EVreporter

APR 2023 | MAGAZINE

Issue No. 27

WHAT'S INSIDE

CHOGORI®

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Hello, Large Series Connectors

Large 2+1+5 Pin (50A+15A+5A)

Large 2+4 Pin (50A+5A)

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- Push-lock mechanism
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- RoHS and Reach Compliant
- Overmolding plug meets 10000 times bending test
- Panel mount solution with 90 degree cable out to reduce the overall height
- Lock nut with wings available to make disconnectting more easier

Specifications

- Mating Cycle：≥3000 Times
- Voltage Rating：80V DC
- IP Rating：IP67 mated

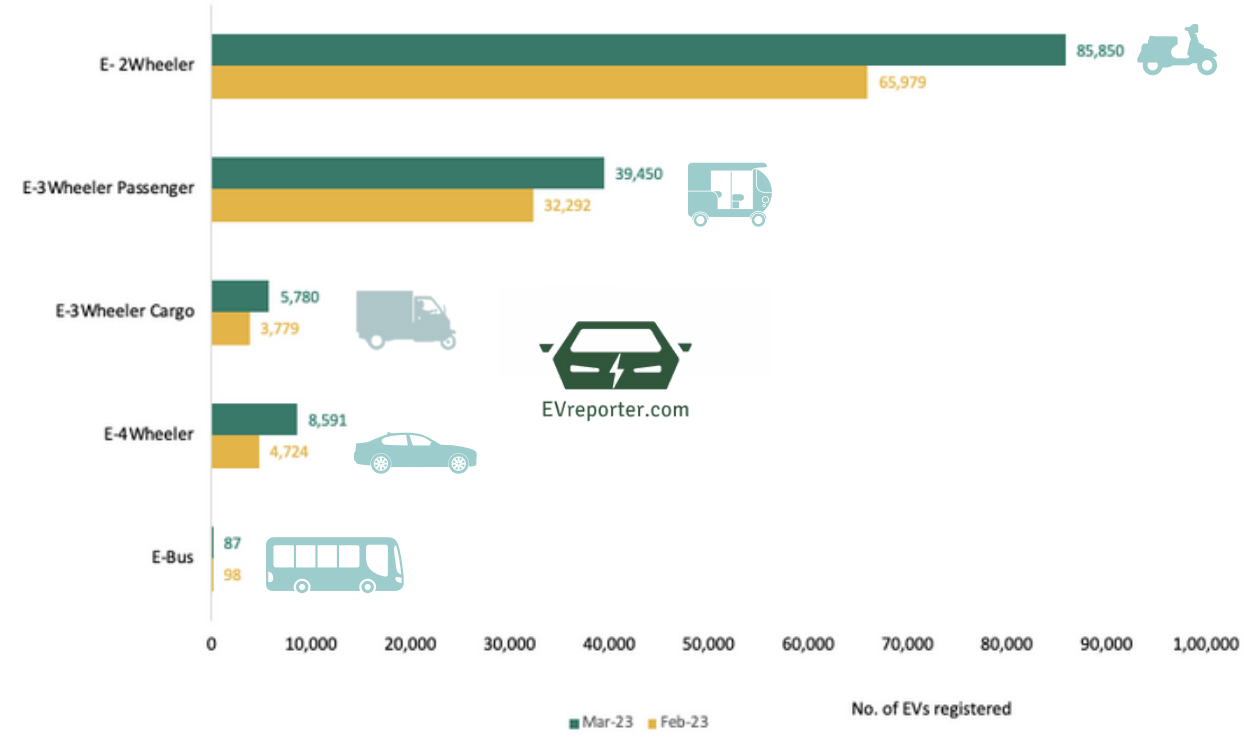
IATF 2-IAO-QMC 01003

QUALITY ASSURED FIRM ISO 9001 UCC

Specially designed for friendly efficient, water-proof 2-3 Wheels application.

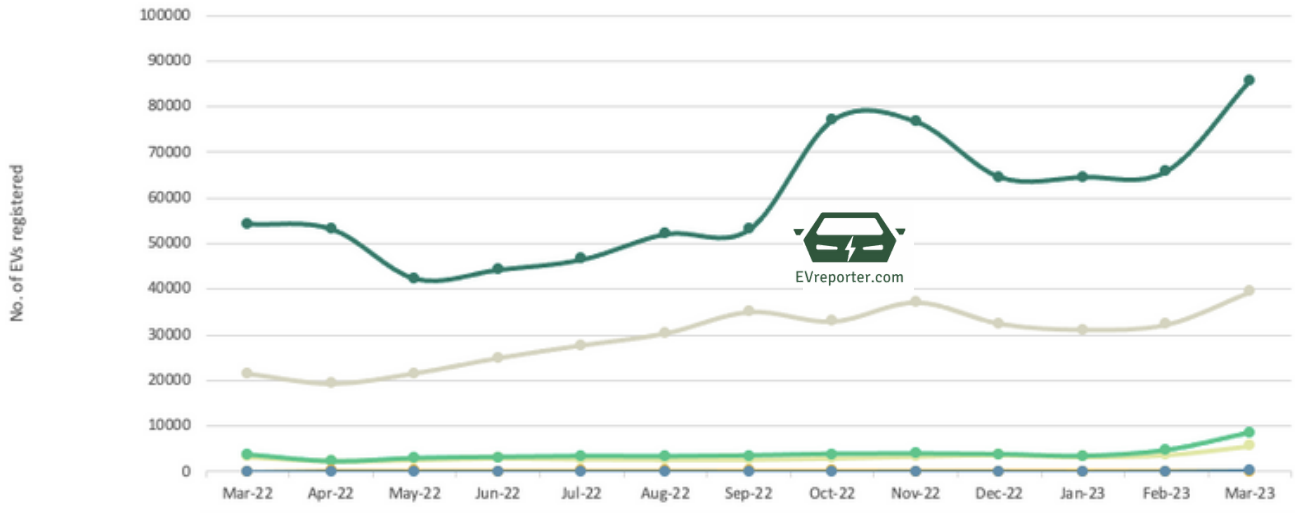
Category wise Electric Vehicle sales, Mar 2023

