



Industry Assessment & Roadmap Outline for ZE-MHDTs in India

D2b | Fleet Landscape & Application Analysis



Enabling Smart & Clean Tech Markets



Energy



E-Mobility



LVDC



Enviro



Urban

'P' in our name stands for triple bottom line sustainability of people, profit and planet that we want to bring in all our internal functioning, projects we do, and industries we support. It also keeps us prompt, progressive and partnership valuing. **Manifold** represent abstraction of complex problem to smaller dimension, still preserving elements which matters and are available to influence/control and also measure the system dynamics. We are 'small data' company and take pride in collecting and analysing most relevant data to help our clients with decisions and actions.



Abbreviations



CO2	Carbon-di-oxide
CRISIL	Credit Rating Information Services of India Limited
CV	Commercial Vehicle
EV	Electric Vehicle
GHG	Green House Gas
GoI	Government of India
GVW	Gross vehicle weight
HDT	Heavy Duty Truck
IDT	Intermediate Duty Truck
LDT	Light Duty Truck
LFOs	Large fleet operators
LPG	Liquefied petroleum gas
MAVs	Multi Axle Vehicle
MDT	Medium Duty Truck
MFOs	Medium fleet operators
MHDT	Medium & Heavy Duty Truck
NBFC	Non- Banking Financing Company

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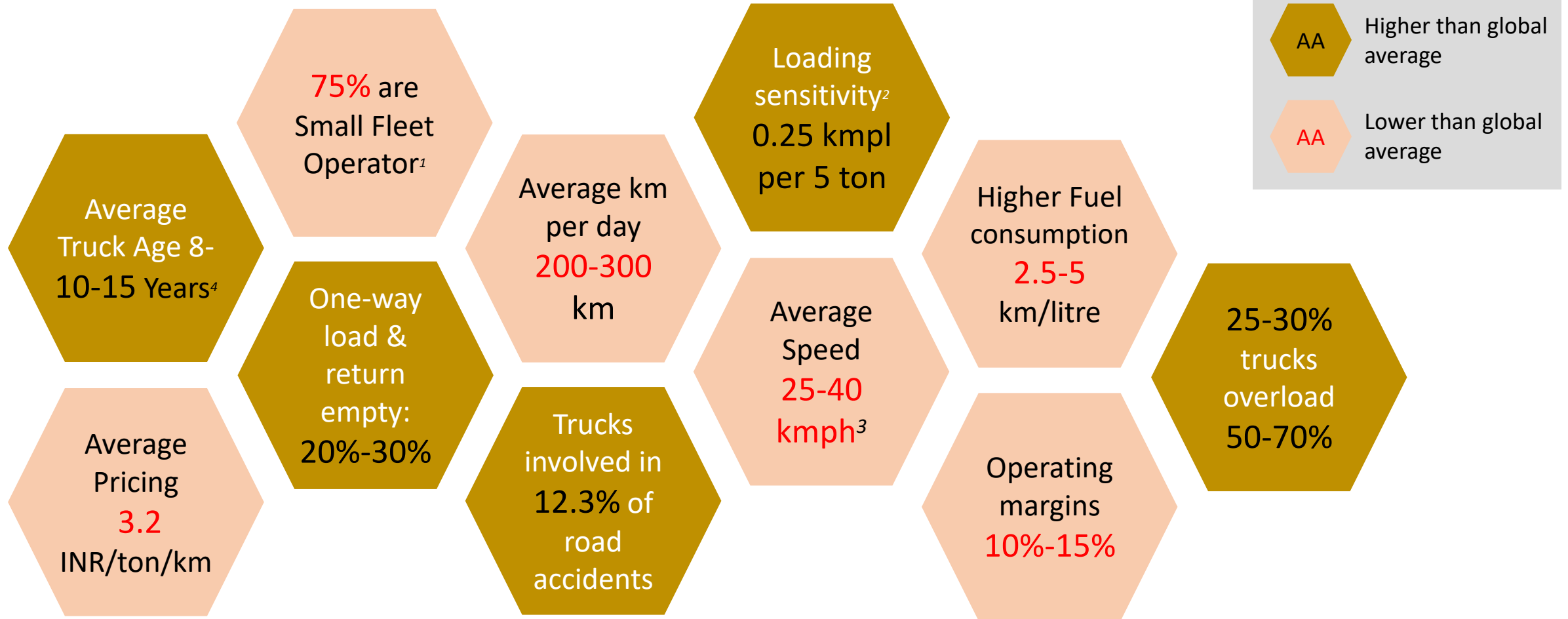
Analysis of Identified Application

Prioritized segments for Electrification

Level-1 Beachhead model



MHDT in India: Stats



AA Higher than global average

AA Lower than global average

¹ Small fleet operators (SFOs): owns less than 6 trucks

² Loading sensitivity: Sensitivity of fuel consumption to payload carried. 5 Ton increase in payload results to 0.25 km/l decrease in fuel efficiency

³ With Expressways, average speed could be 30-60 kmph.

⁴ Average age of first life of truck is 8-10 years. After which it is re-sold and maximum life can go upto 15 years before getting scrapped. Govt is working on limiting age of trucks to maximum 15 years mainly to control pollution and to reduce road accidents

Source: Primary Stakeholder consultation carried by pManifold'21

Note: [Refer Annexure for detailed calculations](#)



Key Complexities of Existing Truck Operations

COMPLEXITIES

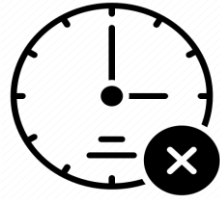


Overloading

25-30% MHDT has 50 to 70% overloading. This leads to

- Higher emission
- Road deterioration

Possibly less overloading propensity



Entry Restrictions

Timing restriction inside city for MAVs
Example of Mumbai City:

- 6am to 12pm – closed
- 12pm to 4pm – open
- 4pm to 9pm – closed
- 9pm to 6am – open

Emission aspect of entry restrictions addressed



Driver Shortage

25% of vehicle stands still due to driver shortage

Ease of driving & less maintenance



Driver Stoppage

Every 50-70 km driver stop to cool down vehicle, check wear and tear etc

Frequent stoppage may reduce as engine overheating no longer an issue

POTENTIAL BENEFITS OF ELECTRIFICATION

Source: Primary Stakeholder consultation carried by pManifold'21



Key Complexities of Existing Truck Operations

COMPLEXITIES



Rising Fuel Prices

In last one year, diesel prices has gone up by 50%

Most states provides subsidised electricity tariff for EV charging¹



Diesel Theft (Diesel Chori)

On an average, 10% of diesel is stolen per trip

Fuel theft is not applicable. Batteries expected to have high security.



Unorganised Market

Unorganised cabin & load body-building, which are mostly cash transactions

e-trucks may be sold completely built for optimum battery integration



Red-tapism

Digitisation of registration, passing and permit process can be part of e-truck policy

Digitisation of registration, passing and permit process can be part of e-truck policy

POTENTIAL BENEFITS OF ELECTRIFICATION

¹ Many companies are willing to invest in Renewable Energy Projects esp. solar & wind mills with support from Government

Source: Primary Stakeholder consultation carried by pManifold'21



Identified Applications



Parcel/Market Load

Perishable Goods

Tankers

Bulk Goods

Others

Parcel Load

Intra-city Retail (Short-haul)*



Inter-city Wholesale (Medium-haul)*



- Carry regular shape of goods packages
- High volume & low weight
- Less overloading propensity

Market Load

Intra-city Retail (Short-haul)



Inter-city Wholesale (Medium-haul)



- Carry irregular shape of goods packages
- Mix density payload
- Moderate overloading propensity

*Short Haul: < 150 km Medium haul: 150 – 400 km Long Haul: > 400 km



Identified Applications



Parcel/Market Load

Perishable Goods

Tankers

Bulk Goods

Others

Vegetables & Fruits

Intra-city Retail (Short haul)



Inter-city Wholesale (Medium haul)



- Deteriorate over a short time
- Mix Payload
- Less overloading propensity
- Perishable & fragile

