Skill	• Lack of Institutional Training (Focus-unlearning of inefficient driving habits)

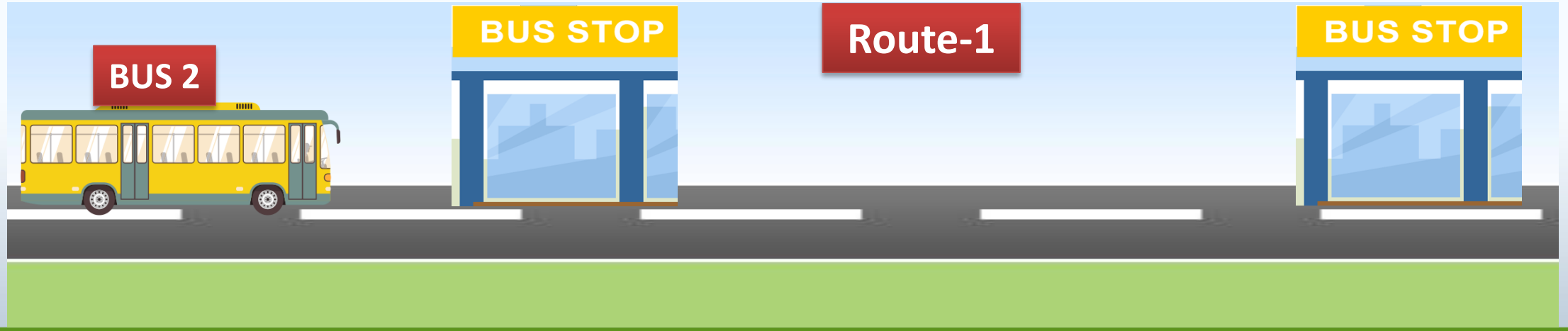
Why Bus Targeting ?

Bus Targeting

Identical Bus → Same Route



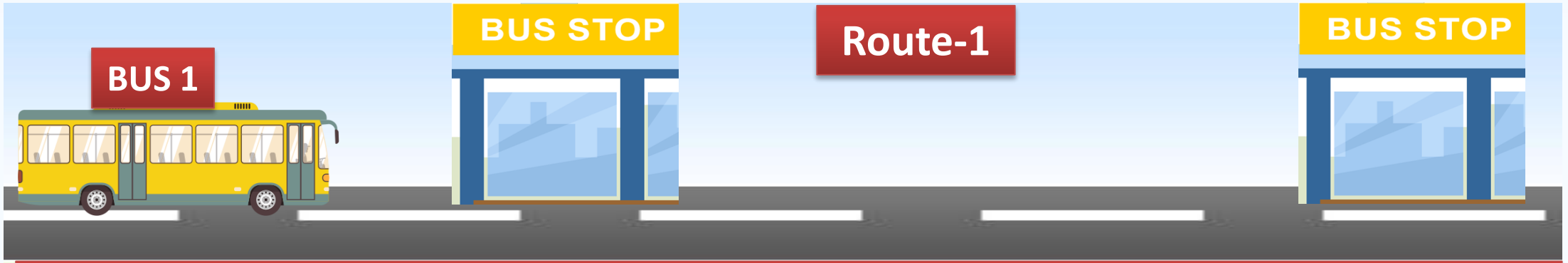
4.0 kmpl



3.7 kmpl

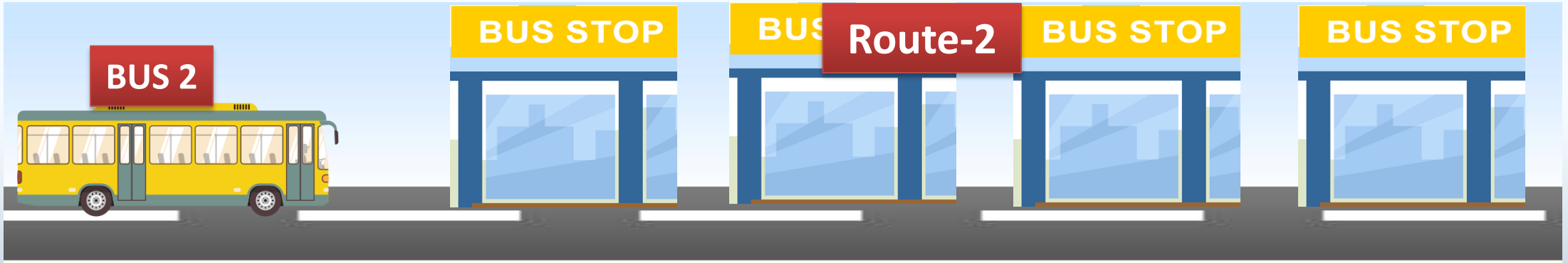
Bus Targeting

Identical Bus → Different Route



Total Buses = 10, Route KMPL= 4.2, Relative KMPL= -0.2 - Poor

4.0 kmpl

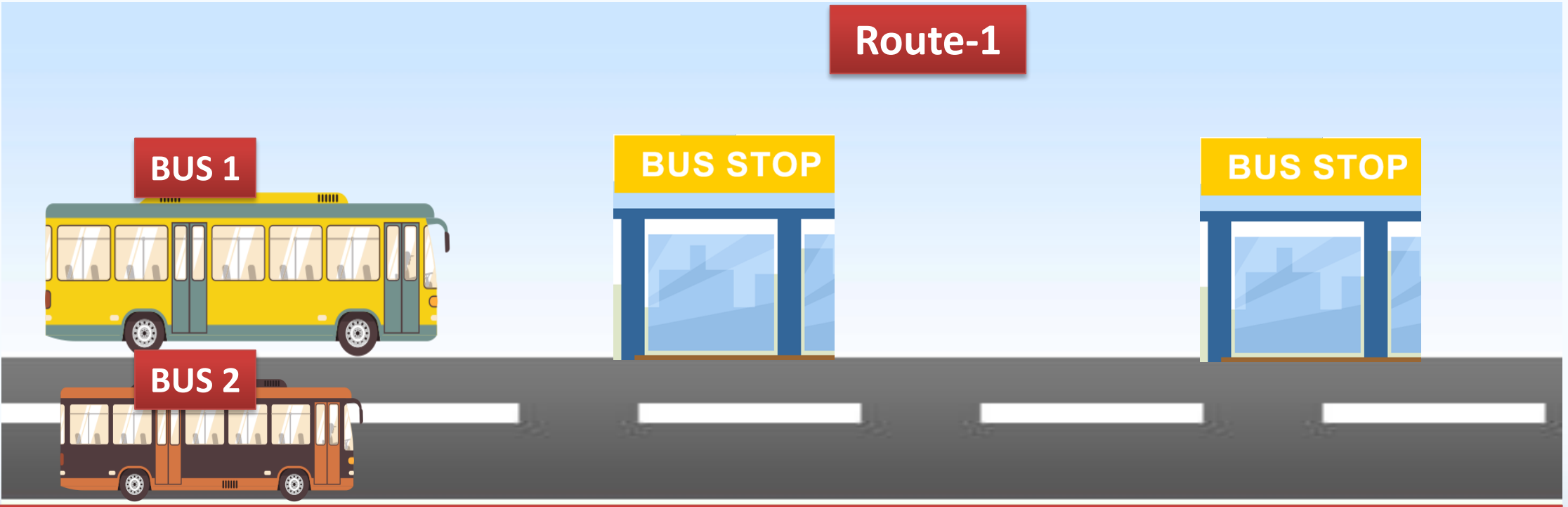


Total Buses = 10, Route KMPL= 3.4, Relative KMPL= 0.1

3.5 kmpl

Bus Targeting

Same Route → Different Bus Type



4.0 kmpl

4.8 kmpl

Bus KMPL(1) = 4.0, Route KMPL(1)= 3.8, Rel. KMPL(1)= 0.2

Bus KMPL(2) = 4.8, Route KMPL(2)= 4.7, Rel. KMPL(2)= 0.1 – Poor

Bus Targeting

Bus	Route	Bus Type	KM	Liters	(Step 1) Average kmpl	(Step 2) Route/ Bus Type Average (kmpl)	(Step 3) Relative Fuel Economy (kmpl)	Rank (1= Lowest)
101	12	1	4,435	1,341	3.31	3.45	-0.14	3
102	12	1	4,689	1,256	3.73	3.45	0.28	9
103	12	1	4,325	1,299	3.33	3.45	-0.12	4
Average	**12**	**1**	**13,449**	**3,896**	**3.45**			
104	12	2	4,897	1,404	3.49	3.22	0.26	8
105	12	2	4,478	1,501	2.98	3.22	-0.24	2
106	12	2	4,690	1,459	3.21	3.22	-0.01	5
Average	**12**	**2**	**14,065**	**4,364**	**3.22**			
107	14	1	4,890	1,267	3.86	3.62	0.24	7
108	14	1	4,550	1,356	3.36	3.62	-0.27	1
109	14	1	4,724	1,289	3.66	3.62	0.04	6
Average	**14**	**1**	**14,164**	**3,912**	**3.62**			

Why Driver Targeting ?