Total Registered Electric Vehicle Sales - **Mar'23 - 1,40,037** I Feb '23 - 1,06,964



Category wise-Sales Trend from Mar 2022 to Mar 2023

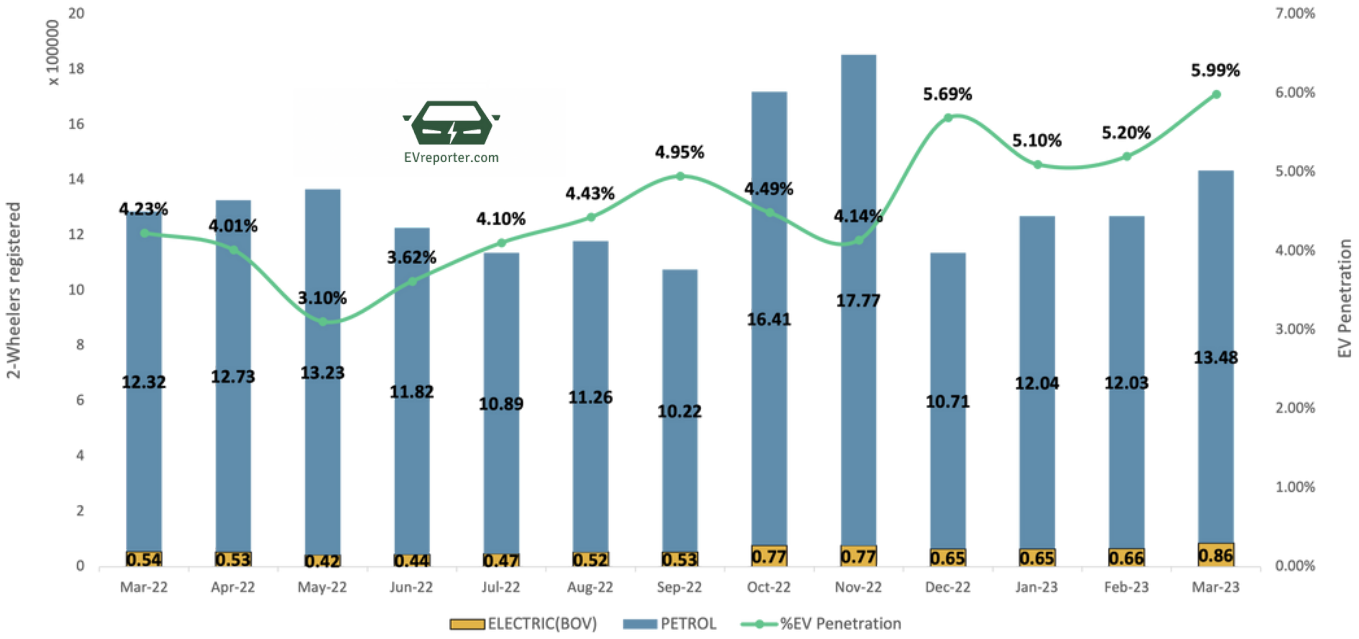
11,80,903 EVs sold in last 12 months from Apr 2022 to Mar 2023



