ICRA

INDIAN TRACTOR INDUSTRY

Charging up for the Electric Revolution

NOVEMBER 2023

Highlights

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Total cost of ownership works out favourably for the electric tractor segment, given the material savings in running cost.

Focused measures, such as availability of purchase incentives, reduced electricity tariffs and incentives for setting up charging infrastructure, required to support adoption, going forward.

Electric vehicle (EV) penetration across automotive segments is expected to grow exponentially over the next decade, spurred by Government support, enhanced awareness and increasing product launches. The electrification in the tractor segment, even though expected to be gradual, is also witnessing enhanced interest from market participants.

Despite higher upfront cost, the total cost of ownership works out favourably for the electric tractor (e-tractor) segment, given the material savings in running cost. The payback period for the incremental upfront cost (after factoring in cost for replacement of battery) is expected to range between 4-5 years, as per industry estimates.

Even as the total cost of ownership works out favourably, there continue to be multiple challenges that could constrain adoption of e-tractors over the near to medium term. These include factors, such as high-power requirement, long working hours of tractors mandating large batteries, lack of adequate charging infrastructure and inadequate financing availability.

Various focused measures can help mitigate the challenges to an extent and support adoption over the medium term. These include availability of purchase incentives (such as benefits available to other automotive segments under the FAME II scheme), reduced electricity tariffs, and incentives for setting up charging infrastructure.

Emission norms for off-road vehicles increasingly gaining importance

Exhibit: Comparative trend – NOx emission (Historical and Estimated)

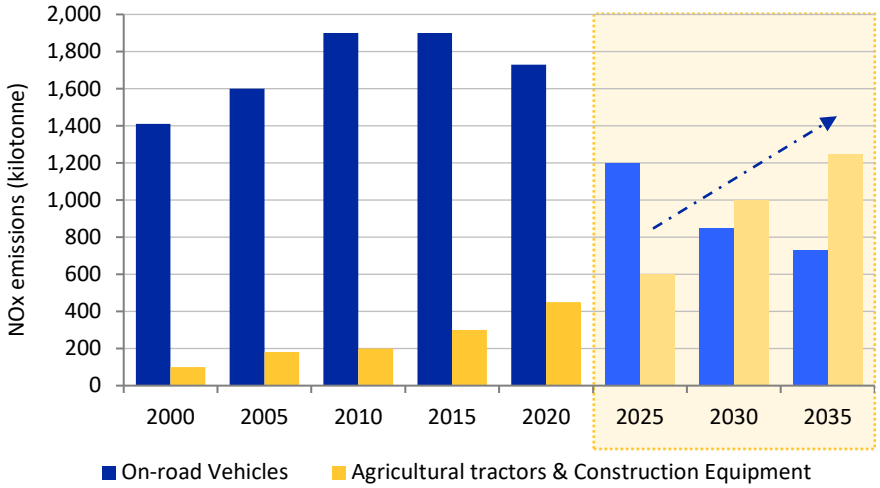
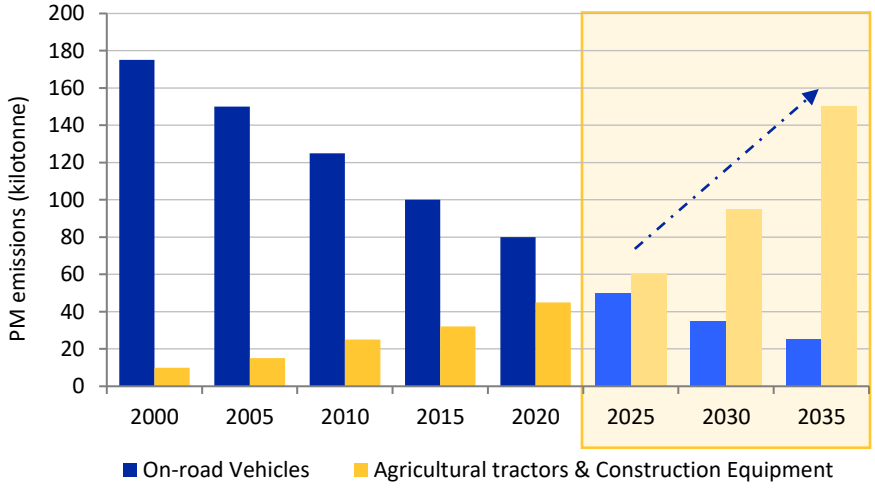