Fish



- Decay if not kept insulated or frozen
- Mix Payload
- Less overloading propensity
- Perishable & fragile



Identified Applications



- Parcel/Market Load
- Perishable Goods
- Tankers**
- Bulk Goods
- Others

Water



- Permanently mounted tank for transporting water
- More overloading propensity

Petrol



- Design specifically to transport petroleum products in bulk
- Highly regulated, dangerous and hence no overloading. Always one way empty trips

Edible Oil



- Mobile bulk container used to transport wholesale
- Highly regulated and hence no overloading



Identified Applications



Parcel/Market Load

Perishable Goods

Tankers

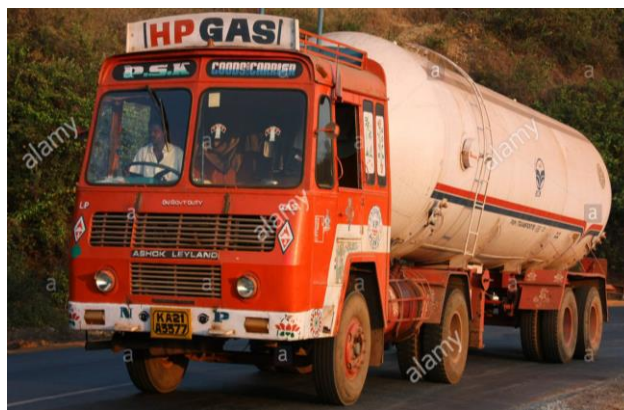
Bulk Goods

Others

Steel



LPG Bulker



LPG Cylinders

Distribution from Bottling plant



Finished Product



Cement Bulker



Cement Bags

Use point Distribution



- Generally does medium to long haul trips.
- Carry Steel rolls, plates, sections & finished products (Less volume, more weight)
- More overloading propensity

- It transport goods from factory outlet to distributor (Medium & long haul trips)
- NO Overloading
- Carry bulk goods

- It transport goods from distributor to end-user. (Short & Medium haul trips)
- Carry cement bags & LPG cylinders
- More overloading propensity



Identified Applications



Parcel/Market Load

Perishable Goods

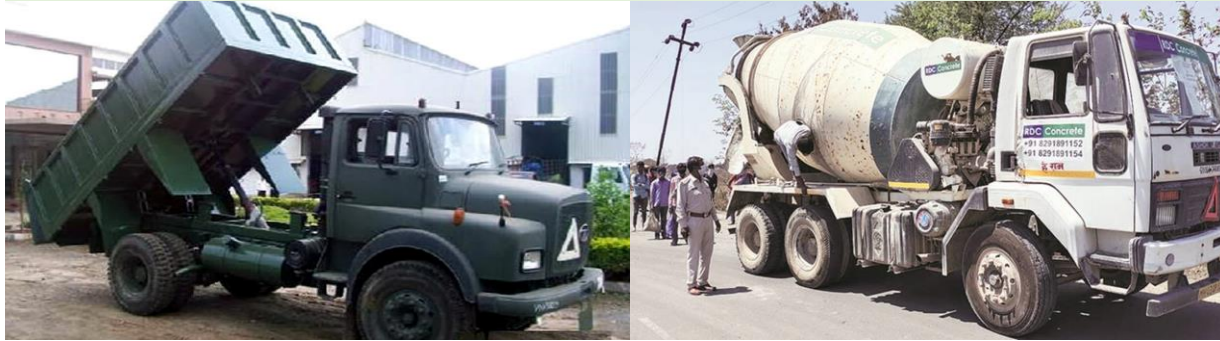
Tankers

Bulk Goods

Others

Tippers

Intra-city Distribution



Inter-city Wholesale & Garbage



- Construction material/waste handling
- Generally short haul trips
- Low propensity of overloading

Coal & Mineral



- Only used between mineral/quarry to bulk transportation centres
- Short haul trips
- Low propensity of overloading



Drayage Application in India



- All Major Ports are connected with railway to transport Cargos from ports
- Other cargos which are not transported by rail are transported by second-use of existing trucks



Contribution of tractor-trailers (mostly second use) at ports is negligible as an application.