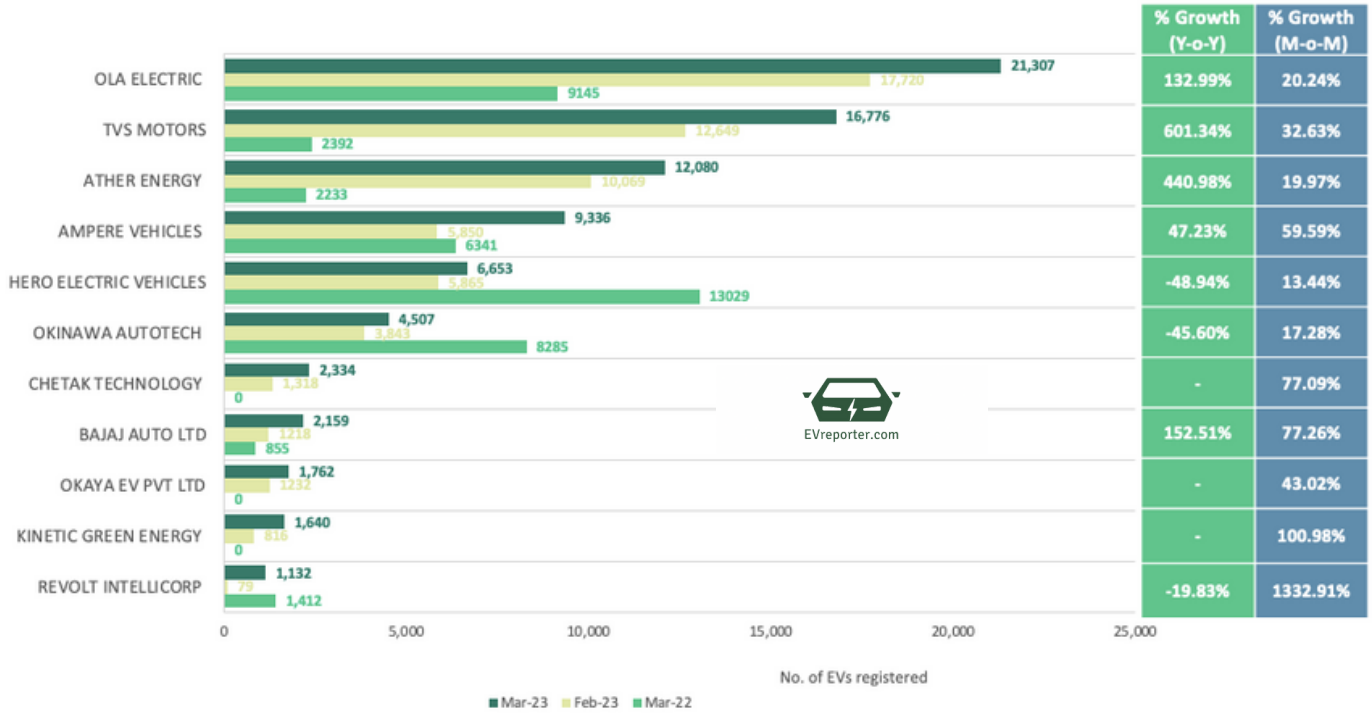
	Mar-22	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23
E- 2Wheeler	54400	53259	42403	44367	46599	52187	53192	77098	76684	64579	64,640	65,979	85,850
E-3Wheeler Passenger	21511	19340	21641	24988	27754	30365	35028	32945	37131	32435	31,140	32,292	39,450
E-3Wheeler Cargo	3312	2419	2673	3041	2842	2757	2757	3045	3457	3770	3,333	3,779	5,780
E-4Wheeler	3718	2249	2959	3210	3404	3351	3529	3898	3960	3820	3,423	4,724	8,591
E-Bus	78	165	165	145	207	227	214	241	117	151	96	98	87
Others	51	63	48	81	50	60	43	41	58	55	3	92	279
TOTAL	**83070**	**77495**	**69889**	**75832**	**80856**	**88947**	**94763**	**117268**	**121407**	**104810**	**102635**	**106964**	**140037**

Source: Vahan Dashboard. Data as per 1350 out of 1436 RTOs across 34 out of 36 state/UTs
Low speed 2Ws not included.