Driver Targeting

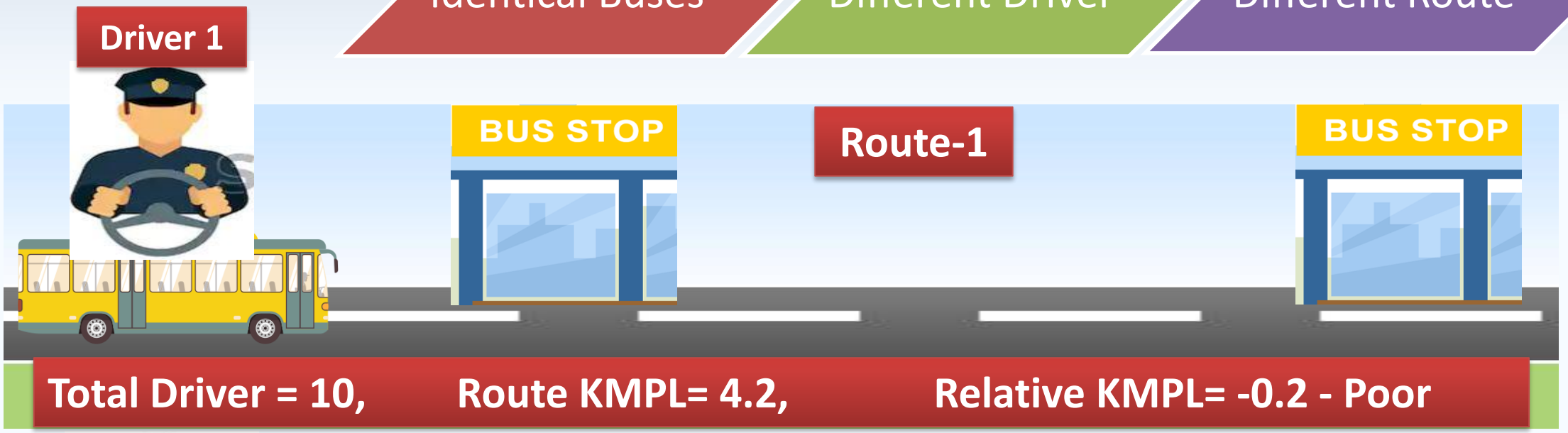
Same Route → Identical Buses → Different Drivers

4.5 kmpl

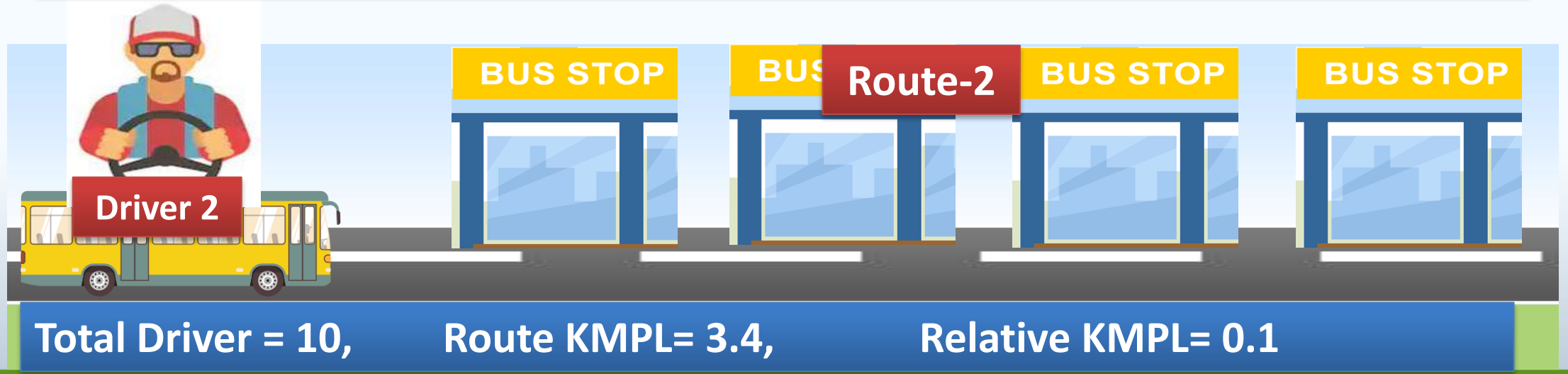
4.2 kmpl

Driver Targeting

Identical Buses → Different Driver → Different Route



4.0 kmpl



3.5 kmpl

Driver Targeting

Same Route → Different Bus Types → Different Drivers

4.0 kmpl

4.8 kmpl

Driver KMPL(1) = 4.0, Route KMPL(1)= 3.8, Rel. KMPL(1)= 0.2

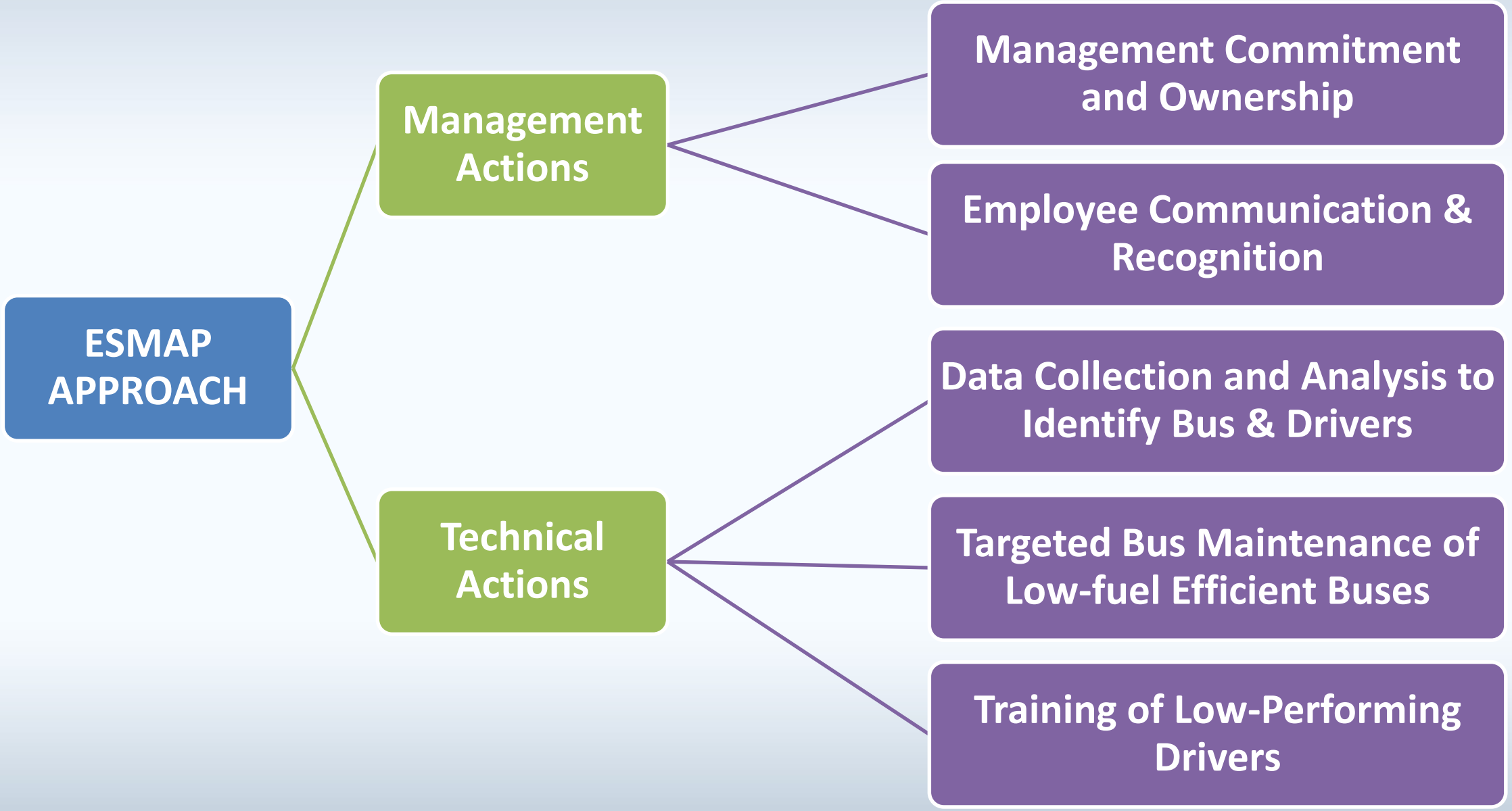
Driver KMPL(2) = 4.8, Route KMPL(2)= 4.7, Rel. KMPL(2)= 0.1 – Poor