Surveyed Stakeholder Profile

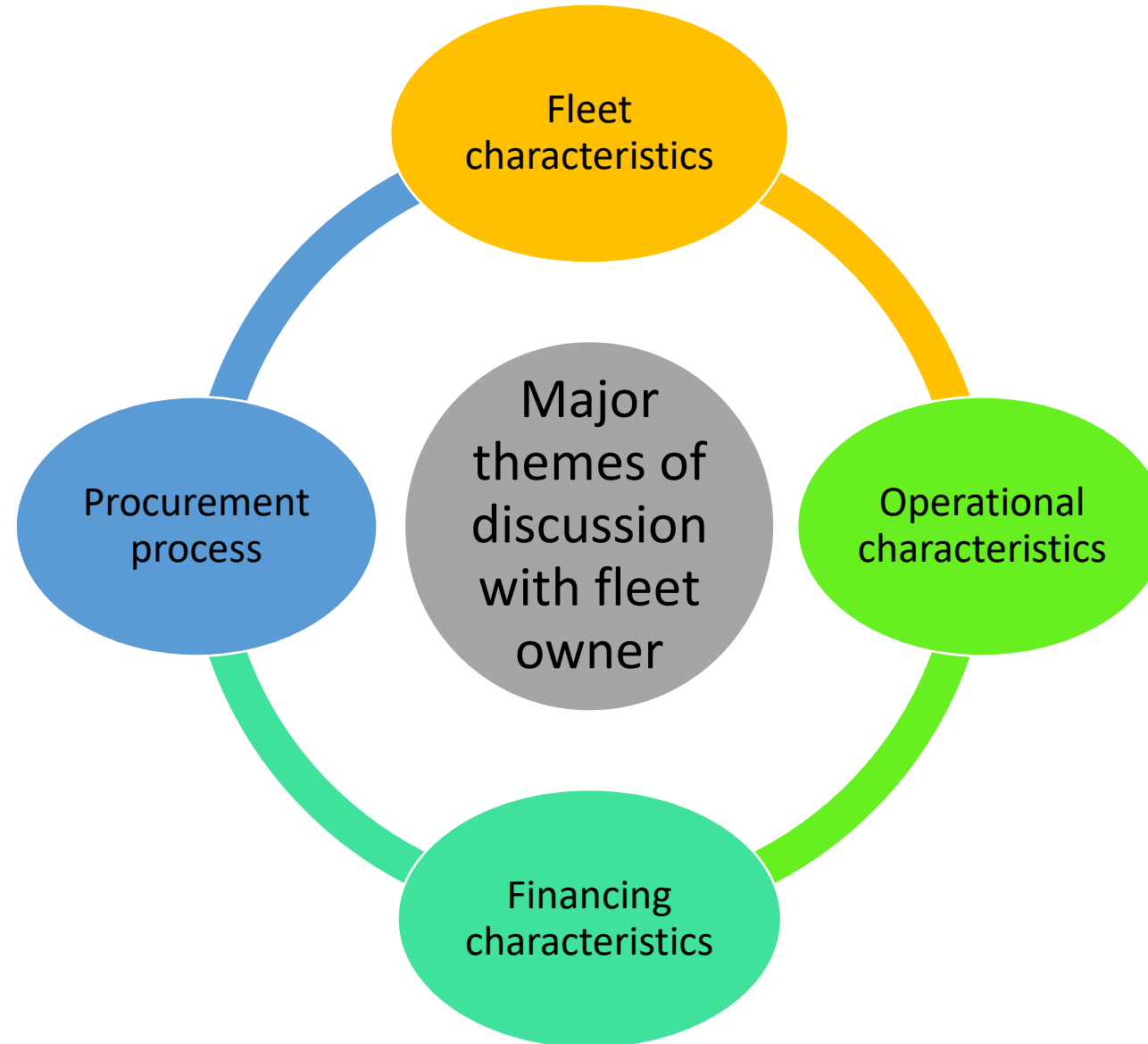


Primary Application	Secondary Application	Surveyed Stakeholder
Parcel/Freight	Parcel Load	M Govindaswamy, Madurai Radha Transports, Madurai, Fleet Strength: 52 ICVs
	Market Load	Rajesh Khandelwar, Owner of 15 trucks and operating more than 80 trucks
Perishable Goods	Vegetables & Fruits	Ram Mohan : Vegetable Wholesaler owns 12 trucks & S Vinoth Kumar: ICV Owner-driver, Koyambedu, Chennai
	Fish	Muthu Krishnan, Area Sales Manager – South, Ashok Leyland, Chennai
Tankers	Petroleum Products	Rajesh S, Vice President – Product Management, Ashok Leyland (Retired)
	Water	
	Edible Oil	
	Milk	
Bulk Goods	Steel	Mohammad Shameer, Regional Sales Manager – South, Tata Motors, Bangalore
	Metals - Finished Products	
	Cement Bags	
	Metals - Finished Products	
	Cement Bulker	
	LPG Bulklers	Muthu Krishnan, Area Sales Manager – South, Ashok Leyland, Chennai
Others	Coal & Minerals (off-site)	Rajesh S, Vice President – Product Management, Ashok Leyland (Retired)
	On-road Tippers	

- **Surveyed 2 Fleet operators, 1 Fleet owner, 3 Regional Sales Manager and 1 Market expert who has 30+ years of Truck marketing and product management experience**
 - **Operating in India**
 - **Small to Large fleet operator**
 - **At least 1 fleet owner from Primary application has been covered during consultation**



Survey Theme – Fleet Owner



Fleet and Ownership Profiling



MHDT Fleet Sizes

As per CRISIL data source,

Fleet operators	Definitions
Small fleet operators (SFOs)	Less than 6 trucks
Medium fleet operators (MFOs)	6-20 trucks
Large fleet operators (LFOs)	>20 trucks

Source: Road turns rough for small fleet operators, CRISIL, Nov 2018

- Henceforth, this classification is used in our study

As per primary interaction with fleet owner,

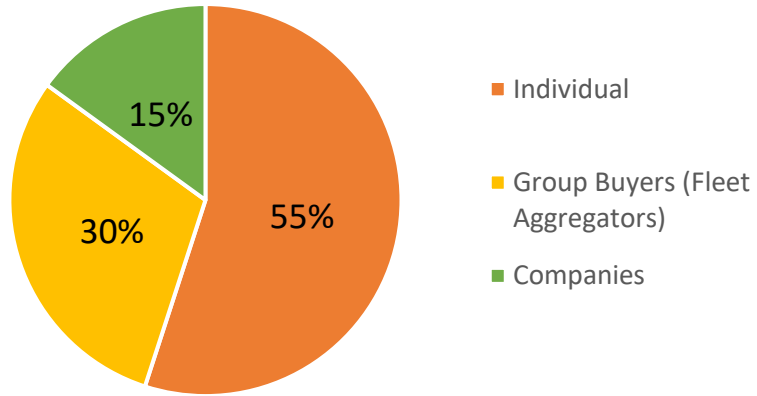
Fleet operators	Definitions
Driver-cum-owner	1 trucks
Individual owner	1-9 trucks
Fleet Owner	≥10 trucks
<ul style="list-style-type: none"> Small Fleet owner Large Fleet owner 	10-20 trucks ≥20 trucks

Source: Primary Stakeholder consultation carried by pManifold'21

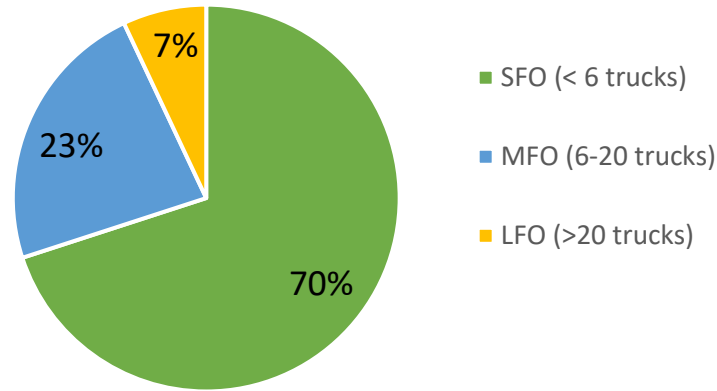


Fleet Owner's Profiling

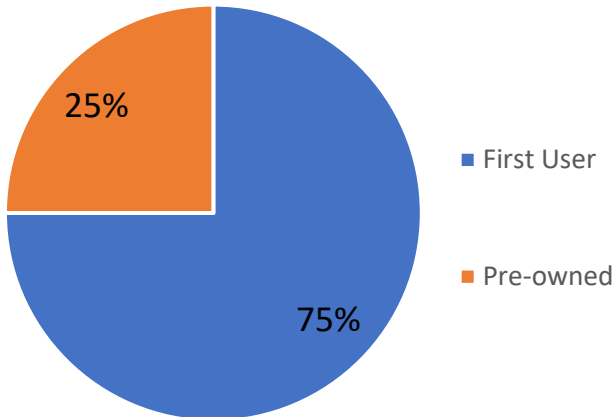
Buyers Type



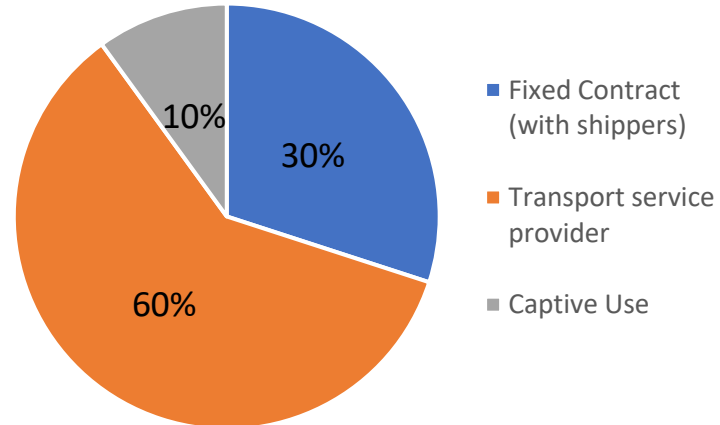
Fleet Sizes



Truck Use



Contract Type



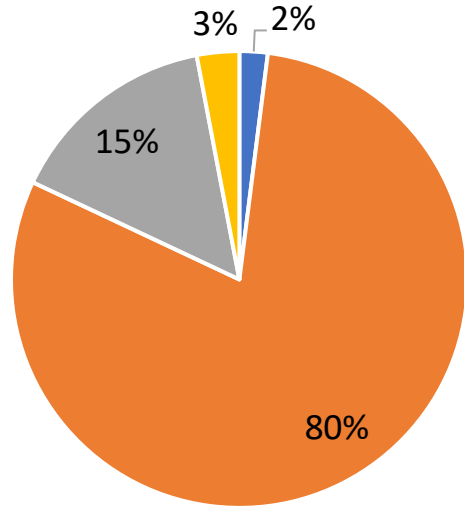
- Although 70% of the buyers own less than equal to 6 trucks, they make up 27 % of the on-road fleet.
- On the similar line, 23% of buyer who own 6-20 trucks makes up 38% of on-road fleet.
- Nearly 75% on road trucks in India are in their first use, which is typically 8-12 years
- The second use is usually an addition of 5 years and is restricted to few specific applications. e.g. In-Port container movement, Raw material transport from quarry to road hub, etc