Exhibit: Comparative trend – PM2.5 emission (Historical and Estimated)



- While significant progress has been made with regards to emission regulation of on-road vehicles, especially with the implementation of BS-VI norms, the emission control regulations for non-road vehicles (including tractors) have been less stringent till date.
- International Council on Clean Transportation (ICCT) has emphasised a need to strengthen emission control norms for non-road vehicles to curb transportation related air quality impact, with emissions from non-road vehicles projected to increase substantially, going forward.

Source: Evaluation of emission control scenarios for agricultural tractors and construction equipment in India, ICCT & ICRA Research

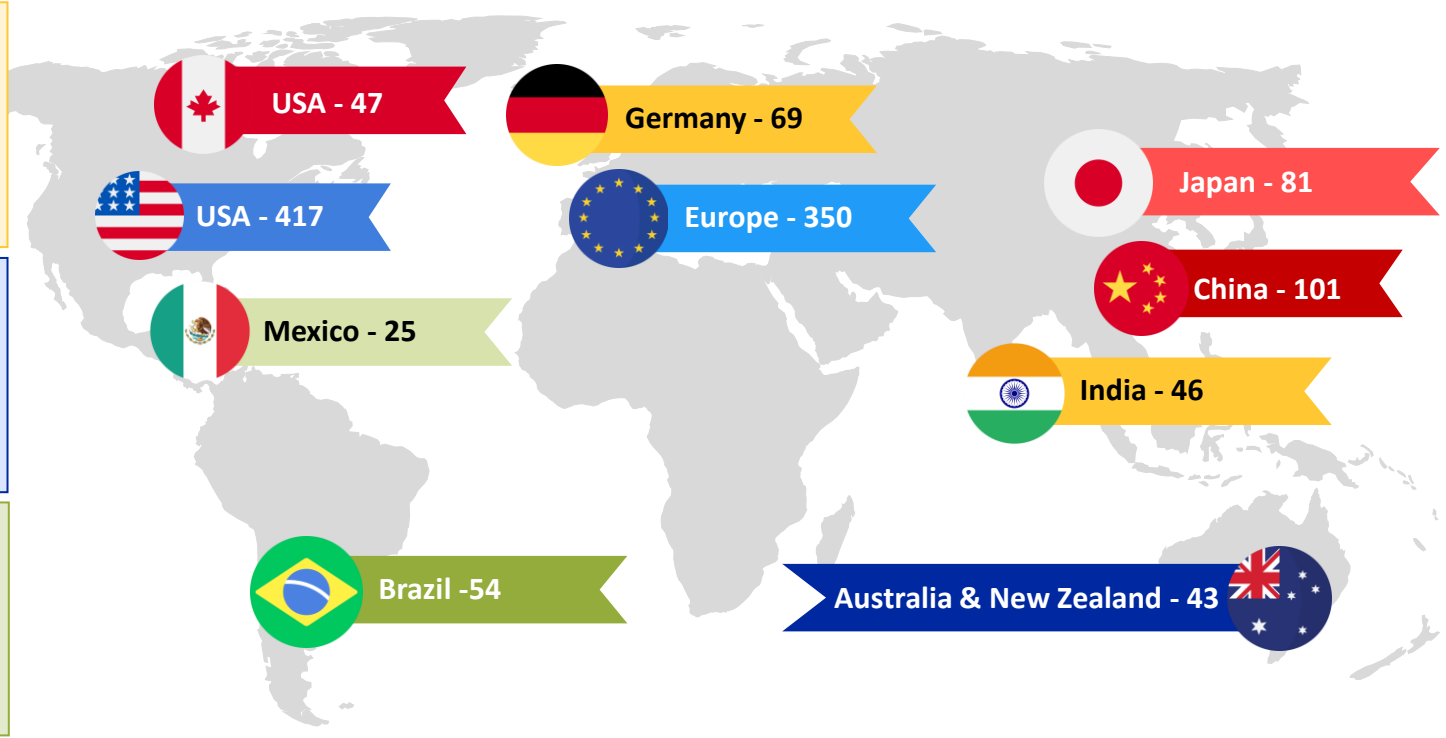
Adoption of e-tractors expected to gradually pick up globally

Exhibit: Global e-tractor sales by region (Data pertaining to CY2022 – Number of tractors)

US Climate Protection Act to advocate the full adoption of EVs by 2030, likely to aid higher adoption of electric farm tractors.