Driver Targeting

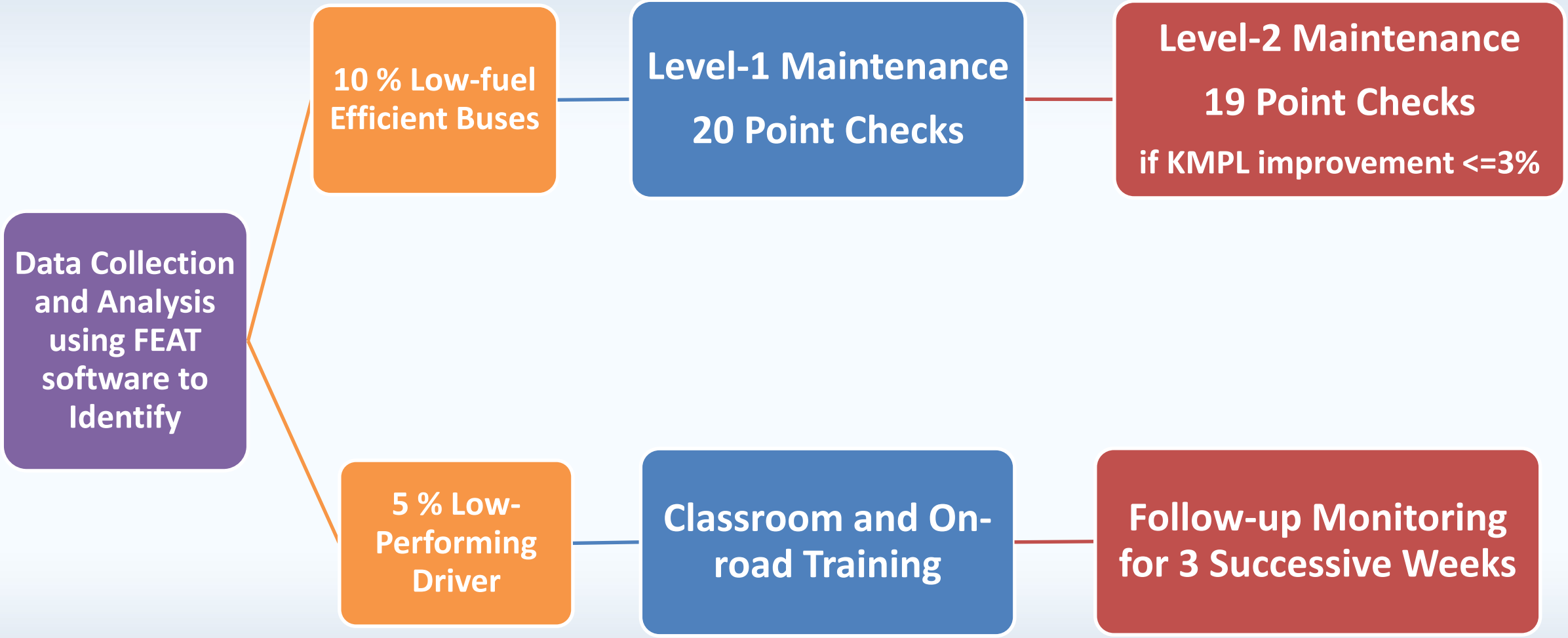
Driver	Route	Bus Type	KM	Liters	(Step 1) Average kmpl	(Step 2) Route/ Bus Type Average (kmpl)	(Step 3) Relative Fuel Economy (kmpl)	Rank (1= Lowest)
512	12	1	4,456	1,234	3.61	3.45	0.16	6
514	12	1	4,678	1,256	3.72	3.45	0.27	8
583	12	1	4,315	1,406	3.07	3.45	-0.38	1
Average	**12**	**1**	**13,449**	**3,896**	**3.45**			
511	12	2	4,987	1,432	3.48	3.22	0.26	7
521	12	2	4,489	1,489	3.01	3.22	-0.21	3
586	12	2	4,589	1,443	3.18	3.22	-0.04	4
Average	**12**	**2**	**14,065**	**4,364**	**3.22**			
506	14	1	4,980	1,276	3.90	3.62	0.28	9
567	14	1	4,540	1,245	3.65	3.62	0.03	5
569	14	1	4,644	1,391	3.34	3.62	-0.28	2
Average	**14**	**1**	**14,164**	**3,912**	**3.62**			

ESMAP Approach
Implementation

ESMAP Approach- Action Points



Technical Actions



ESMAP Approach – Workflow

Total 4 Rounds of Activity

Time Required for Activities Per Round – 6 to 8 weeks

Pre-Engagement Task

Pre-Engagement Task

“Train the Trainer” Approach

Depot Executive	Number of Executives Trained
Nodal Officer in Each Depot	18
Data Operator cum Analyst	20
Bus Maintenance Manager	23
Bus Driver Trainer	19
TOTAL	**80**

Data Collection- Formats

Bus Inventory

Bus Code	Bus Type	Bus Registration Number	Manufacturer	Manufacturing Year	Seats	AC / NonAC	Floor Type	Horse Power	Transmission Type	Lifetime Bus KM
101	3	KA5F-0101	LEYLAND	2013	48	NON AC	SEMI	130	MANUAL	485266

Driver Inventory

Driver Code	Driver Name
512	Ravi Kumar Sahu

Data Collection- Formats

Route Inventory			
Route Code	One Way Length KM	One Way Std Trip Time Min	Buses Operated
12	17.80	70	6

Data Collection- Formats

Fuel Consumption							
Input Date	Route Code	Bus Code	Driver1 Code	Driver2 Code	Driver3 Code	Daily Operated KM	Fuel Added Liters
1-Jul-19	12	101	512	514		207.2	45

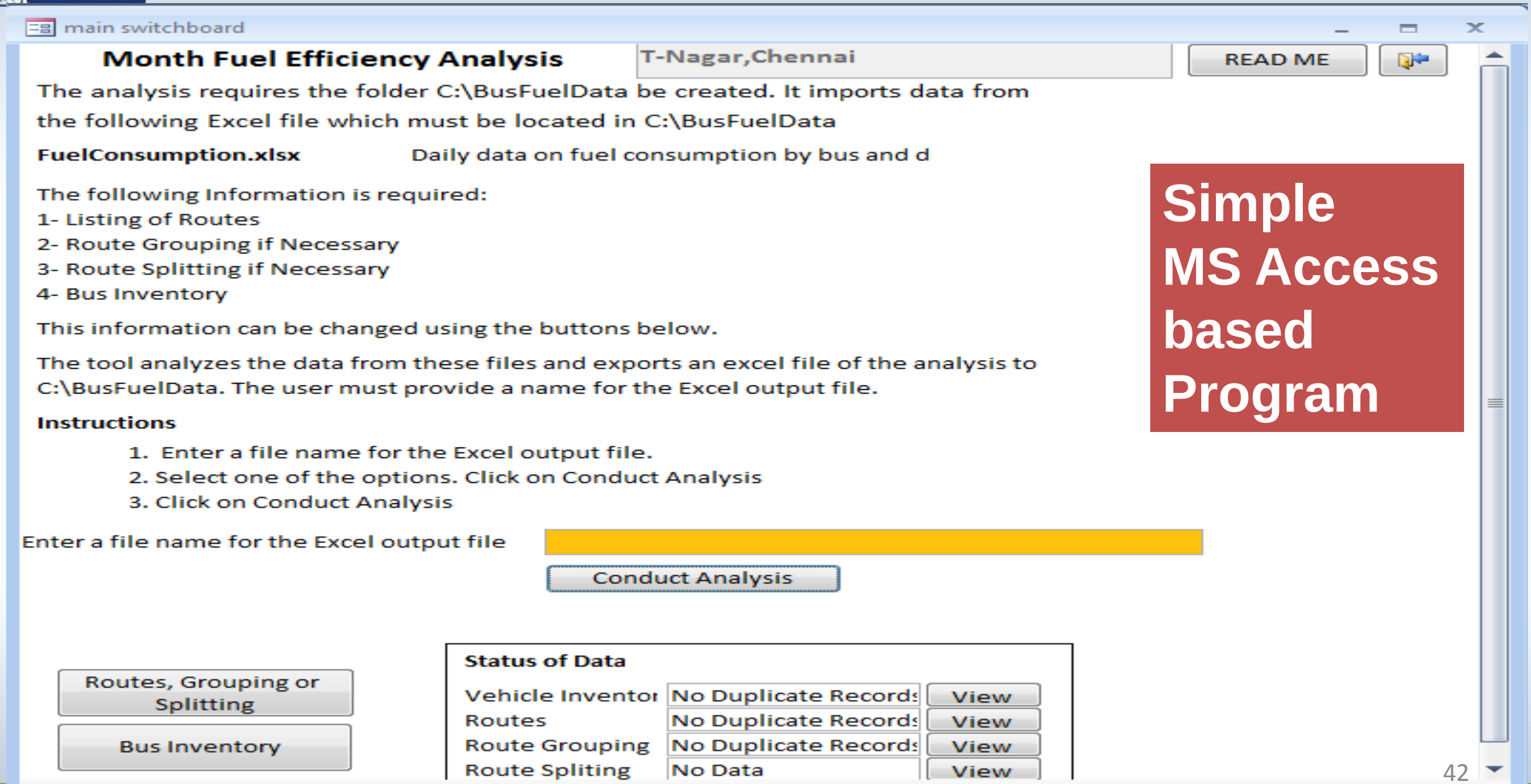
Daily one entry for each bus - In depot with 100 buses