Fleet Owner's Profiling



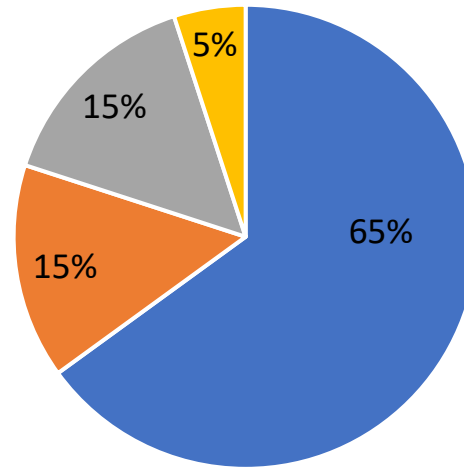
Financing Model



- Own Funds
- Finance with - NBFC
- Finance with - State/Private Banks
- Finance with - Others

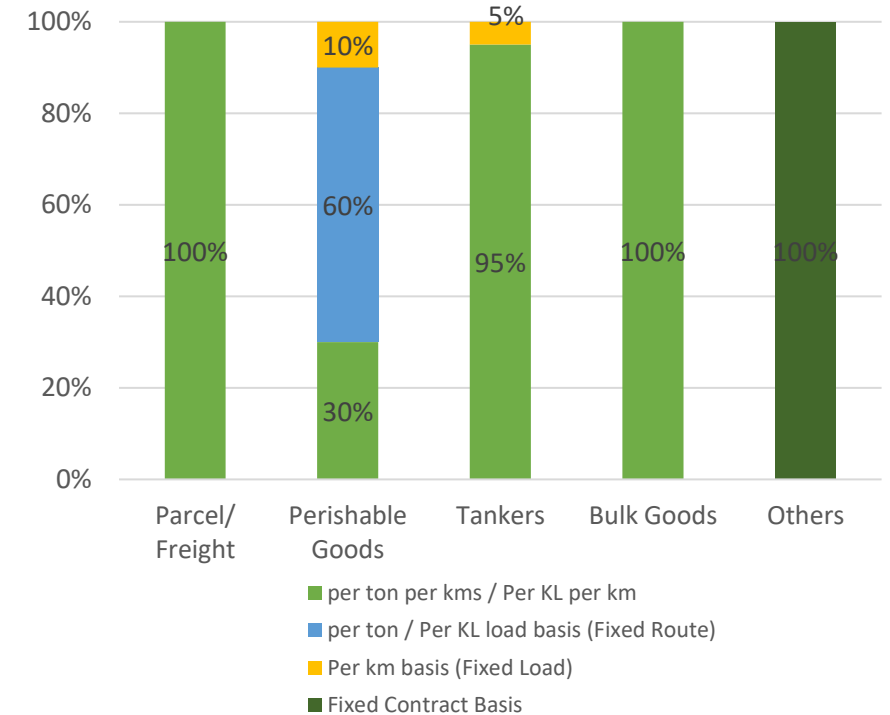
➤ 80% of the truck owners are financed by NBFC

Contract Design



- per ton per kms / Per KL per km
- per ton / Per KL load basis (Fixed Route)
- Per km basis (Fixed Load)
- Fixed Contract Basis

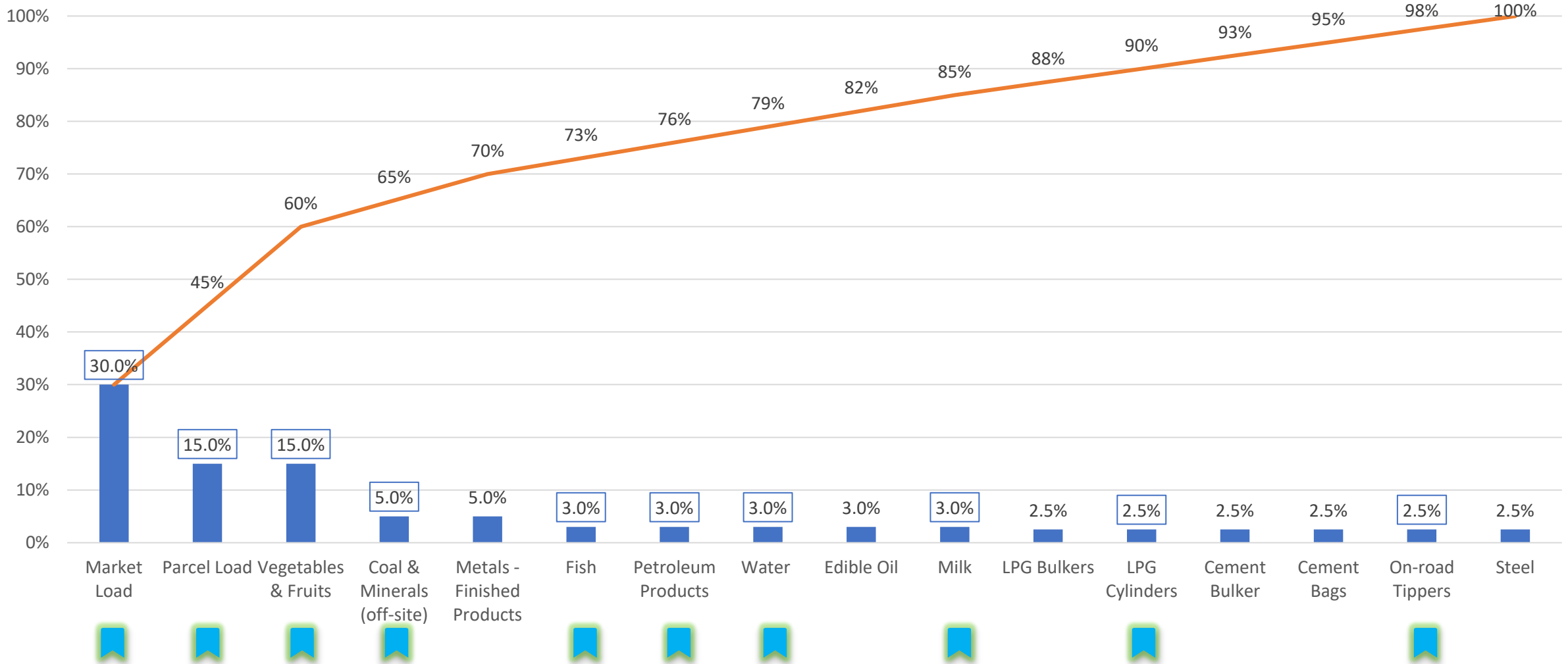
➤ 65% of trucks are charged on the basis of ton per kilo-meters