Fuel wise 2W Sales Trend, Mar 2022 - Mar 2023



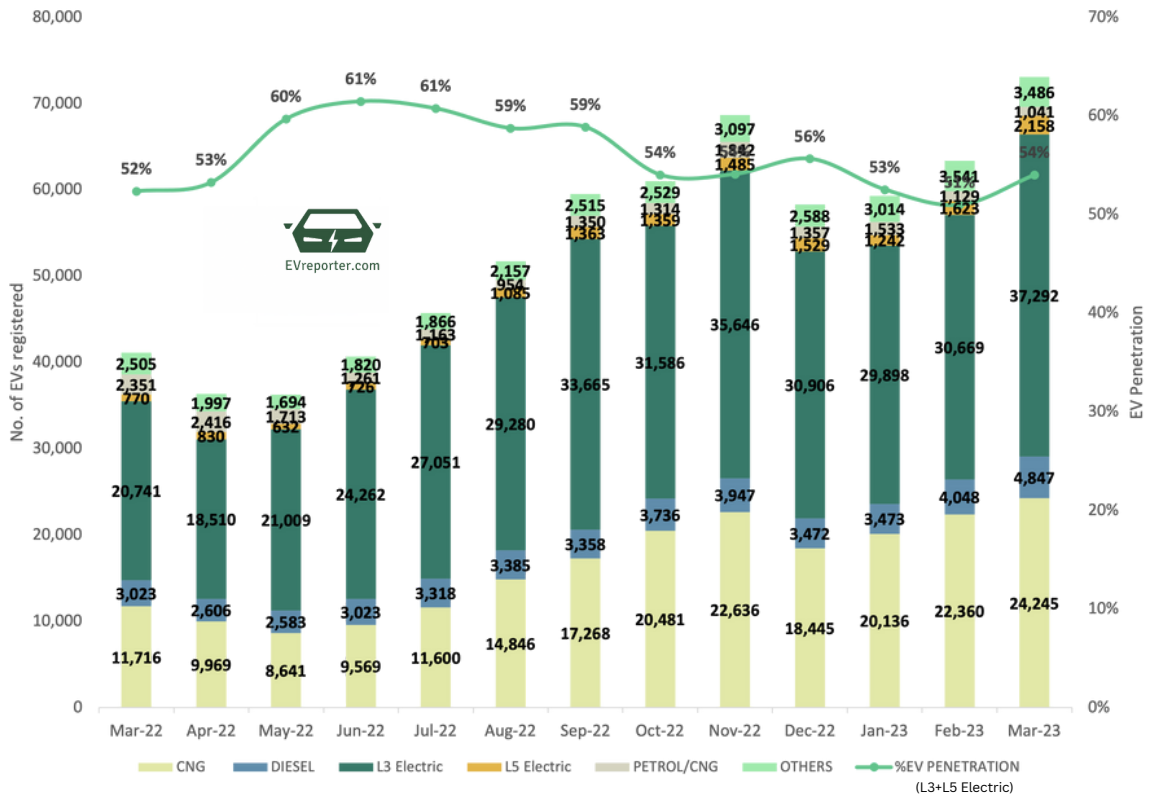
High Speed E-2W Sales Trend by OEM



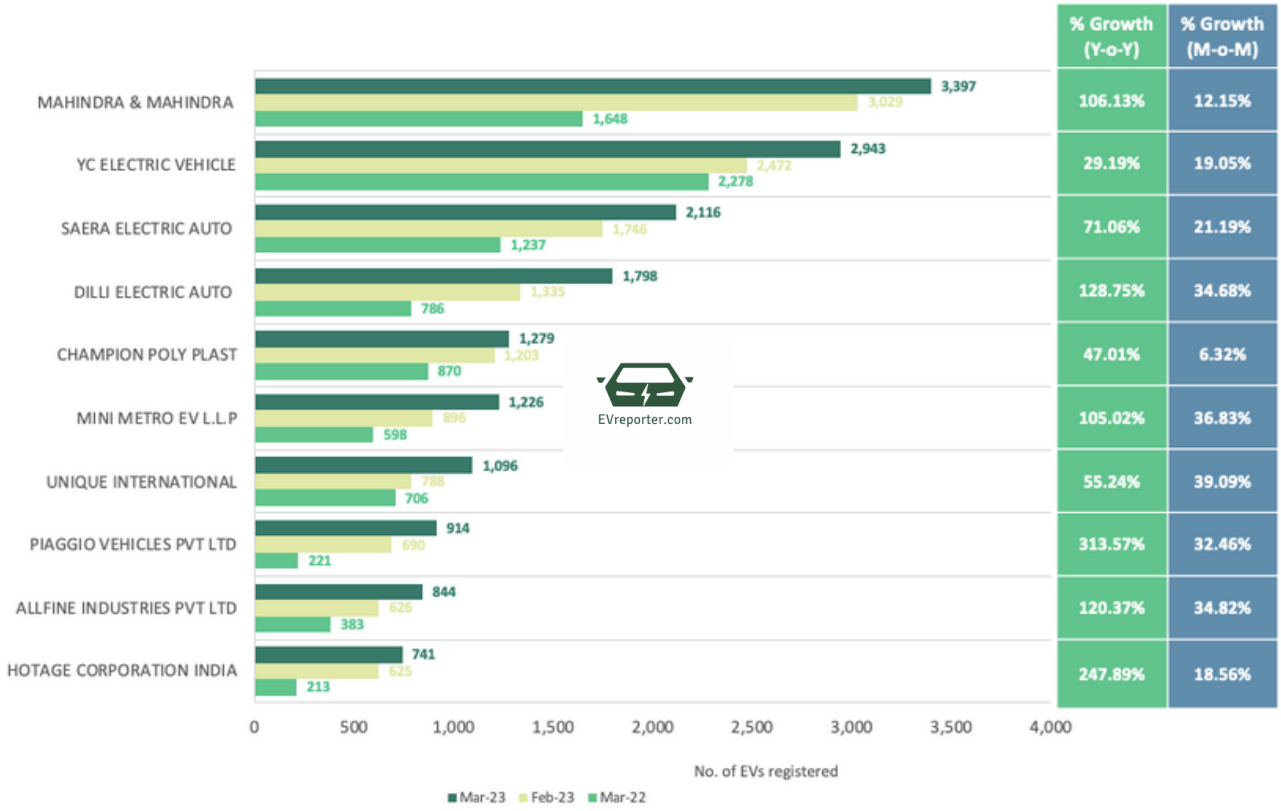
	% Growth (Y-o-Y)	% Growth (M-o-M)
OLA ELECTRIC	132.99%	20.24%
TVS MOTORS	601.34%	32.63%
ATHER ENERGY	440.98%	19.97%
AMPERE VEHICLES	47.23%	59.59%
HERO ELECTRIC VEHICLES	-48.94%	13.44%
OKINAWA AUTOTECH	-45.60%	17.28%
CHETAK TECHNOLOGY	-	77.09%
BAJAJ AUTO LTD	152.51%	77.26%
OKAYA EV PVT LTD	-	43.02%
KINETIC GREEN ENERGY	-	100.98%
REVOLT INTELLICORP	-19.83%	1332.91%

Source: Vahan Dashboard. Data as per 1350 out of 1436 RTOs across 34 out of 36 state/UTs
Low speed 2Ws not included.