- **Typically 3000 data points are to be carefully analyzed**

Data Validation

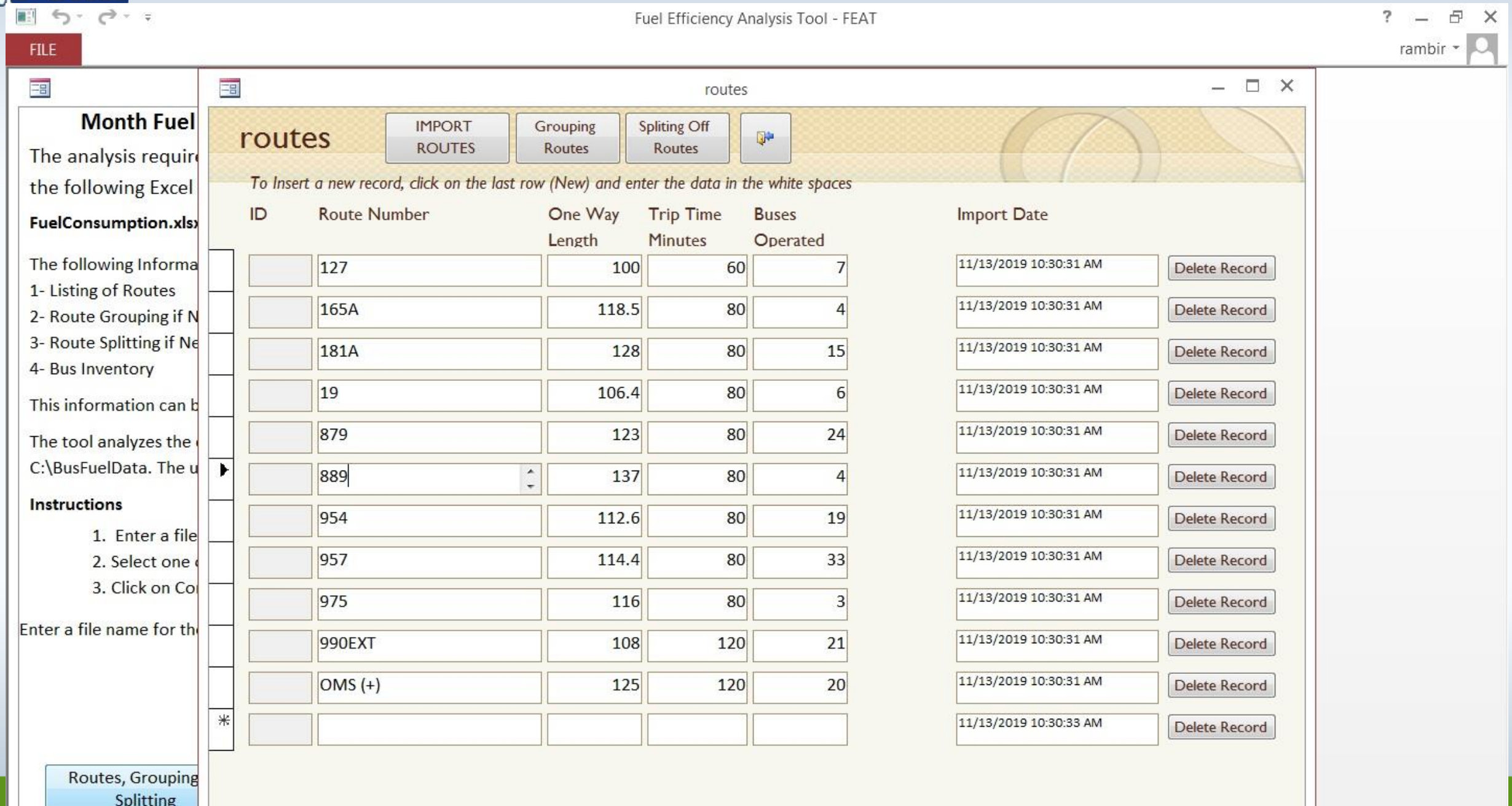
Type of Error	Solution
1. Missing or incorrect entry during manual recording in paper 2. Error while transcribing in electronic format	1. Raised awareness among executives at all level 2. Training provided to data entry operator 3. Verified and corrected erroneous data

