



UK PACT
(Partnering for Accelerated Climate Transitions)

National Dissemination Workshop on

Electrification of Public Transport and Intermediate Public Transport in Indian Cities

26th April, 2022

Session 2: IPT Electrification Strategy for Mehsana

Operational Economics

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Electric Three-Wheelers in India : Big Picture



Approx 85% share of E-3W in total EV sales in India



- Around 15 Lakh E-Three Wheelers sold in India so far.
- Approx 7500 E 3-W sanctioned under FAME I and II.

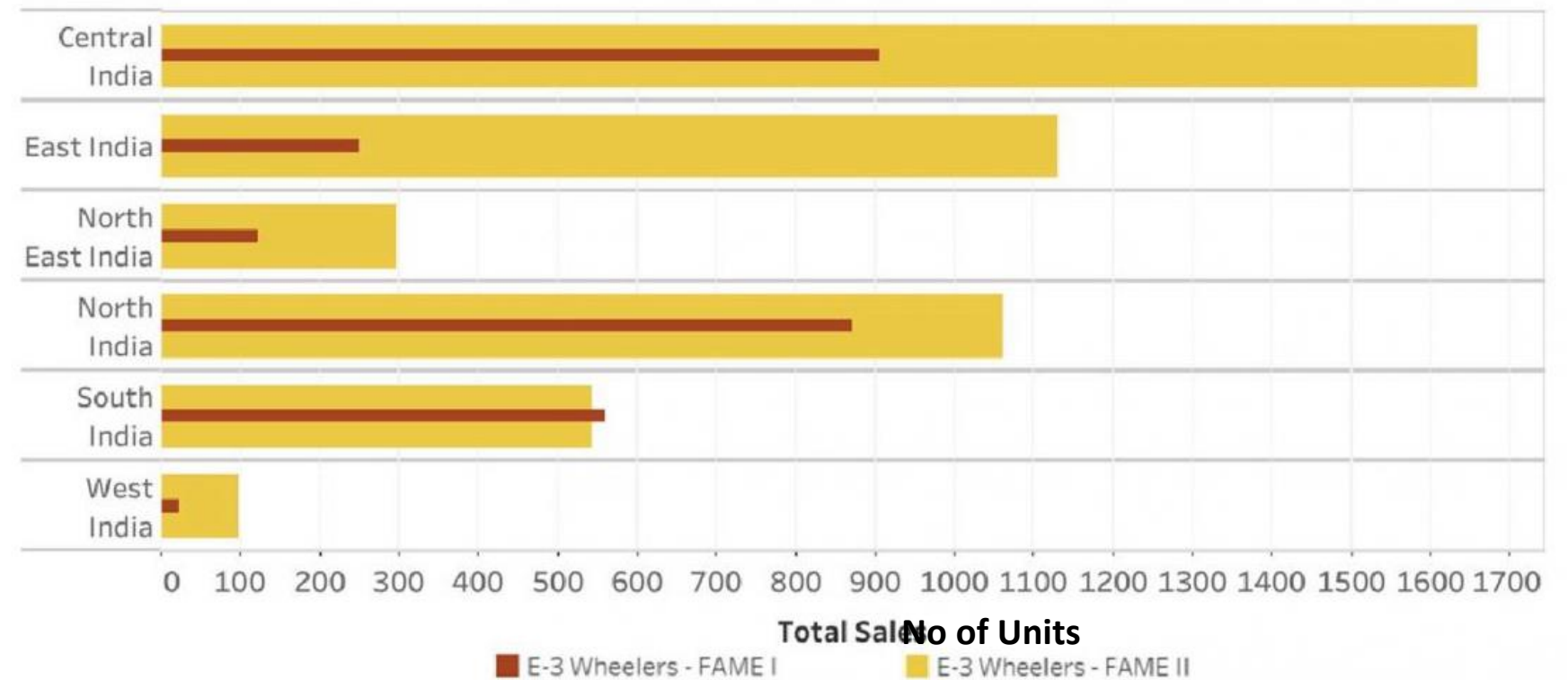


However, only 121 (nos) E – 3 wheelers sold in Gujarat as yet.