3W Passenger Sales Trend by Fuel Type, Mar 2022 - Mar 2023

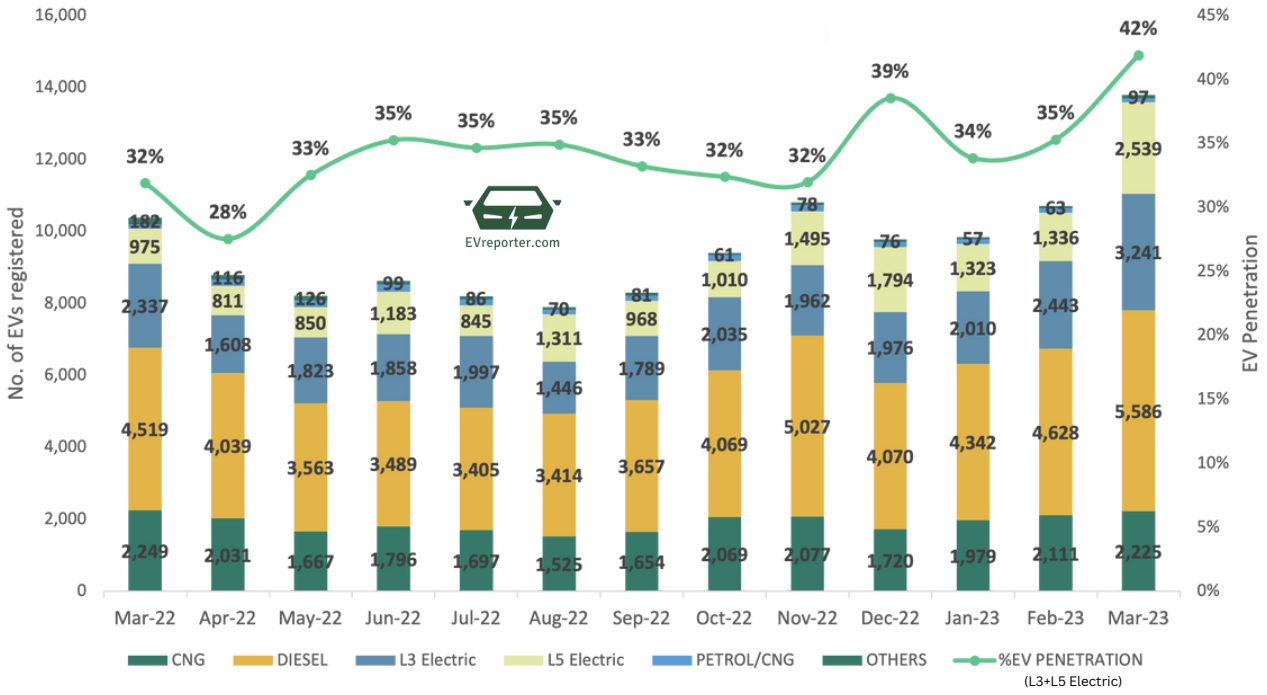


E-3W Passenger Sales Trend by OEM

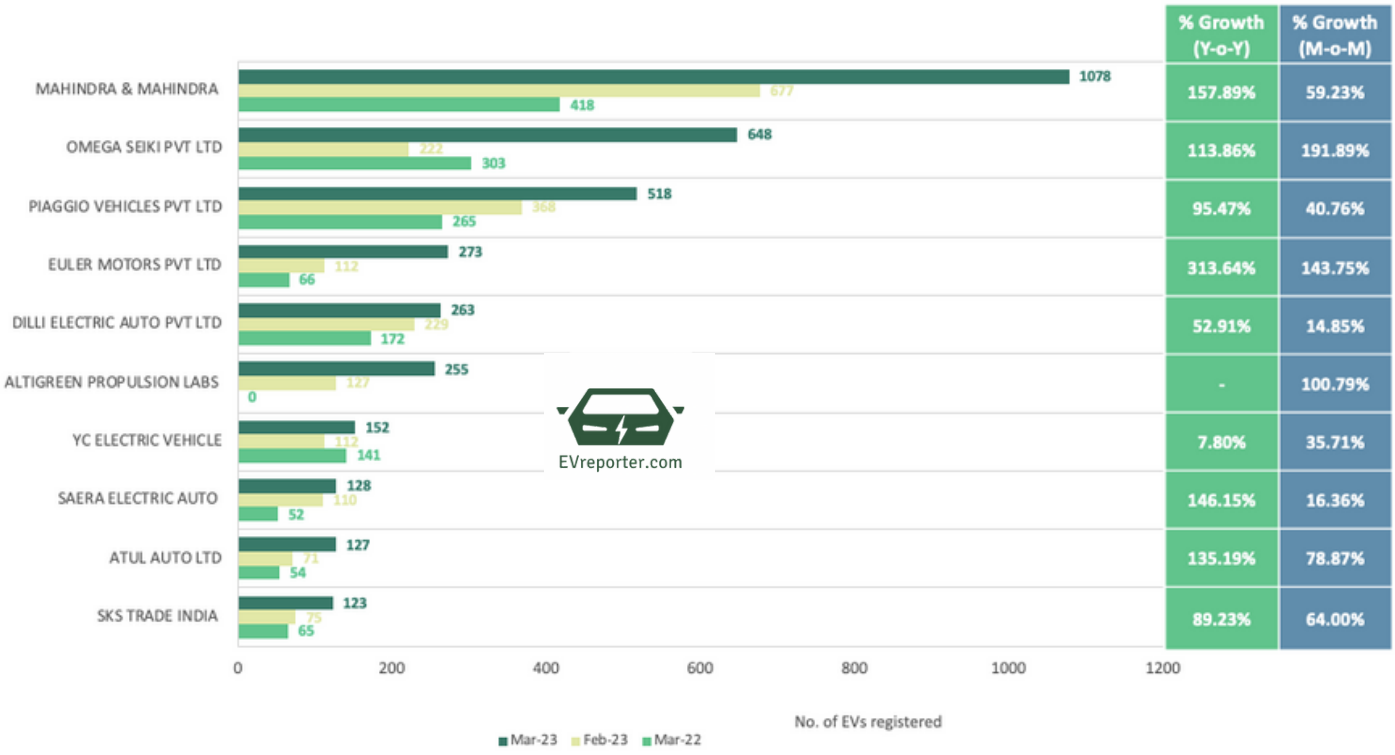


Source: Vahan Dashboard. Data as per 1350 out of 1436 RTOs across 34 out of 36 state/UTs. The aim of these graphs is to represent an overall trend of the new EV registrations in India.