➤ Parcel/Freight & Bulk goods are charged on per ton per kms basis



On-Road Fleet share of Applications

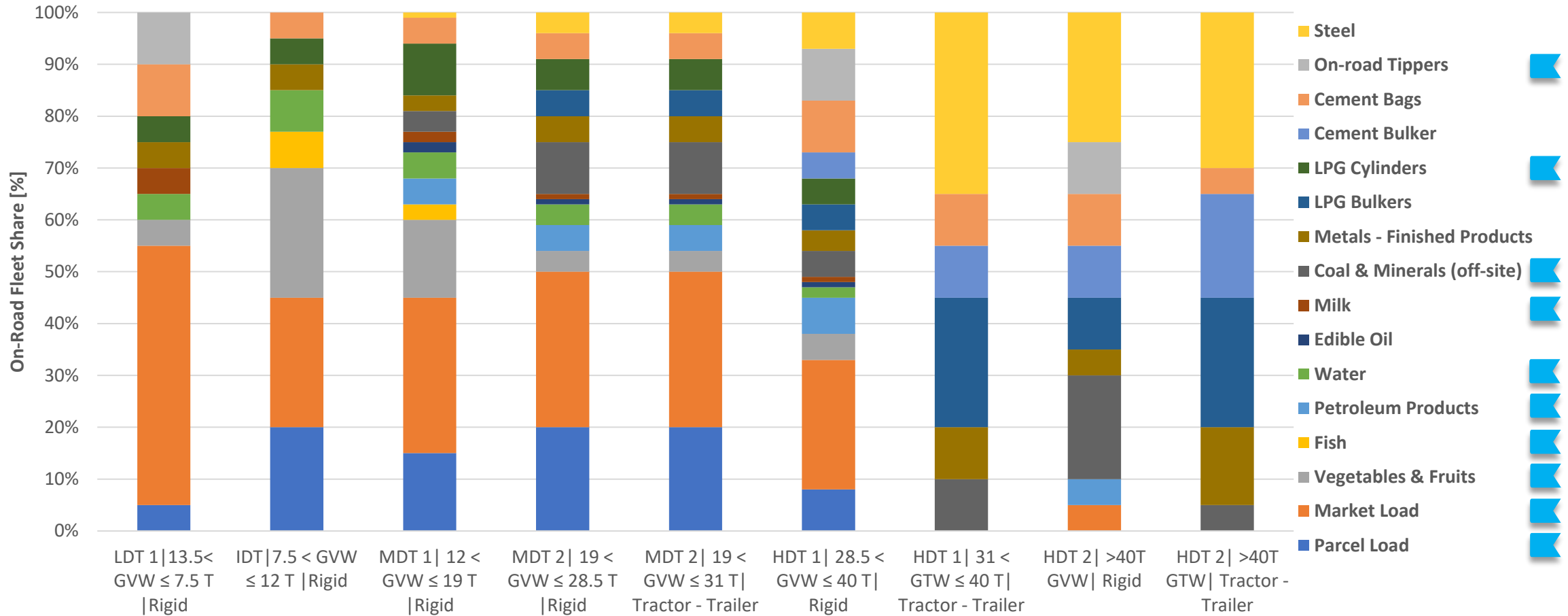


- Segments identified based on electrification favourable attributes 1) trip distance 2) distance per day 3) overloading propensity
- Identified segment make up ~81% of fleet share of applications

Source: pManifold Analysis (Primary research Industry expert)



Share of Truck Segments by Applications

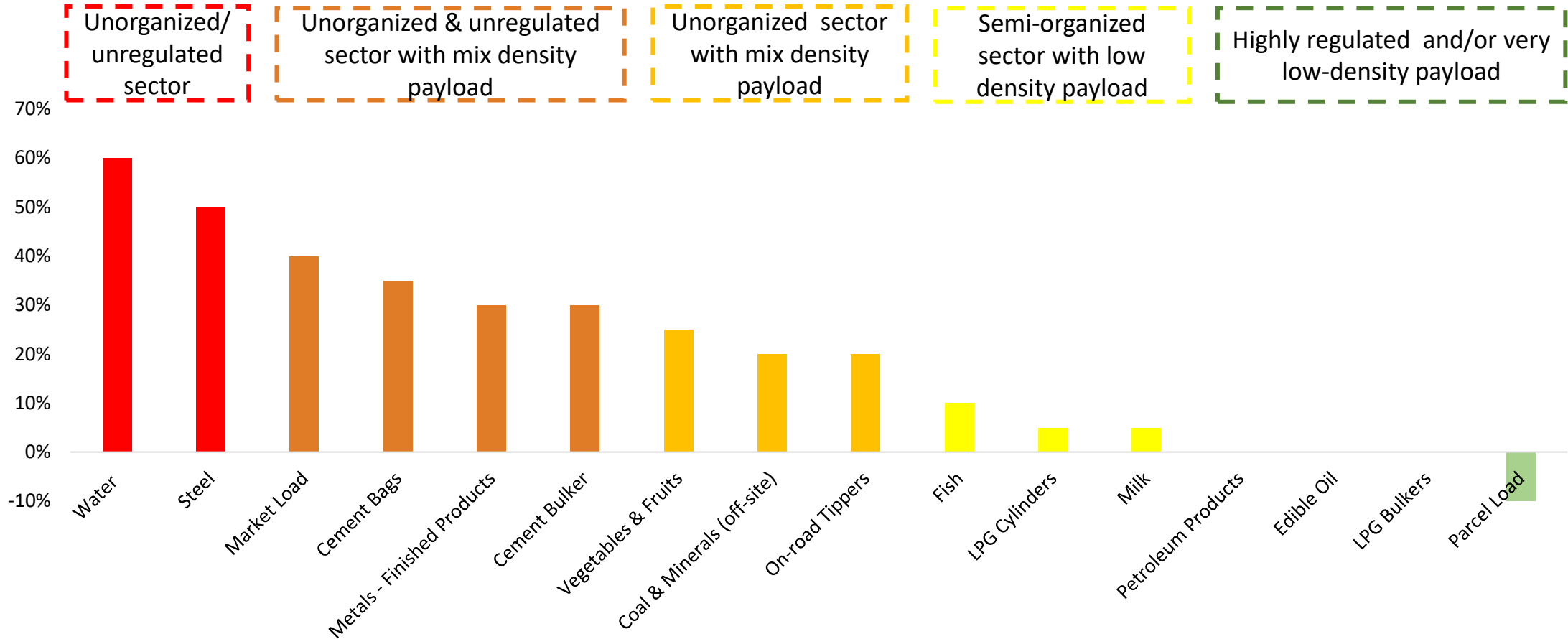


Source: pManifold Analysis (Primary research Industry expert).

- 25% LDTs & 60% IDTs are mostly used for short distance and/or intra-city applications (LPG Cylinders, Parcel Load, Perishables, etc)
- 15% MDTs & 10% HDTs are also used for short distance applications (coal & mineral handling, construction material, etc)
- 22% MDTs & 5% HDTs are used in long distance applications with regulated loading (petroleum, milk & oil tankers, parcels, etc)