- Initially, most of the E -3 W were sold by fragmented Cottage industries located mostly in the northern India.
- Now the industry has evolved in terms of standardization in the technology, manufacturing process and regulations.
- 27 registered vehicle manufacturers with Ministry of Heavy Industries

Regional sales of electric three-wheelers through FAME - I & II incentives



Source: WRI Analysis based on data from FAME website as on July 2020

Policy landscape for e-3 Wheelers

FAME – II, (valid till 31st March 2024)

- The scheme targets electrification of 5,00,000 three wheelers
- A subsidy of Rs.10,000 per kWh (capped at 20% of show room price of vehicle) is offered based on the battery capacity of the vehicle.

Gujarat EV Policy (2021)

- Targets 70,000 three-wheelers for subsidy
- Subsidy amount: Rs.10,000 per kWh (limited to 40% of ex-showroom price)

Electric Passenger Three-Wheelers available in Gujarat

Electric Passenger 3W

E-Auto/
L5M

E-Rickshaw



Mahindra electric
[Plug-in]

PIAGGIO
[Plug-in]



Mahindra electric
[Plug-in]

ATUL
AUTO LIMITED
[Plug-in]







KINETIC GREEN
Think Electric Think Kinetic
[Plug-in]

Market Assessment – E-3 wheeler Models

Parameters	Mahindra (E-auto)	Mahindra (E-rickshaw)	Piaggio (E-auto)	Atul (E-rickshaw)	Kinetic Green (E-rickshaw)	Kinetic Green (E-rickshaw)
						
Model name	Treo	Treo Yaari	Ape E-city FX	Elite passenger	Kinetic Safar Smart	Kinetic DX
Dimension (LxWxH) mm	2746 x 1350 x 1750	2769 x 995 x 1750	2700 x 1370 x 1725	2799 x 1100 x 1800	2640 x 990 x 1725	2781 x 995 x 1799
Seating Capacity	D+3	D+4	D + 3	D+4	D+4	D+4
Vehicle body make	Fibre	Fibre	Metal	Metal	Steel	Metal
Roof type	Soft	Soft	Soft	Hard	Hard	Hard
Breaks (Front & Rear)	Hydraulic drum	Mechanical drum	Hydraulic drum	Mechanical & Hydraulic drum	Drum	Drum
Suspension (Front & Rear)	Leaf Spring		Coil spring & Rubber spring	Coil Spring & Leaf Spring	Leaf Spring	Pressure spring & Leaf Spring
Top Speed	55 kmph	24.5 kmph	45 kmph	25 kmph	25 kmph	25 kmph
Approx. range in single charge	130 km	85 km	85-95 km	60 km	80 km	80 km

Source: Interview with Vehicle Manufactures and dealers

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Battery type	Li-ion	Li-ion	Li-ion	Li-ion/ Lead acid	Li-ion/ Lead acid	Li-ion/ Lead acid
Battery capacity	7.37 kwh	3.69 kwh	7.5 kwh	3.7 kwh – Li-ion 6.7 kwh – Lead acid	4 kwh	Not available
Battery life	5 years	5 years	17,000 cycles/ 5 year	3 years – Li-ion 1.5 year – Lead acid	3 years	Not available
Energy Efficiency*	0.1 kwh/ km	0.04 kwh/ km	0.1 kwh/ km	0.05 kwh/ km	0.1 kwh/ km	Not available
Charging time	3 h 50 min	2 h 30 min	3 h 45 min	4-4.5 h – Li-ion 8-10 h – Lead acid	3 h	Not available
Warranty	Vehicle & Battery - 3 years or 80,000 km whichever is earlier	Vehicle & Battery - 3 years or 40,000 km whichever is earlier	Vehicle - 3 years or 100,000 km Battery – 3 years	Vehicle - 1 year Battery - 36 Months or 40,000 Kms (Li-ion) & 1.5 year (Lead acid)	Vehicle - 1 year Battery – 3 years	Not available
Total Cost of vehicle**	Rs. 320,686	Rs. 206,763	Rs. 3,15,081	Rs. 2,27,000	Rs. 192,100 ***	Not available
Battery cost (As on Date)	Cell replacement cost @ Rs. 5500/cell after 3 yrs (32 cells in Treo and 16 cells in Yaari)		Approx. Rs. 50,000	Rs. 65,000 – Rs. 70,000	Rs. 95,000	Rs. 35,000 – Rs. 45,000
Maintenance cost	Rs. 500/month	Rs. 500/month	Rs. 400/ month	Rs. 300/ month	Not available	Not available