3W Cargo Sales Trend by Fuel Type, Mar 2022 - Mar 2023



E-3W Cargo Sales Trend by OEM



	% Growth (Y-o-Y)	% Growth (M-o-M)
MAHINDRA & MAHINDRA	157.89%	59.23%
OMEGA SEIKI PVT LTD	113.86%	191.89%
PIAGGIO VEHICLES PVT LTD	95.47%	40.76%
EULER MOTORS PVT LTD	313.64%	143.75%
DILLI ELECTRIC AUTO PVT LTD	52.91%	14.85%
ALTIGREEN PROPULSION LABS	-	100.79%
YC ELECTRIC VEHICLE	7.80%	35.71%
SAERA ELECTRIC AUTO	146.15%	16.36%
ATUL AUTO LTD	135.19%	78.87%
SKS TRADE INDIA	89.23%	64.00%

Source: Vahan Dashboard. Data as per 1350 out of 1436 RTOs across 34 out of 36 state/UTs. The aim of these graphs is to represent an overall trend of the new EV registrations in India.

OEM wise E- 4Wheeler Sales, Mar 2023

S.No.	OEMs	Mar-23	Feb-23	Difference	% Change	Market Share March 2023
1	TATA MOTORS	7,150	3,900	3,250	83%	83.2%
2	MG MOTOR INDIA	497	360	137	38%	5.8%
3	BYD INDIA	281	236	45	19%	3.3%
4	MAHINDRA & MAHINDRA	237	7	230	3286%	2.8%
5	PCA AUTOMOBILES INDIA	205	0	205	-	2.4%
6	BMW INDIA	51	57	-6	-11%	0.6%
7	VOLVO AUTO INDIA	50	36	14	39%	0.6%
8	HYUNDAI MOTOR INDIA	46	48	-2	-4%	0.5%
	Others	74	81	-7	-9%	0.9%
	Total	**8,591**	**4,725**	**3,866**	**82%**	**100.0%**

Others include JLR, Porsche, Audi etc.

Source: Vahan Dashboard. Data as per 1350 out of 1436 RTOs across 34 out of 36 state/UTs.

OEM wise Electric Bus Sales, Mar 2023

S.No.	OEMs	Mar-23	Feb-23	Difference	% Change	Market Share March 2023
1	SWITCH MOBILITY AUTOMOTIVE	31	18	13	72.22%	36%
2	OLECTRA GREENTECH LTD	24	13	11	84.62%	28%
3	TATA MOTORS LTD	13	0	13	-	15%
4	MYTRAH MOBILITY PVT LTD	12	0	12	-	14%
5	PMI ELECTRO MOBILITY SOLUTIONS	6	53	-47	-88.68%	7%
6	VE COMMERCIAL VEHICLES LTD	1	0	1	-	1%
7	ASHOK LEYLAND LTD	0	0	0	-	0%
8	JBM AUTO LIMITED	0	14	-14	-100.00%	0%
	TOTAL	**87**	**98**	**-11**	**-11.22%**	**100%**

Source: Vahan Dashboard. Data as per 1350 out of 1436 RTOs across 34 out of 36 state/UTs.

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Creating for Tomorrow

Engineering plastics solutions for E-mobility applications

XYRON™ modified polyphenylene ether [mPPE]

Higher class flammability

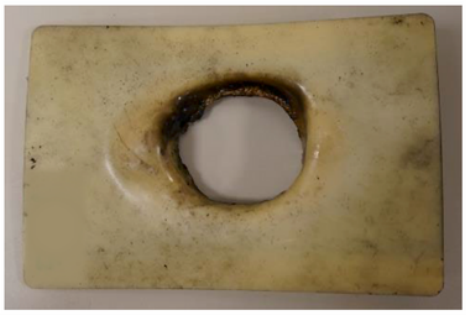
Great hydrolysis resistance

Excellent flammability class

Grade/UL94	V-0 (mmt)	5VA (mmt)
XYRON™ 340Z	0.75	**2.5**
XYRON™ 540Z	0.75	**2.5**
XYRON™ 443Z	0.75	**2.5**
XYRON™ G601Z	1.50	**2.0**

Burn Test for Li-B applications

Typical PPE/PS (Non-FR)



Burn temp: 760°C
Burn time: 113s (1min 53 secs)
Burn through: Yes
Drip: Yes

Typical PPE/PS (V1)

Burn temp: 760°C
Burn time: 135s (2min 15 secs)
Burn through: Yes
Drip: No

XYRON™ 540Z (V0)

Burn temp: 760°C
Burn time: 514s **(8min 34 secs)**
Burn through: Yes
Drip: No

Testing conditions:
Angle of flame: 20°, Thickness: 3 mm
Flame: Blue tip at the center of the plate
Time start: When the fire is turn on
Time stop: When burn through happen

Advantages of XYRON™

Value proposition		Property	XYRON™	PC	PC/ABS
Energy efficiency due to low weight		Low specific gravity	●	●	●
Structural integrity for large and complex designs		Dimension stable	●	●	●
Battery Safety AIS-156	Fire resistance test with thin plate	Thickness	●	●	●
	1m drop test	Impact strength	●	●	●
	Direct/indirect contact of water	Impact strength (after aging) [1]	●	●	●
	Thermal shock test	Impact strength (after aging) [2]	●	●	●

Testing conditions:
Notched Charpy Impact
1 – Internal Method: -20°C to 85°C/85%RH for 10 cycles.
2 – AIS-156: -40°C to 80°C for 10 cycles.