Data Analysis Using FEAT Tool

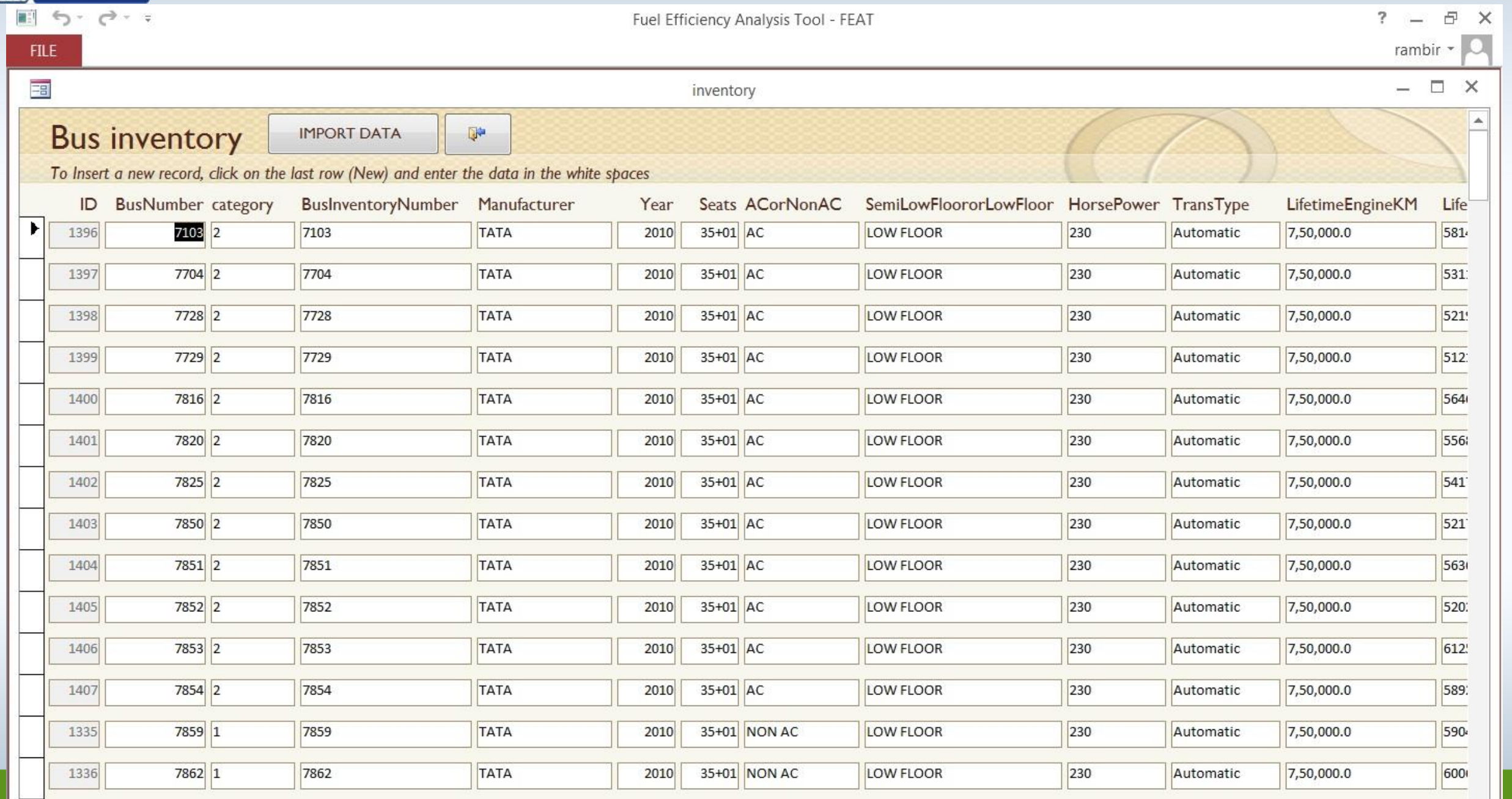


Simple MS Access based Program

Data Analysis Using FEAT Tool



Data Analysis Using FEAT Tool



ID	BusNumber	category	BusInventoryNumber	Manufacturer	Year	Seats	ACorNonAC	SemiLowFloororLowFloor	HorsePower	TransType	LifetimeEngineKM	Life
1396	7103	2	7103	TATA	2010	35+01	AC	LOW FLOOR	230	Automatic	7,50,000.0	581
1397	7704	2	7704	TATA	2010	35+01	AC	LOW FLOOR	230	Automatic	7,50,000.0	531
1398	7728	2	7728	TATA	2010	35+01	AC	LOW FLOOR	230	Automatic	7,50,000.0	521
1399	7729	2	7729	TATA	2010	35+01	AC	LOW FLOOR	230	Automatic	7,50,000.0	512
1400	7816	2	7816	TATA	2010	35+01	AC	LOW FLOOR	230	Automatic	7,50,000.0	564
1401	7820	2	7820	TATA	2010	35+01	AC	LOW FLOOR	230	Automatic	7,50,000.0	556
1402	7825	2	7825	TATA	2010	35+01	AC	LOW FLOOR	230	Automatic	7,50,000.0	541
1403	7850	2	7850	TATA	2010	35+01	AC	LOW FLOOR	230	Automatic	7,50,000.0	521
1404	7851	2	7851	TATA	2010	35+01	AC	LOW FLOOR	230	Automatic	7,50,000.0	563
1405	7852	2	7852	TATA	2010	35+01	AC	LOW FLOOR	230	Automatic	7,50,000.0	520
1406	7853	2	7853	TATA	2010	35+01	AC	LOW FLOOR	230	Automatic	7,50,000.0	612
1407	7854	2	7854	TATA	2010	35+01	AC	LOW FLOOR	230	Automatic	7,50,000.0	589
1335	7859	1	7859	TATA	2010	35+01	NON AC	LOW FLOOR	230	Automatic	7,50,000.0	590
1336	7862	1	7862	TATA	2010	35+01	NON AC	LOW FLOOR	230	Automatic	7,50,000.0	600

Result after Analysis from FEAT

Route Average

Route Number	Bus Type	Bus HP	Route KM	Route Fuel Added	Route Avg. KMPL
12	1	110	20500	5380	3.81
	2	140	27300	9039	3.02
14	1	110	23800	7100	3.35

Result after Analysis from FEAT

Bus Ranking – Lowest Performing Buses on the Basis of Relative Economy

Bus Number	Bus Type	Bus KMPL	Route Avg. KMPL	Relative KMPL	Bus Rank
101	1	3.45	3.81	-0.36	1
102	1	3.31	3.45	-0.14	2
103	2	2.93	3.02	-0.09	3
104	1	3.86	3.81	0.05	4
105	2	3.15	3.02	0.13	5
106	1	3.73	3.45	0.28	6

Result after Analysis from FEAT

Driver Ranking – Lowest Performing Driver on the Basis of Relative Economy

Driver Code	Bus Type	Driver KMPL	Route Avg. KMPL	Relative KMPL	Driver Rank
512	1	3.43	3.79	-0.36	1
514	1	3.29	3.43	-0.14	2
513	2	2.91	3.00	-0.09	3
516	1	3.84	3.79	0.05	4
580	2	3.13	3.00	0.13	5
509	1	3.71	3.43	0.28	6

Bus Maintenance – Level-I Checks- 293 Buses

- Air Filter
- Wheels
- Tyre Pressure
- Driveshaft and Differential
- Lubrication
- Engine
- Air Conditioner
- Clutch and Brakes

Bus Maintenance Level I Checklist

Sr. No.	Level 1 checks
1.	Tyre inflation as per Inflation chart
2.	Free Rolling of Wheels
3.	Wheel Bearing condition & Lubrication
4.	Brake Pedal Free play
5.	Gap between Brake Liner and Drum/Disc
6.	Caliper boot & Wear Adjuster cap
7.	Brake Retraction after pedal release
8.	Lubrication of Driveshaft joints & Bearings
9.	Lubrication of Differential
10.	Tightness of Driveline & Gearbox mounting bolts

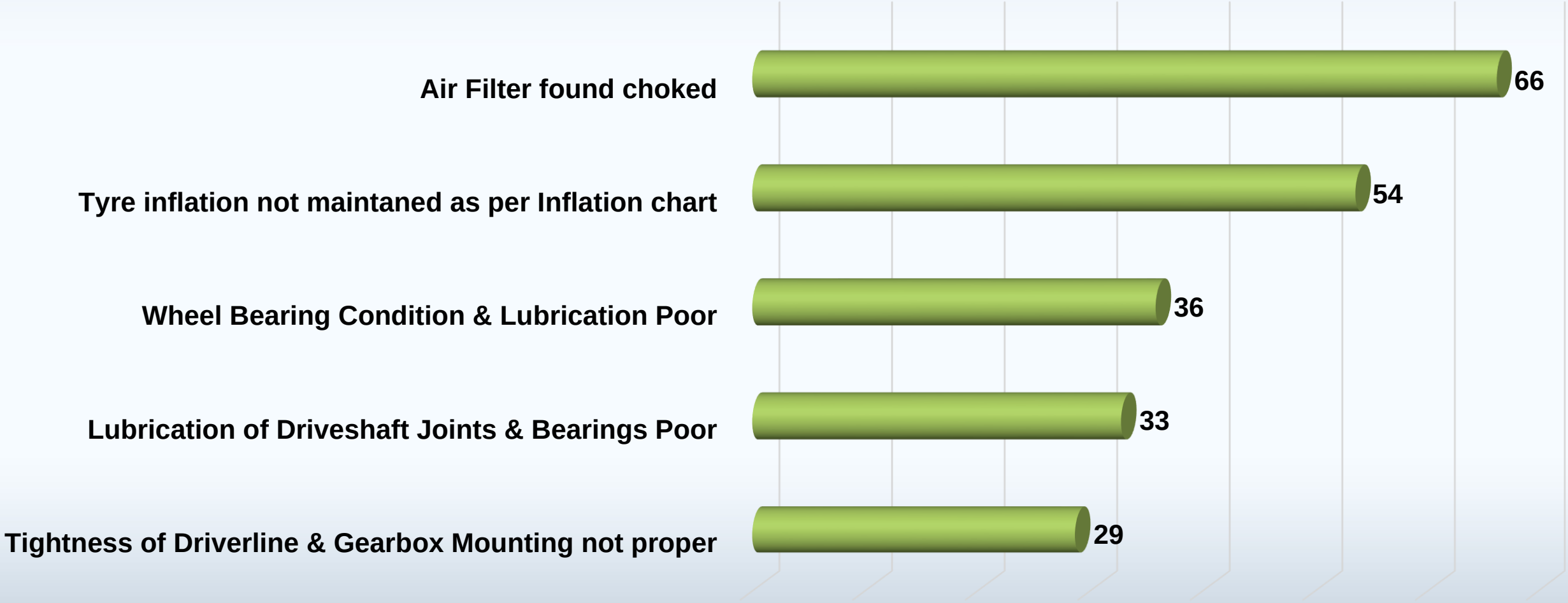
Sr. No.	Level 1 checks
11.	Condition of Clutch pedal linkages
12.	Condition of Accelerator linkages & Lubrication
13.	Accelerator Return spring condition
14.	Air cleaner condition (Choke indicator)
15.	Exhaust pipes/ muffler blockage
16.	Fault codes displayed from On-board diagnostics
17.	Visible Smoke level on snap acceleration
18.	A/C Compressor belt tension
19.	Refrigerant pressure
20.	Compressor working condition