* Calculated based on operational km in single charge and energy consumed to charge battery

*** As on 2019

** After FAME II Subsidy ranging from Rs. 45,000 to Rs. 70,000 per vehicle

Source: Interview with Vehicle Manufactures and dealers

Average Purchase Costs of Passenger 3-Wheelers

Sr. no	Input	CNG BS VI Auto	E- Auto	E-rickshaw
		Rs.		
1	Basic Cost (Inclusive of Battery and Charger in case of E- Auto)	2,12,000	3,54,000	2,35,000
2	FAME II Subsidy	0	78000	40000
3	Govt of Gujarat Subsidy	0	50000	40000
4	Total Ex showroom Price with Subsidy (Sr. no 1- 2)	2,12,000	2,76,000	1,95,000
5	Insurance	11,500	10,800	9,500
6	Registration Charges (2.5%/6% of Ex-showroom)	5,300	6,900	15,000
7	Meter cost	3000	3000	3000
8	Total on road price (Sum sr. no 4 to 7)	2,31,800	2,96,700	2,22,500

E – Auto is around 67% costlier than CNG and 51% E- Rickshaw

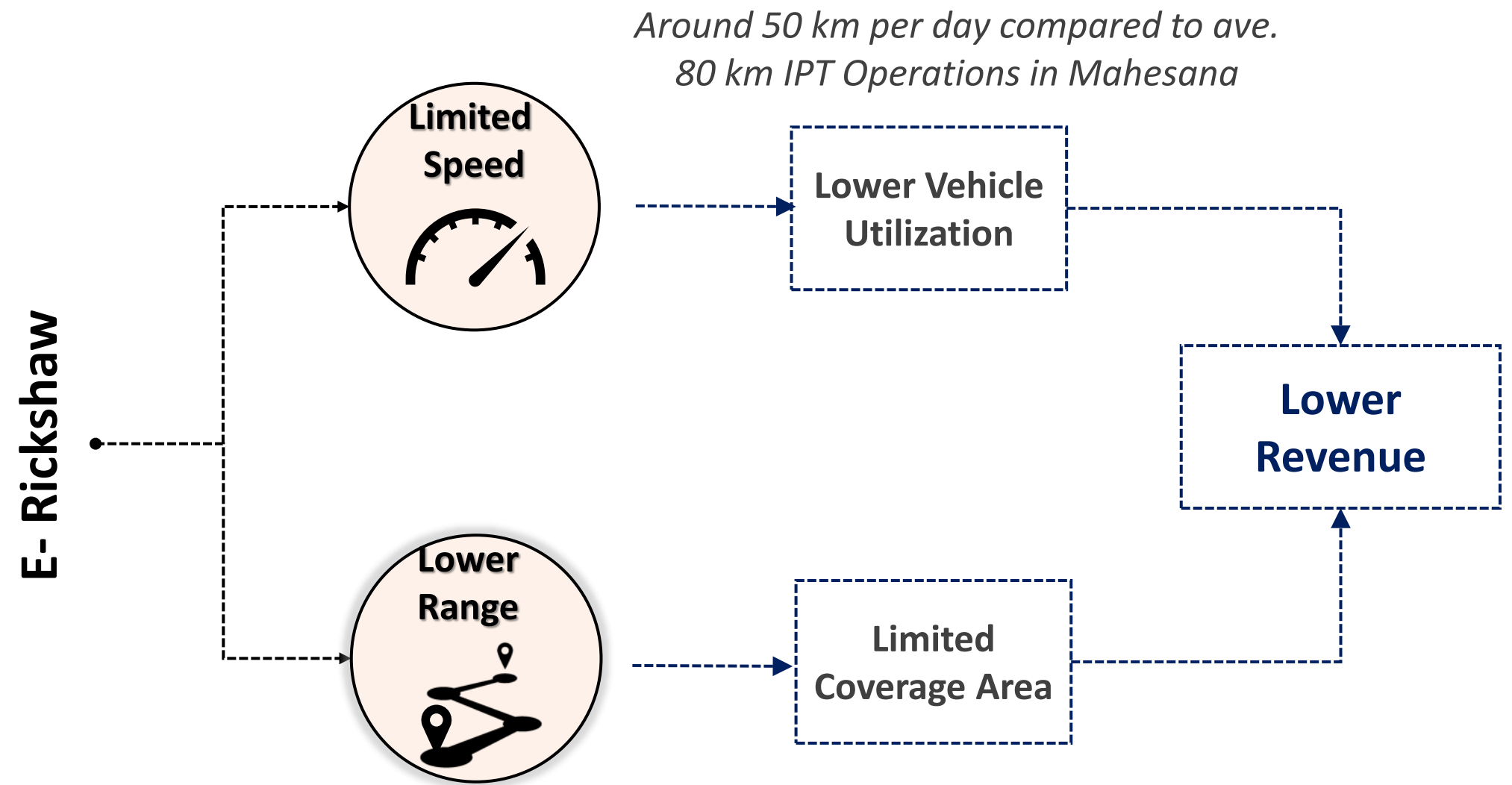
FAME II and Govt of Guj Subsidy @ Rs. 10,000 per Kwh. Govt of Gujarat subsidy Capped at Rs. 50,000 /vehicle