● Excellent
● Good
● Poor

AsahiKASEI
XYRON™ LEONA™ TENAC™ TENAC™-C
PRODUCTS

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www.asahi-kasei-plastics.com/en/

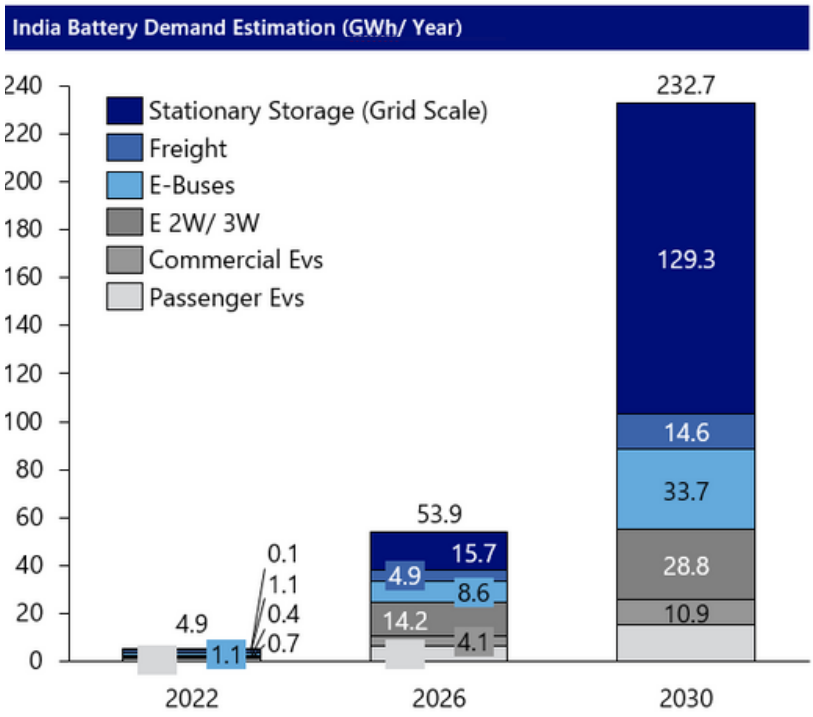
contact us

INDIA'S LITHIUM-ION CELL SUPPLY CHAIN - LEADING PLAYERS AND PLANS

Over the past decade, demand for lithium-ion batteries has increased significantly due to the growing adoption of electric vehicles and the expansion of renewable energy sources. Asia-Pacific is one of the largest markets for lithium-ion batteries. China is the largest producer and consumer of lithium-ion batteries, followed by North America, Europe, Japan and South Korea. India's LiB industry is also making significant strides, with many companies investing in the sector and new startups coming up.

In this article, **Preetesh Singh - Specialist, CASE and Alternate Powertrains at Nomura Research Institute,** summarises the efforts of different players in the Li-ion battery value chain and the direction the Indian government is taking to support such players.

India LiB Demand Overview



Battery demand is **expected to rise to 230 GWh by 2030.** This would require nearly **26 gigafactories** with an average advanced **battery production capacity of 10 GWh per year.**

India has **no manufacturing plants at this scale currently**, hence, developing and rapidly scaling its advanced battery manufacturing industry will **require focused and coordinated public-private actions**

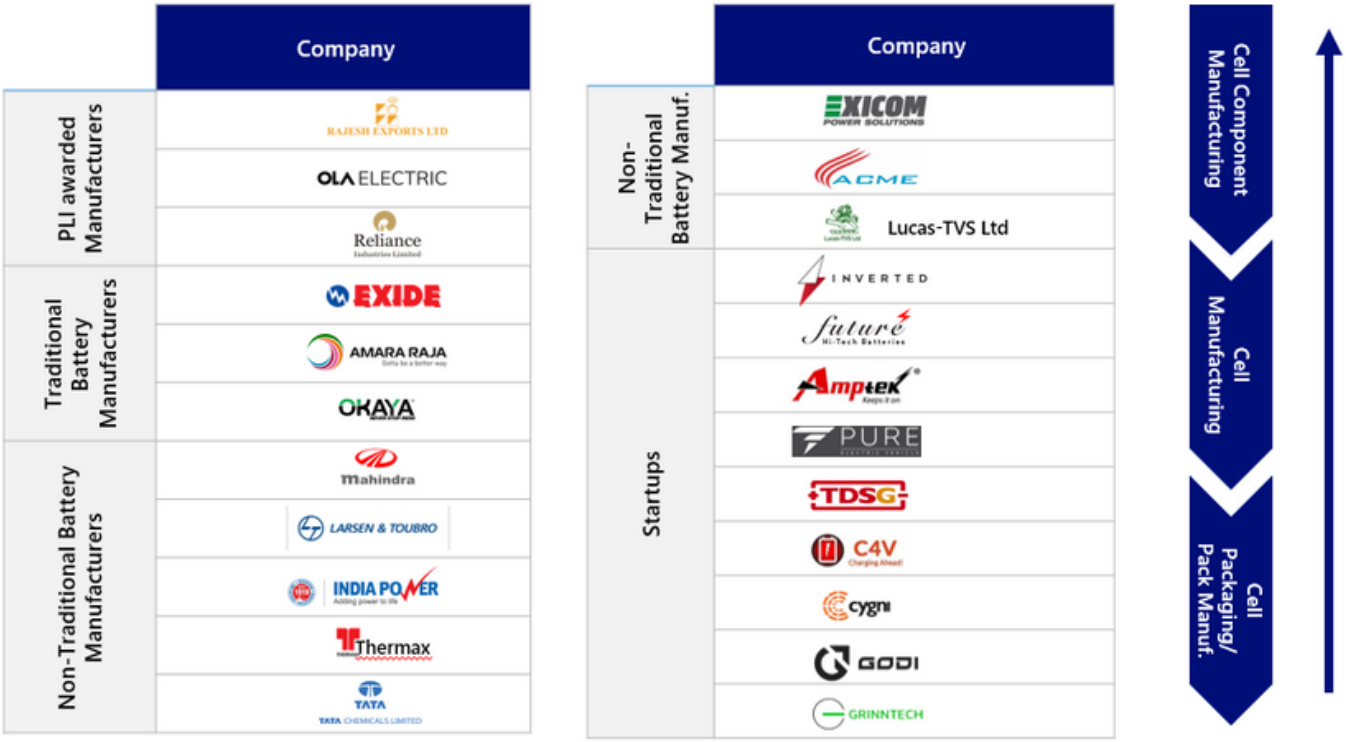
These numbers **highlight both the opportunity and criticality** for **India's emergence as a major global hub for advanced cells manufacturing.**