Overloading

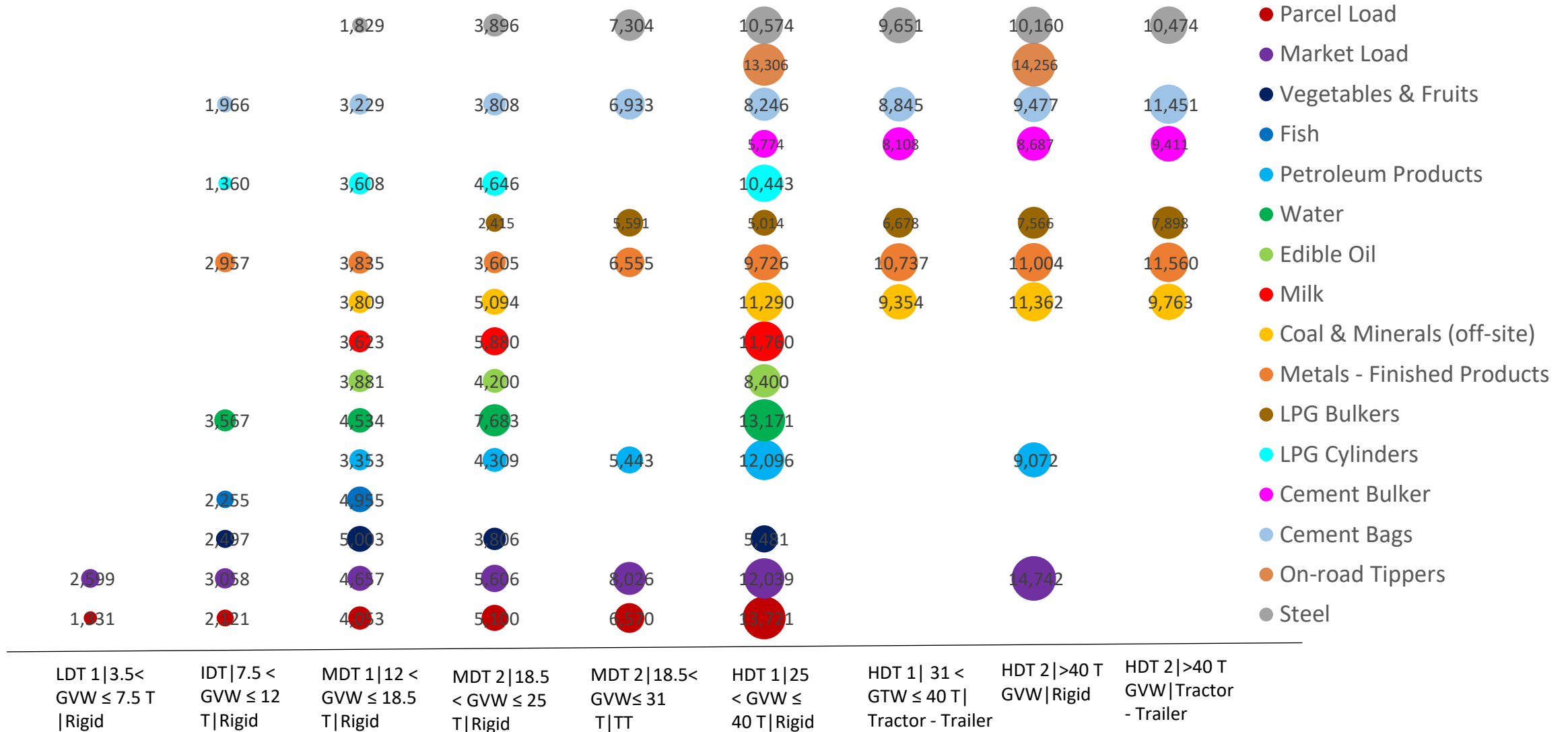


- As application sector become more organized and regulated, overloading propensity seems to decrease
- Overloading also seems to increase with density of payload, as owner seek to maximize load-body (volume) utilization

Source: pManifold Analysis (Primary research Industry expert)



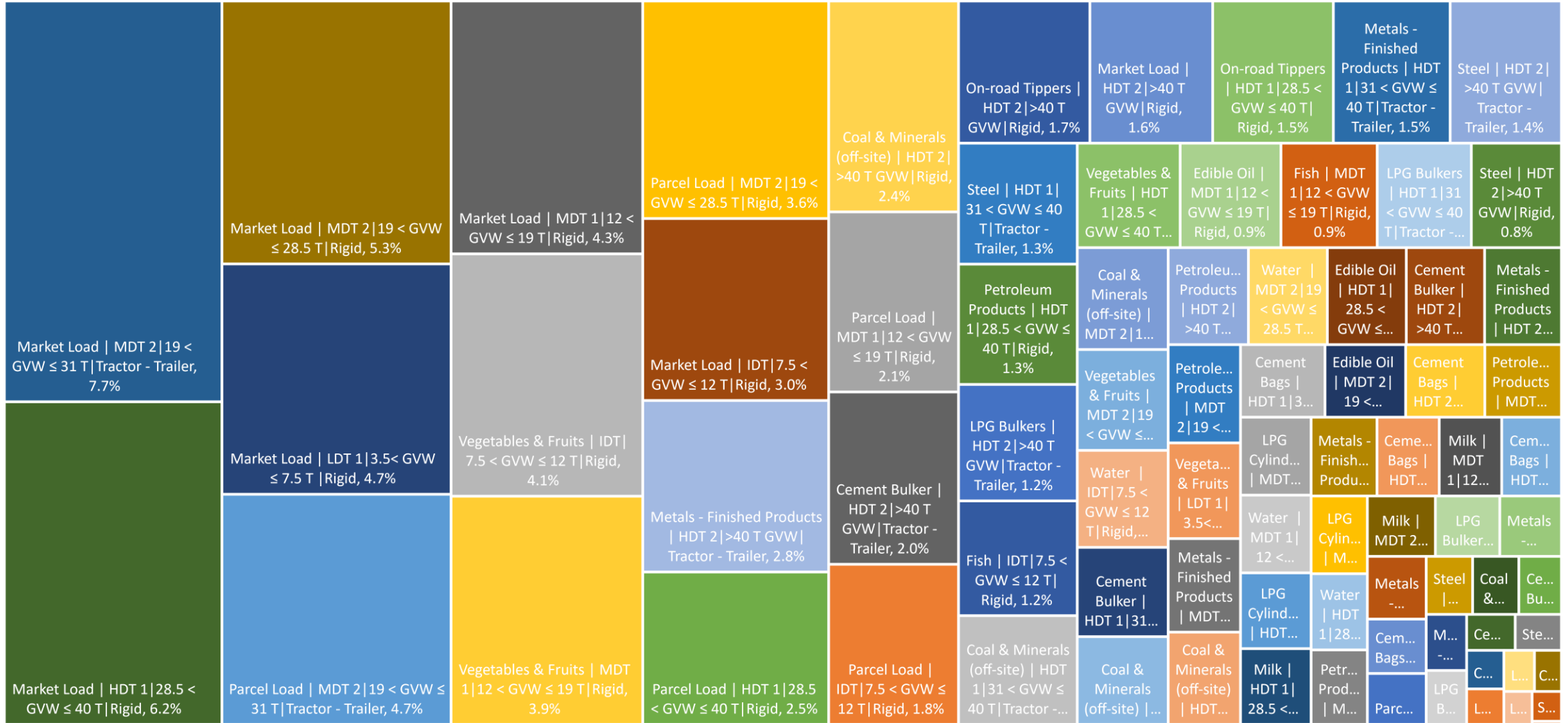
Vehicle Utilization (ton-km/day)



Source: pManifold Analysis (Primary research Industry expert)



Estimated CO₂ Share of On-Road Fleet



➤ Directed Weighted Vehicle Utilization on road fleet share

Refer annexure slide for detailed methodology

Source: pManifold Analysis (Primary research Industry expert)



Potential Segments for Electrification Prioritization



➤ Identified segments for electrification has potential to save up to 45% of CO2

Source: pManifold Analysis (Primary research Industry expert)



Level-1 Beachhead Model



Wave 1



E- 3 wheelers



E-Bus Intra City MCV

2021

Wave 2



Parcel load Rigid ZE-IDT & MDT 1



LPG Cylinders- Rigid ZE-IDT



Garbage - Rigid ZE-MDT 1

2022

Wave 3



Parcel load Rigid ZE-MHDT 1



LPG Tankers - Rigid ZE_MDT



Milk Tankers - Rigid ZE-MDT

2024

Wave 4



Oil (Petroleum) Tankers - Rigid ZE-MDT



Steel Rigid ZE-HDT 1



Market load Rigid ZE-MDT

2026

Wave 5



Water tanker Rigid ZE-MDT



Coal & Mineral Rigid ZE-MHDT



Finished Products Rigid ZE-HDT

2028

2030

[Refer annexure slide for details](#)