The difference in cost of E-Auto compared to CNG auto reduced to 28%.

- E Auto and E Rickshaw incur Battery replacement cost at around Rs. 50,000 and Rs 30,000 at approx every 3 years.
- Resale value of CNG Auto, E Auto/ E Rickshaw is estimated to be 25% and 10% respectively.

Limitation of E-Rickshaw in comparison with CNG Auto and E-auto

3-Wheeler	Speed	Range in single fuel filling
CNG Auto	45-50 kmph	140-150 km
E-Auto	45 kmph	100-110 km
E-rickshaw	25 kmph	70-80 km



Range anxiety and Lower vehicle utilization with speed ≤ 25 km/ hr are the major drawbacks of E-Rickshaw. As a result, revenue may be lower.

Cost Benefit Estimate for 1st year of Operation for Owned and Operated Vehicle

Sr. no	Particular	CNG BS VI Auto	E- Auto	E-rickshaw
		Rs. Per Month		
1	Operating Cost (EMIs, Fuel/ Energy, Maintenance, Insurance)	10306	9015	6740
2	Revenue	22500	22500	13500
	Monthly Surplus	12,194	13,485	6,760
	Annual Surplus	1,46,328	1,61,821	81,122

- E – Auto could be more cost effective, by Rs. 1300 per month and Rs. 15,500 annually than CNG Auto.
- E – Rickshaw might generate less revenue compared to CNG and E-Auto due to lower vehicle utilization.
- The cumulative estimated surplus in E three wheelers can cover the battery replacement cost that would incur after 3 years.

Total Cost Ownership (TCO)

Year	CNG BS VI Auto	E- Auto	E-Rickshaw
	Cost In PV terms (Rs)		
0	231800	246700	182500
1	70064	44931	33473
2	59592	37270	28780
3	48971	29197	23365
4	39806	49105	32026
5	35647	15229	11274
6	32743	14194	10614
7	29339	12486	9245
8	26944	11630	8696
9	24157	24665	16238
10	3522	1590	1251
TCO	6,02,584	4,86,996	3,57,461
Total Estimated Operation During Life (km)	280000	280000	175000
TCO per km	2.15	1.74	2.04

E-auto saves about Rs 1.16 lakhs in 10 years compared to owning CNG auto.

Battery replacement Year

Battery replacement Year

Resale of vehicle at the end of the year

The projected costs are discounted at 12% which is the estimated WACC to the vehicle owner

THANK YOU