Bus Maintenance – Level-I Checks

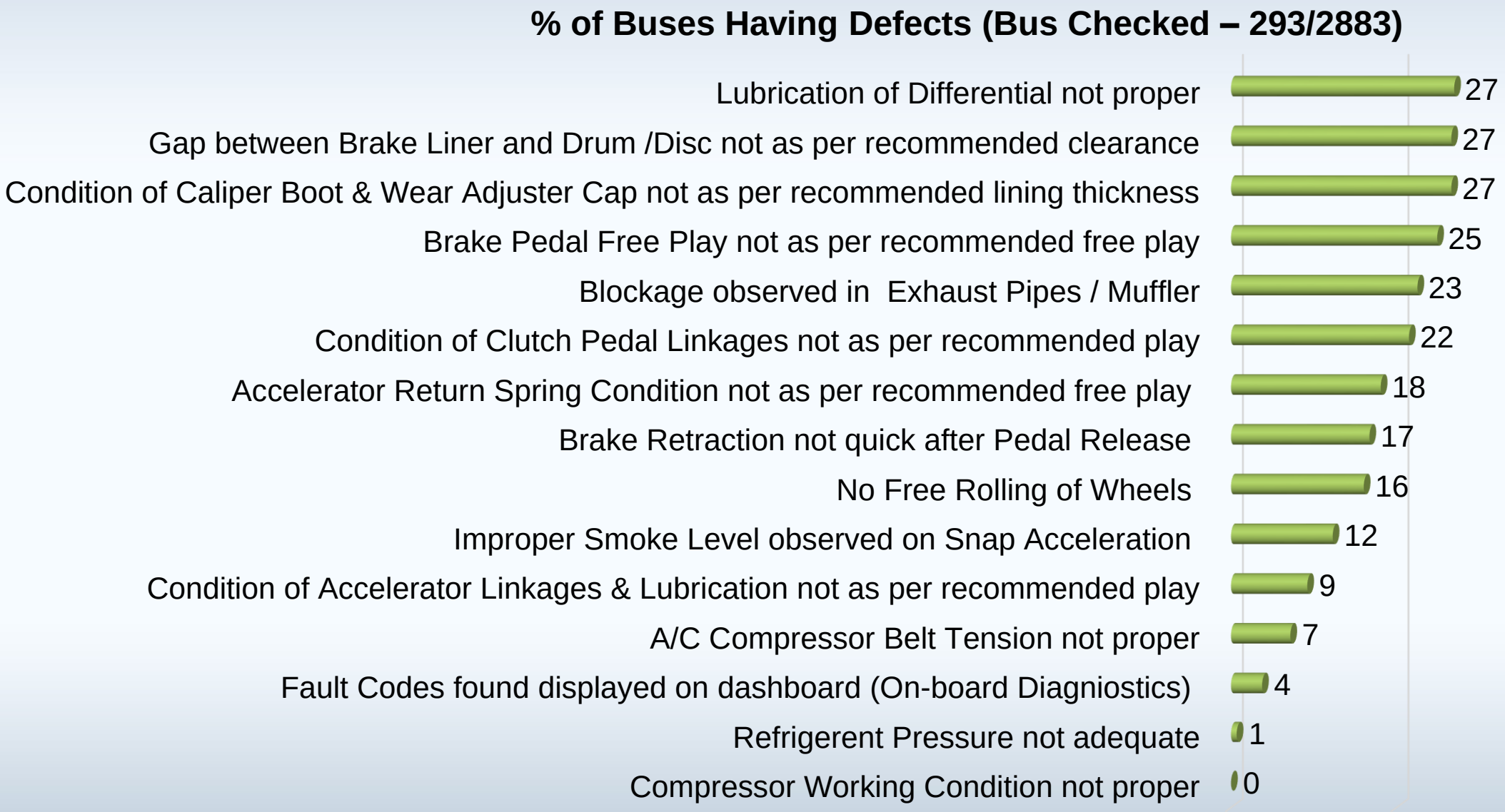
Bus Maintenance – Level-I Checks

Level-I Observations

% of Buses Having Defects (Bus Checked – 293/2883)



Level-I Observations



Bus Maintenance – Level-II Checks- 61 Buses

Clutch	Wheels	Leakages
Fuel Injection System	Engine Oil	Turbocharger
Engine Cylinder	Exhaust System	Overheating

Bus Maintenance Level II Checklist

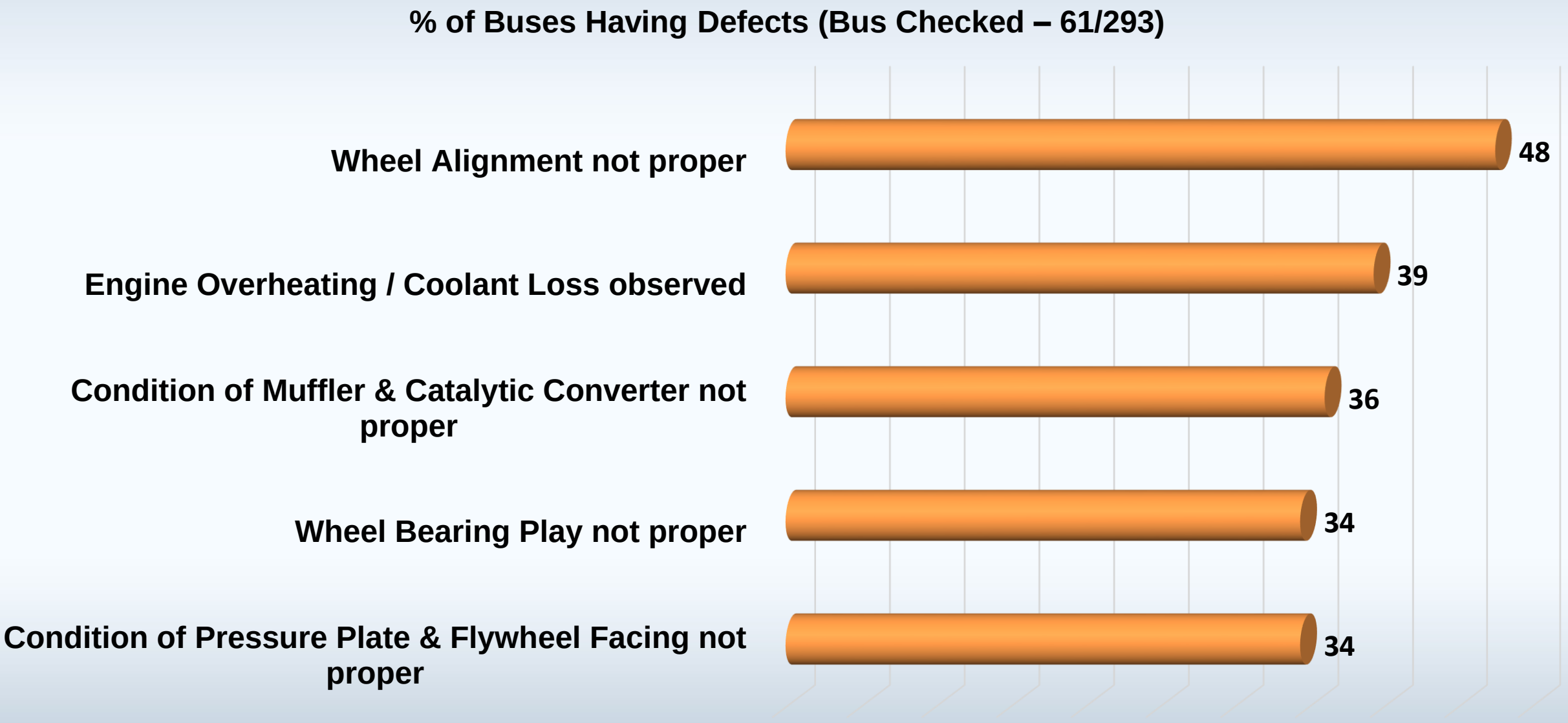
Sr. No.	Level-II Checks
1.	Wheel Alignment
2.	Tyre Camber
3.	Wheel Bearing Play
4.	Condition of Clutch Facing
5.	Condition of Pressure Plate & Flywheel Facing
6.	Condition of Release Bearing & Linkages
7.	Leakage of Fuel from Fuel Tank / Fuel Lines
8.	Leakage of Gas (with smoke Detector)
9.	Tightness of Tanks Mounting & Pipes Clamps
10.	Fuel Injection Pump Timing & Max Fuel Stop Setting

Sr. No.	Level-II Checks
11.	Fuel Injection Pump Working Condition
12.	Condition of Injectors (Spray / Pressure Test)
13.	Condition of Turbo Charger
14.	Tightness of Cylinder Head Bolts/ Nuts & Cylinder Head Condition
15.	Engine oil consumption / Engine Blow- by condition
16.	Cylinders Compression Values (for High Oil Consumptions)
17.	Engine Overheating / Coolant Loss (Flush if Required)
18.	Condition of Muffler & Catalytic Converter
19.	Exhaust Brake Butterfly Operation