Farmers in Germany are encouraged to buy electric farming tractors on the basis of the 'Umwelt bonus' (environmental bonus) programme.

The Government of China provides financial incentives for purchasing electric farm tractors.



Source: BIS Research, EMIS, ICRA Research

Various market participants in India working on taking the lead in the space

Startups

CELLESTIAL eMOBILITY

AUTONXT AUTOMATION

HAV TRACTORS FOR LIFE.

Incumbent OEMs

mahindra TRACTORS

JOHN DEERE

Component suppliers

PADMINI VNA MECHATRONICS

Hilux AUTOELECTRIC

K-Lite

Kubota

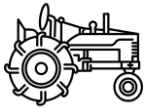
SONALIKA INTERNATIONAL

VST TILLERS TRACTORS LTD.

*Source: ICRA Research; *VST Tillers Tractors Ltd has developed components for an electric smart tractor built in the US.*

Total cost of ownership works out favourably for electric tractors

Exhibit: Indicative TCO comparison between 40-45 HP diesel-based tractors and ~27 kW e-tractors

	40-45 HP Diesel Tractor 	~27 kW e-Tractor 	SAVINGS 
On-road Price (In Rs. lakh)	8.5	14.0	-39%
Fuel Charge for 6 Years (In Rs. lakh)	20.7	2.9	620%
Other Operating Cost* (In Rs. lakh)	6.9	15.6	-55%
TCO for 6 Years (In Rs. lakh)	34.9	30.4	15%
SAVINGS	-	4.5	~13%

*Source: ICRA Research; *Other Operating Cost Include: Interest Cost, Loan Processing Charges, Maintenance Charge, Battery Cost (applicable for e-tractor only) and Misc. Costs.*
Fuel cost assumptions: 6 litres of diesel consumption per hour; 10 units of electricity consumption per hour; Average running of ~600 hours per year assumed

Significant operational savings ensure relatively low pay-back period

Exhibit: Payback period estimation for an electric tractor

Pay-back period estimated to range between 4-5 years

As the demand for e-tractors increase and the technology improves, the upfront cost of e-tractors is expected to come down, thereby further lowering the pay-back period.

E-tractors are touted to be more fuel efficient than diesel tractors, leading to substantial operational savings over a lifetime of operations.

*Source: ICRA Research; *Other Operating Cost Include: Interest Cost, Loan Processing Charges, Maintenance Charge, Battery Cost (applicable for e-tractors only) and Misc. Costs.*

Significant challenges to electrification persist, however, which need addressal

Exhibit: Key challenges related to electrification of tractors

KEY CHALLENGES	USAGE PATTERN	UPFRONT COST	APPLICATION	CHARGING INFRA	FINANCING AVAILABILITY
	▪ High power requirement/long working hours mandate large-sized batteries	▪ Materially higher initial cost of purchase	▪ Unsuitable for applications such as puddling (tillage of rice paddies while flooded)	▪ Lack of charging infrastructure and constant power supply in rural areas	▪ Minimal interest from financiers, given the lack of track record of operations

Source: ICRA Research

Focused measures, thus required to support e-tractor adoption

Exhibit: Key measures needed for faster e-tractor penetration

KEY MEASURES				
▪ Purchase incentives from Central/state governments	▪ Reduction in taxation, RTO and registration charges	▪ Improved electricity availability in agricultural and allied sectors	▪ Support for charging system infrastructure deployment	▪ Enhancing financing availability

A combination of these measures would help mitigate the challenges to an extent and aid adoption.

Source: ICRA Research

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Thank You!