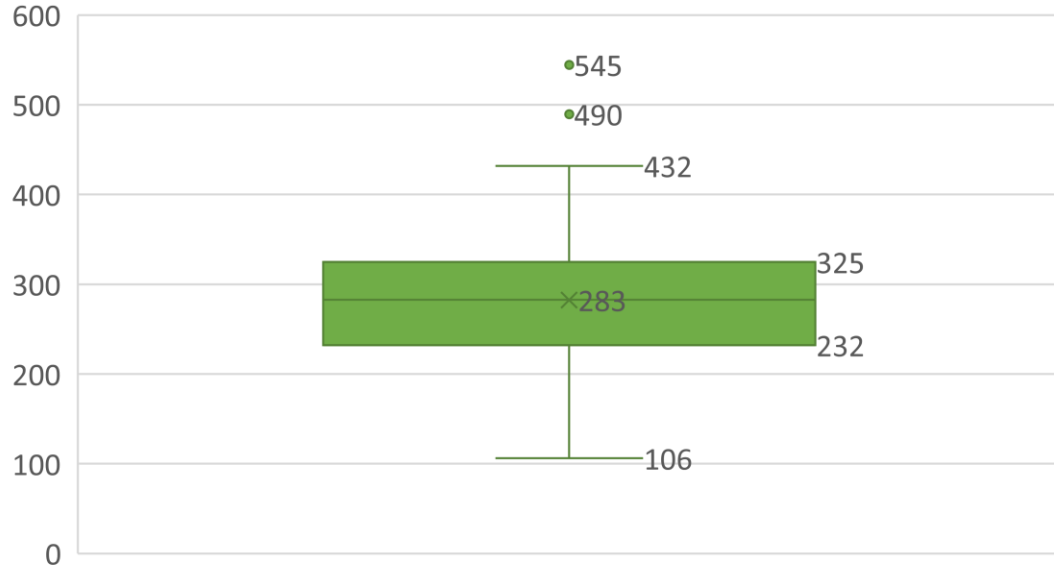
ANNEXURE



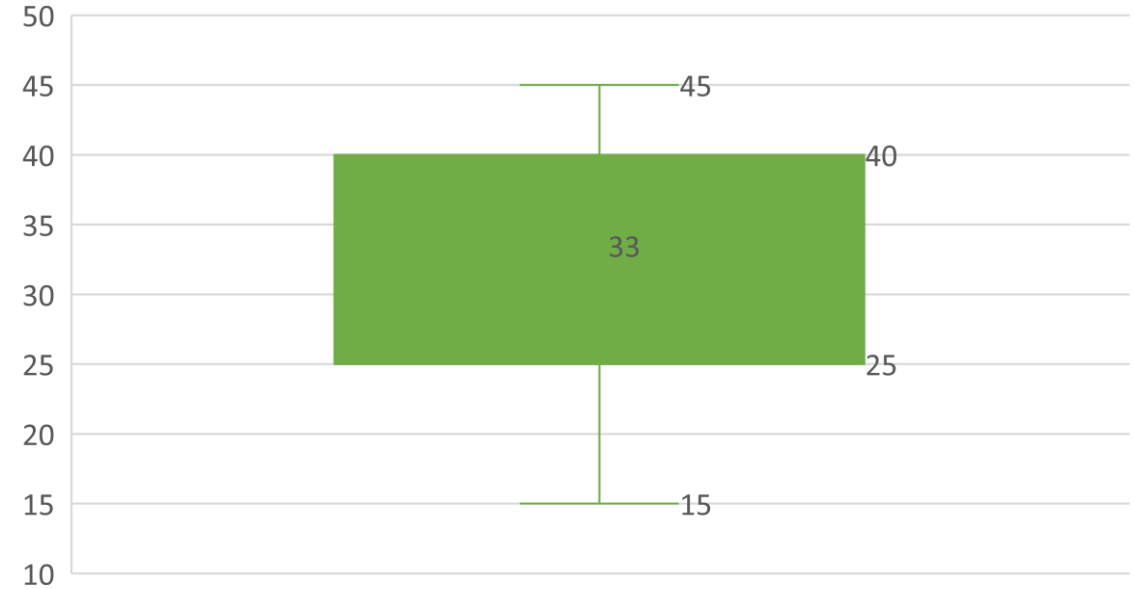
Overall Statistics



Average Distance/Day (km)



Average Speed (km/hr)

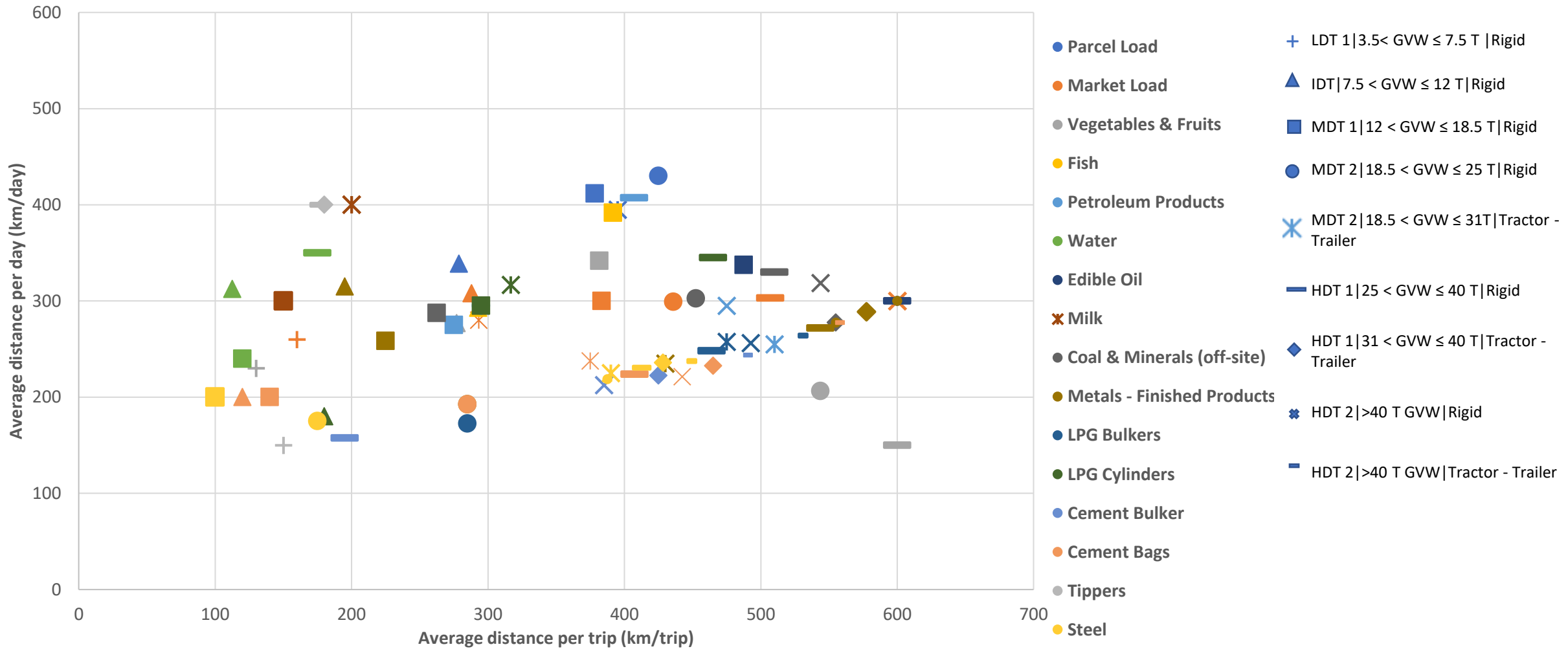


Freight Pricing (Rs per ton per km)

Wheels	GVW	Payload	Fuel Efficiency (km/litre)	Rate (Rs/Ton)	Distance travelled/trip	Rate (Rs/Ton/km)
6-W	16T	9 T to 12 T		830 Rs/Ton	150	5.5
10-W	25T	19 T	3.5 to 4	750 Rs/Ton	200	3.8
12-W	35 T	25 T	3.25 to 3.5	750 Rs/Ton	250	3.0
14-W	38 T	30 T	3 to 3.25	750 Rs/Ton	500	3.0
16-W	41T	30 T to 35 T	2.5	1700-1800 Rs/Ton	900	1.9
18-W	55T	40 T	2.25 to 2.5	1700-1800 Rs/Ton	900	1.9