Bus Maintenance – Level-II Checks

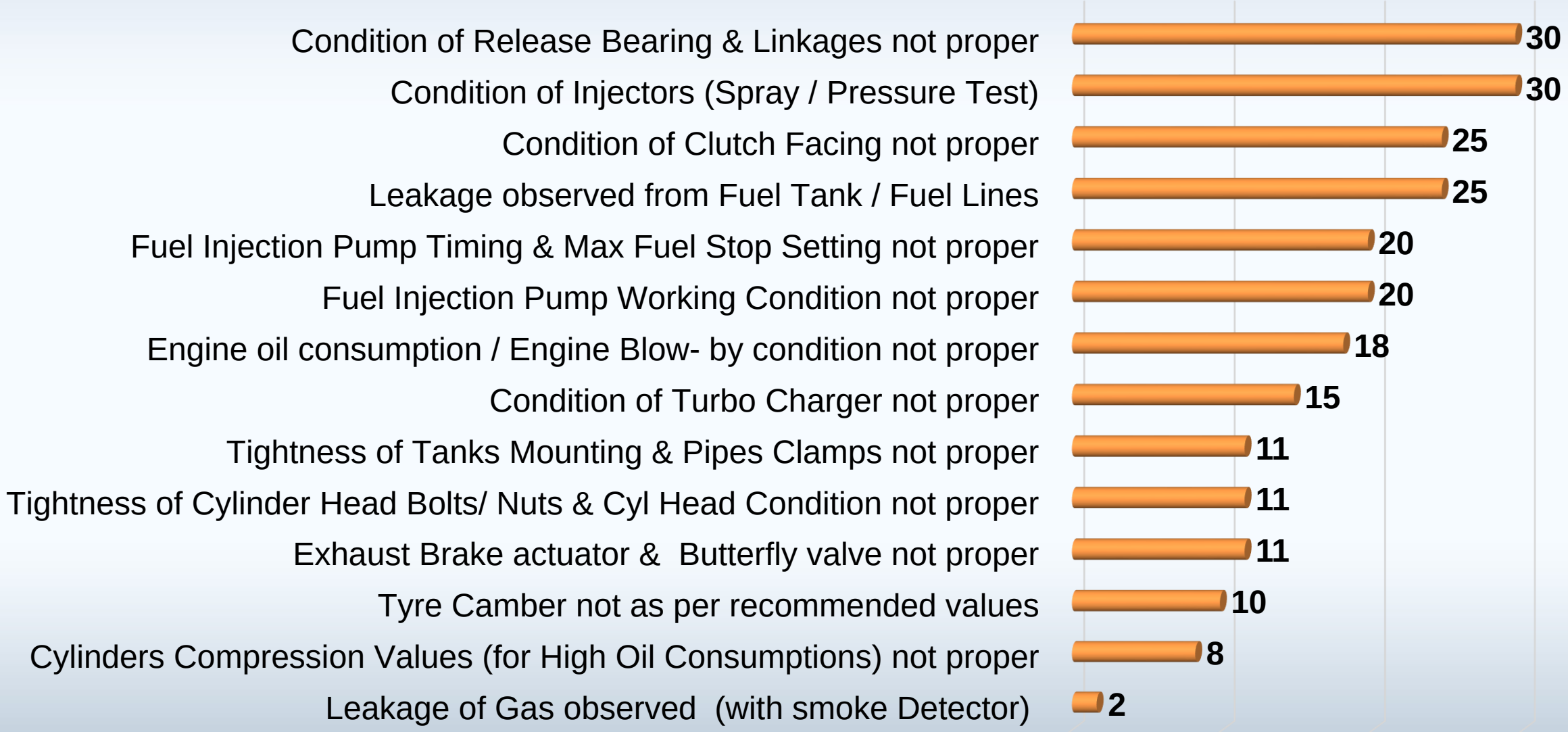
Bus Maintenance – Level-II Checks

Level-II Observations



Level-II Observations

% of Buses Having Defects (Bus Checked – 61/293)



Driver Training Program

One day classroom training

- Motivational Training
- Presentation on eco-driving techniques

Eco-Driving Techniques

- Bus Starting
- Accelerator Use
- Gear Shifting
- Proper Braking
- Concentration
- Anticipation

Driver Training- On-the Road

Driver Trainer Demonstrates the eco-driving technique – then drivers try and demonstrates those techniques

Driver Follow-up Monitoring for 3 weeks

Driver Trainer accompany drivers on actual route and observe driving behavior

Weekly Follow-up Monitoring Checklist

Sr. No.	Driving Checklist
1.	Did the driver check BEFORE STARTING THE IGNITION whether the pressure in both the "AIR METERS" are correct?
2.	Did the driver keep the FEET ON THE FOOT REST NEAR ACCELERATOR?
3.	Did the driver start the bus in "IDLING" condition without pressing accelerator?
4.	Did the driver set the bus in the motion using FIRST GEAR WITHOUT ACCELERATOR?
5.	Did the driver use SECOND GEAR for driving up to a speed of 20kmph and keep the ACCELERATOR at 1/4th position?
6.	Did the driver use THIRD GEAR for driving up to a speed of 30kmph and keep the ACCELERATOR at 1/2 position?

Sr. No.	Driving Checklist
7.	Did the driver use FOURTH GEAR for driving up to a speed of 40kmph and keep the ACCELERATOR at 3/4 position?
8.	Did the driver use FIFTH GEAR for driving at TOP SPEED and keep the ACCELERATOR in FULL position?
9.	Depending upon road or traffic condition, did the driver use the POWERPOINT POSITION on the ACCELERATOR when driving at maximum speed?
10.	Did the driver use his/ her TOES for PRESSING the ACCELERATOR?
11.	Did the driver REMOVE THE FEET FROM THE ACCELERATOR 100 meters BEFORE the stoppage point such as bus stops, traffic signals etc. and for slowing down at speed breakers and turnings?
12.	Did the driver DRIVE WITHOUT PRESSURE AND WITH CONCENTRATION?

Driving Behavior Observations

S. No.	Driving Flaw (Targeted drivers 294)	% of Drivers Committing Flaw		
		1st Week Follow-up	2nd Week Follow-up	3rd Week Follow-up
1	The driver did not use his/ her TOES for PRESSING the ACCELERATOR?	42%	11%	7%
2	The driver did not REMOVE THE FOOT FROM THE ACCELERATOR 100 meters BEFORE the stoppage point such as bus stops, traffic signals etc. and for slowing down at speed breakers and turnings?	27%	11%	6%
3	The driver did not keep the Foot ON THE FOOT REST NEAR ACCELERATOR?	26%	10%	3%
4	The driver did not set the bus in the motion using FIRST GEAR WITHOUT ACCELERATOR?	26%	21%	8%
5	The driver did not start the bus in "IDLING" condition without pressing accelerator?	26%	11%	3%
6	The driver did not use the FOURTH GEAR for driving upto a speed of 40kmph and did not keep the ACCELERATOR at 3/4 position?	24%	14%	4%

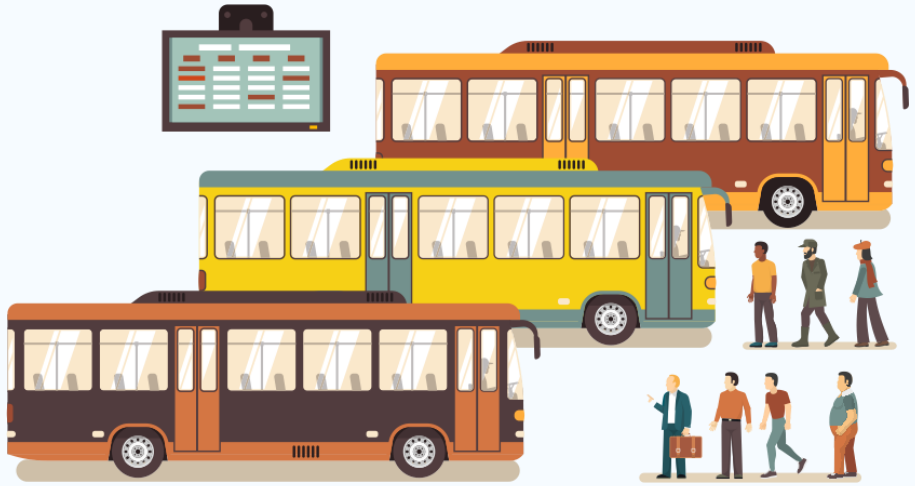
Driving Behavior Observations

S. No.	Driving Flaw (Targeted drivers 294)	% of Drivers Committing Flaw		
		1st Week Follow-up	2nd Week Follow-up	3rd Week Follow-up
7	The driver did not use the THIRD GEAR for driving upto a speed of 30kmph and did not keep the ACCELERATOR at 1/2 position?	22%	17%	4%
8	The driver did not use the POWERPOINT POSITION on the ACCELERATOR when driving at maximum speed?	22%	14%	7%
9	The driver did not use the SECOND GEAR for driving upto a speed of 20 kmph and din not keep the ACCELERATOR at 1/4th position?	18%	10%	5%
10	The driver did not use the FIFTH GEAR for driving at TOP SPEED and did not keep the ACCELERATOR in FULL position?	16%	10%	7%
11	The driver did not check BEFORE STARTING THE IGNITION whether the pressure in both the "AIR METERS" are correct?	8%	7%	4%
12	The driver did not DRIVE WITHOUT PRESSURE AND WITH CONCENTRATION?	6%	7%	3%