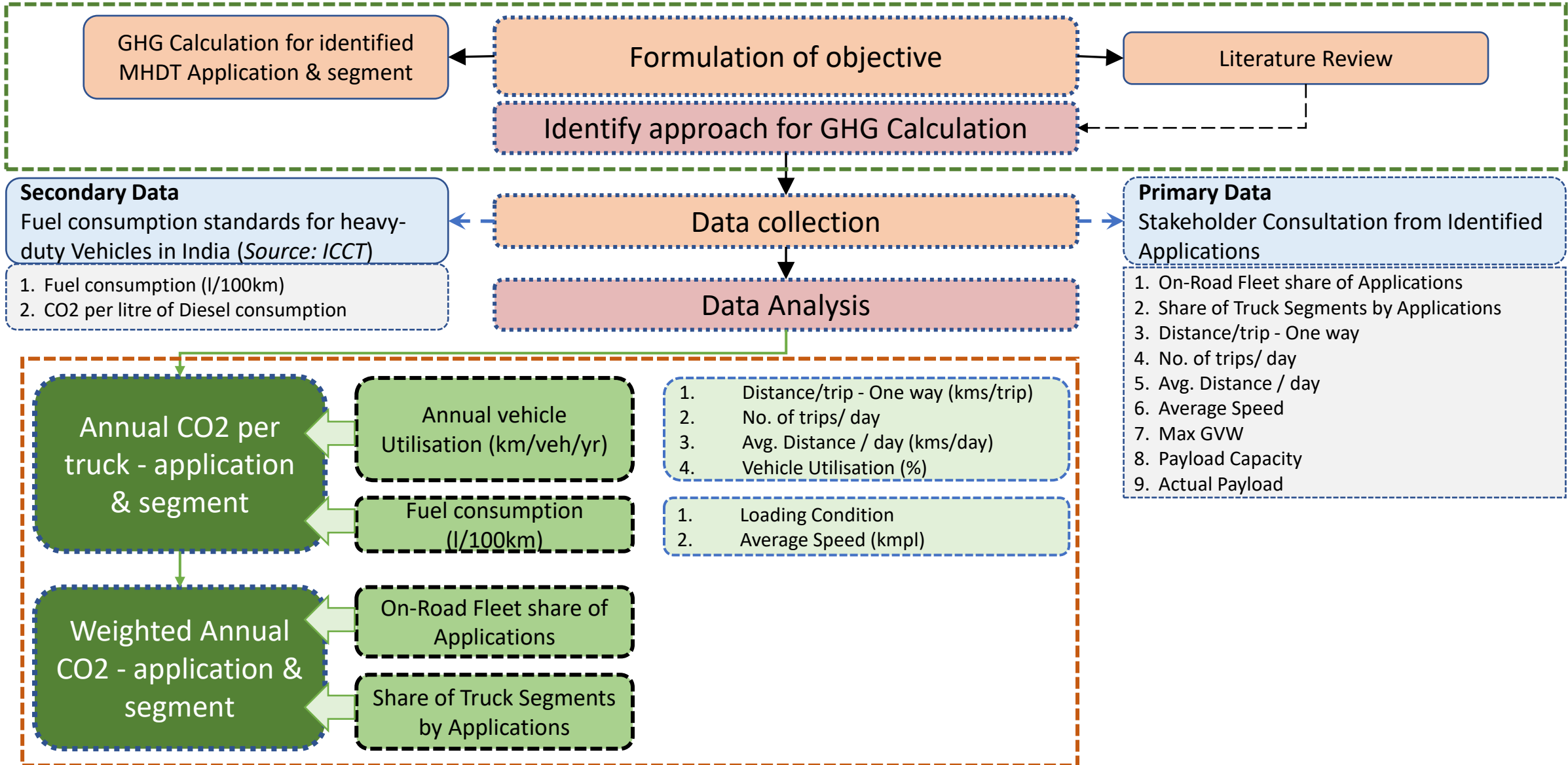
Average Distance per Day



➤ Average distance per day can vary from 100-400

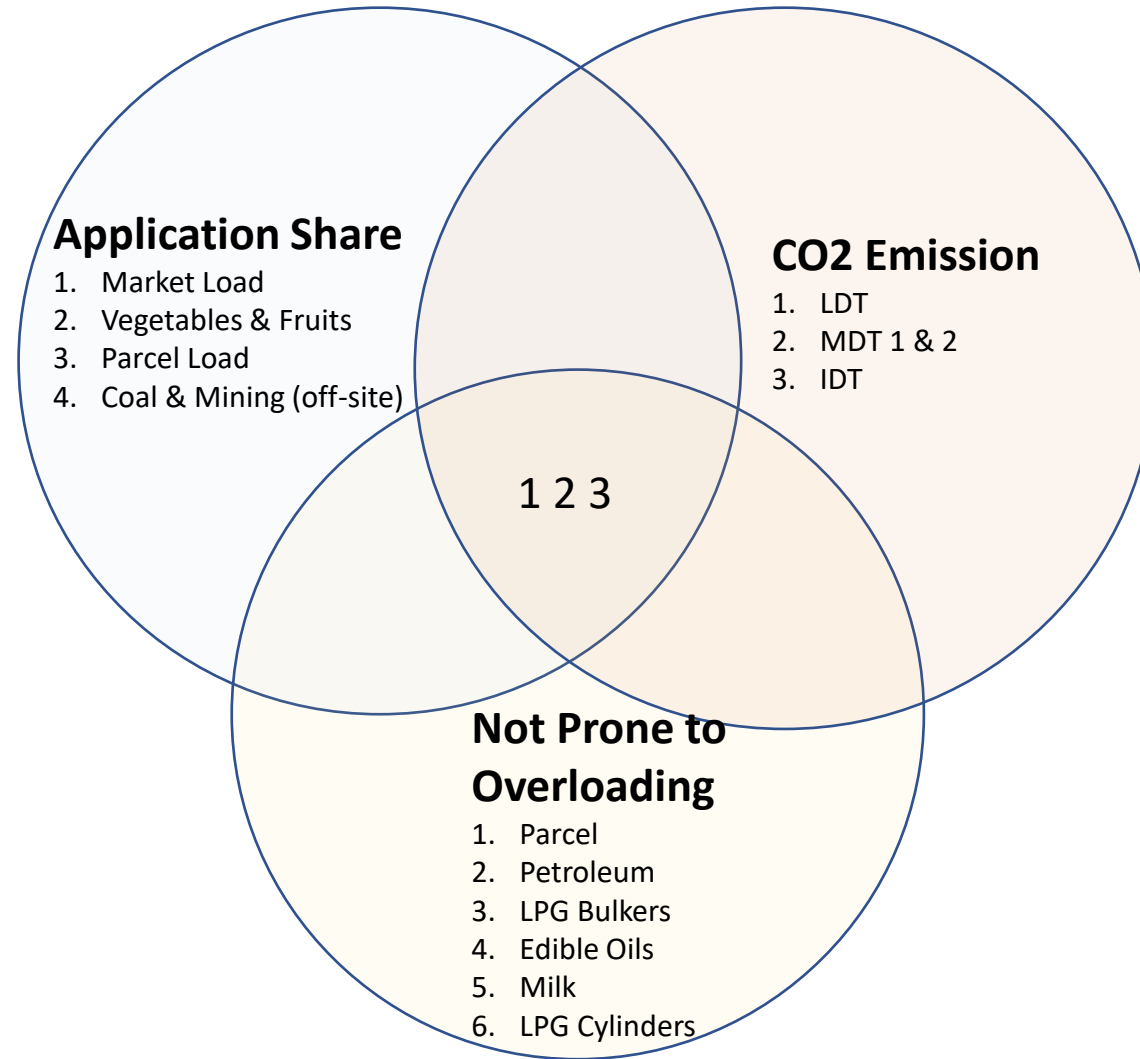


Methodology for CO₂ Emissions Calculations

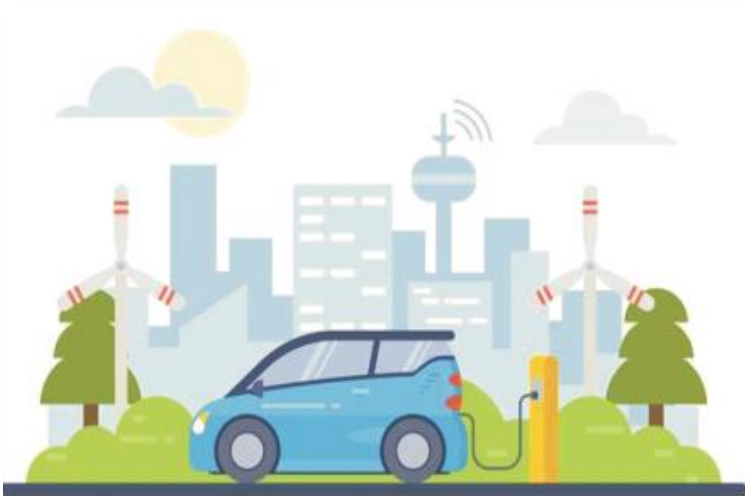




Feasible for Electrification



<http://www.pmanifest.com>



Strategy	Reports	Business Plans
Feasibility	City EV Charging Infra	Workshops
Industry Outlook	Pilots Management	Policy

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