Impact Analysis

Program Summary

Number of Depots – 15/18



Number of Buses Attended – 293

Number of Drivers Trained – 294

Impact Analysis- After 2 Rounds

Buses Attended Level-I Checks	Buses Attended Level-II Checks	Relative Performance Improved	% Avg. Fuel Economy Improved	Fuel Saving in Two Months	Monetary Saving in Two Months
293	61	241	12.5%	38 kl HSD 8.7 T CNG	28.6 Lac

10 % Targeted Buses in Each Round

82% Buses Improved

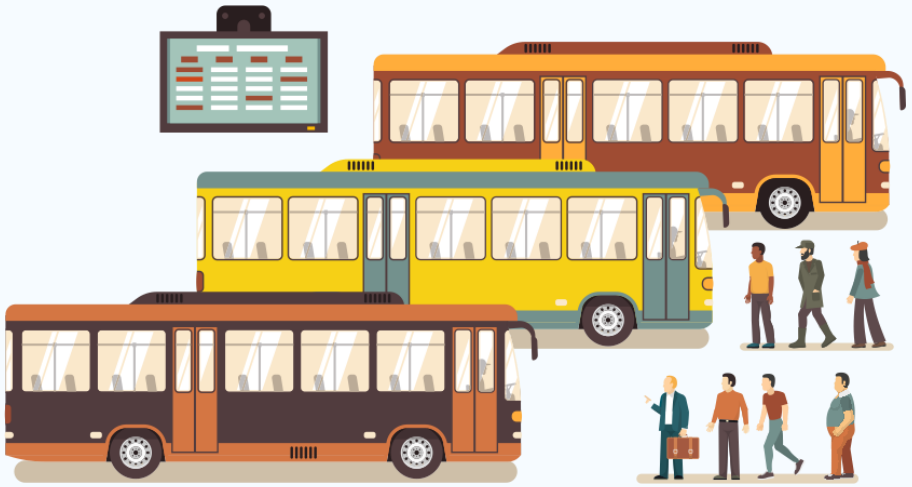
Impact Analysis

Driver Trained	Relative Performance Improved	% Avg. Fuel Economy Improved	Fuel Saving in Two Months	Monetary Saving in Two Months
294	241	12.6%	14 kl HSD 8.5 T CNG	13.2 Lac

5 % Targeted Drivers in Each Round

75% Driver Improved

Impact Analysis on 15 Depot



Saving in Two Months

80.5 KL Diesel Saved

52.3 Lacs Rupees Saved

215.7 T CO_2 Emission Reduced

2	अ. वाहतूकीपासून उत्पन्न	917871	1.51	12804518	20.26	29259937	29383599
	ब. इतर जमा			38110763			

19/5/2019

लोकमत

दोन महिन्यांतील स्थिती : वायुप्रदूषण घटले; उत्पन्नात दरमहा सात लाखांची वाढ

वीस हजार लिटर इंधनची बचत

तानाजी पोवार।
लोकमत न्यूज नेटवर्क

कोल्हापूर : केंद्र शासनाने जागतिक बँकेच्या अर्थसाहाय्यातून कोल्हापूरच्या परिवहन विभागात (केएमटी) 'पीसीआरए' योजना गेल्या अडीच महिन्यांपासून कार्यान्वित केली आहे. तिचा परिणामही सकारात्मक आला आहे. बसेसच्या तांत्रिक बाबींकडे लक्ष दिल्यामुळे गेल्या दोन महिन्यांत सुमारे वीस हजार लिटर इंधनाची बचत होऊन 'केएमटी'च्या उत्पन्नात दरमहा सरासरी सात लाखांची वाढ झाली आहे. त्यामुळे डबघाईला आलेल्या या परिवहन उपक्रमास ही योजना 'बुस्ट' ठरणार हे निश्चित. 'पीसीआरए' योजनेमुळे फक्त उत्पन्नातच वाढ नव्हे, तर वाहनांचे वायुप्रदूषणही कमी होण्यास मदत झाली आहे.

गेल्या अनेक वर्षांत संपूर्ण महाराष्ट्रातील शासनाची परिवहन सेवा तोट्यात सुरू आहे. कोल्हापूर मनपाची परिवहन सेवा (केएमटी) ही त्याचाच एक भाग आहे. 'केएमटी'लाही दरमहा तोट्याला सामोरे जावे लागते. सद्य:स्थितीत केएमटीला सुमारे साडेआठ ते नऊ लाख रुपयांपर्यंत उत्पन्न मिळत आहे. या उत्पन्नात वाढ करण्यासाठी 'पीसीआरए' योजना लागू केली. त्यासाठी ऑक्टोबर २०१८ पासूनही प्रत्येक बसचे सूक्ष्म निरीक्षण करुन तिच्यातील तांत्रिक दोष दूर करण्यासाठी पेट्रोलियम कॉन्झर्व्हेशन अँड रिसर्च असोसिएशनचे वरिष्ठ तांत्रिक सल्लागार वी. एस. राजे, सल्लागार शिवाजी जाधव आणि केएमटी कार्यशाळा व्यवस्थापक प्रतापराव भोसले यांनी प्रयत्न करुन केएमटीच्या प्रत्येक कर्मचारी, चालक, वाहक यांना 'पीसीआरए'चे प्रशिक्षण दिले. त्याद्वारे ही योजना कार्यान्वित केली आहे. विशेष म्हणजे, सरकारी वाहनांचे प्रदूषण कमी करण्याच्या उद्देशाने ही 'पीसीआरए' योजना आणली आहे.

ऑक्टोबर २०१८ पासून प्रत्येक बसमधील तांत्रिक बाबींचे सूक्ष्म निरीक्षण करुन त्यातील दोष कमी करण्याचा प्रयत्न केला जात आहे. त्यासाठी 'फ्लीट' नावाचे सॉफ्टवेअर तयार करुन त्याद्वारे टप्प्याटप्प्याने बसेसच्या कार्यपद्धतीत बदल केला. त्यातून गेल्या दोन महिन्यांपूर्वी सर्व बसेसमधील आणि चालकांच्या कौशल्यातील दोषही कमी करण्यास मदत झाली. त्याचा परिणामही सकारात्मक दिसून आला आहे. या 'पीसीआरए'मुळे प्रत्येक बसचे वायुप्रदूषण कमी झाल्याचे दिसून येते. तर दरमहा डिझेलची बचत होत आहे. परिणामी केएमटीच्या उत्पन्नात खर्च वगळता दरमहा सुमारे सात लाखांची भर पडत आहे.

'पीसीआरए'मध्ये वाहनांची तपासणी

'पीसीआरए' या योजनेमध्ये बसेसचे सूक्ष्म निरीक्षण करुन त्यावर उपाययोजना केल्या जातात. टायरमध्ये हवेचा दाब, इंजिन वॉलसेटिंग तपासणीसह एअर फिल्टर, डिझेल, सायलेन्सर, एअर प्रेशर यांचे लिकेज शोधले जाते; तर बॅटरीची अवस्था, फिल्टर वेळेवर बदलणे, इंधन भरताना वेंवही वाया न घालविणे, आदी २० बाबींकडे गांभीर्याने पाहिले जाते.

'केएमटी' सुसाट : भाग १

129 'केएमटी'च्या एकूण बसेस

दैनंदिन माहिती

106 मार्गावर धावतात

24 हजार कि.मी. रोजची धाव

08 लाख **50** हजार सरासरी रोजचे उत्पन्न

उत्पन्नात वाढ, डिझेलची बचत

- मार्च : ६ लाख ९५ हजार रुपये (डिझेल : १० हजार ५६० लिटर बचत)
- एप्रिल : ५ लाख ९८ हजार रुपये (डिझेल : ९ हजार लिटर बचत) (निवडणुकीमुळे प्रवाशांचा फटका)

पाच टक्के जादा प्रगती

'पीसीआरए'मुळे बसेसच्या इंजिनमधील तांत्रिक दोष कमी झाले. परिणामी, बसेसमध्ये सुमारे पाच टक्के जादा प्रगती झाल्याचे दिसून आले आहे.

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Challenges Faced

- Some depots are hiring drivers on ad-hoc basis, so at times targeted drivers could not complete training program.
- Data maintained by the depot is not in standard format.
- Due to operational constraints buses/drivers could not be made available during working hours.
- Due to various constraints depot delayed in attending maintenance issues
- Some Depots do not have practice of daily topping of fuel tank
- Depot management is occupied with routine operations

Lessons Learnt

- ✓ Modification of preventive bus maintenance schedules has been suggested as per Level-I & Level-II observations.
- ✓ Corrective actions, for faults identified in buses and skill deficiency in drivers observed, should be replicated in all buses/drivers.
- ✓ Depot should continue training and follow-up monitoring to reinforce eco-driving techniques amongst drivers.
- ✓ Depot should strengthen data recording and analysis

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