Source: Niti Aayog

India's rapidly growing population and economy are driving the demand for energy storage solutions. The Indian government has a focus on increasing electric vehicle penetration to reduce air pollution and dependence on fossil fuels. As per Niti Aayog's estimates, the battery demand in India is expected to rise to about 230 GWh by 2030. Despite such large demand, cell manufacturing is still at a nascent stage in India. Given the vast business opportunity, numerous players are now looking to venture into Li-ion battery manufacturing in India. Most of the companies in India are currently focusing on battery-pack manufacturing and are importing cells from China and Korea.

India's LiB industry - key players activity

Ola Electric, Reliance and Rajesh Exports have been selected under the PLI scheme for receiving incentives for cell manufacturing and are expected to start cell manufacturing latest by 2024. Traditional battery manufacturers' presence is inevitable in lithium-ion battery manufacturing. These companies have an excellent understanding of the automotive industry and have long-term experience working with OEMs. Non-traditional players such as Mahindra, L&T, India Power, Thermax, Tata Chemical, and many startup companies are looking to enter into the pack manufacturing business, with some planning to explore cell manufacturing in the future.



Source: Nomura Research Institute

Announcements and association by the companies selected under the PLI scheme

Ola Electric

- Ola Electric, which currently **imports battery cells from South Korea**, plans to set up an Advanced chemistry cell manufacturing plant with 1GWh of battery capacity by 2023 and expand it to 20 GWh in 2026-2027 and 50 GWh in the long term. Ola needs 40 GWh of battery capacity to meet its annual target of producing 10 million e-scooters. Ola expects high demand security for LiB batteries owing to their current and anticipated future captive demand and expected demand from other OEMs.

- The company reportedly plans to invest up to **$1 Billion** in cell manufacturing. Ola is in talks with several state governments to find 1,000 acres of land for the manufacturing plant and is speaking to more than **40 global suppliers from Germany, Korea and Japan, such as Dürr and Siemens**. In addition, the company invested in Israel battery technology firm **StoreDot** to have exclusive rights to manufacture batteries integrating StoreDot's technology in India.

Reliance

- Reliance has made investments in two companies, **LithiumWerks** and **Faradion**. LithiumWerks owns proprietary LFP cell technology. Reliance acquired all its assets, including the entire portfolio of 219 patents, a **manufacturing facility in China**, key business contracts, and hiring existing employees. Faradion, on the other hand, is a sodium-ion battery technology company.
- Reliance plans to invest **₹150 B** in value-chain, partnerships, and future technologies, to create a fully integrated, end-to-end ACC (advanced chemistry cell) manufacturing facility. The company also has an exclusive collaboration with **Ambri**, an American energy storage company, to set up a large-scale battery manufacturing facility in India.

Cell component manufacturing: Anode, Cathode, Electrolyte and Separator

There is a critical need to localise the cell supply chain. The cell materials constitute around 40% of its cost, and India has minimal availability of cell raw materials. **If India targets to achieve 60% of the value addition (as mandated by the PLI), it needs to localise the manufacturing of anode, cathode, electrolyte, and separator.**

Anode

Companies such as **Epsilon, Himadri & HEG** are exploring and taking steps to manufacture anode locally. **Epsilon** produces meso coke, a precursor to anode material, on a commercial scale of 2,500 TPA capacity to manufacture synthetic and natural graphite. By 2030, they plan to have capacities of around 100,000 million TPA of the synthetic anode and 50,000 million TPA tons of natural graphite. **Himadri Chemicals** plans to produce around 20,000 MT soon and expand to 100,000 million tons of anode material by 2028 in a phased manner.

Cathode

India doesn't have many cathode manufacturers yet, given the scarcity of raw material. **Epsilon Carbon has tied up with a US company to explore the cathode manufacturing business in India**. A few startups are also venturing into cathode manufacturing. Some initiatives have been announced by Allox and Epsilon. Hyderabad-based **Allox enhances the imported material and manufactures the LFP cathode through a patented process at a current manufacturing capacity of 50 kilograms per day**. They plan to go into commercial production and increase the production capacity to 10 to 15 tons per day. Allox has also signed an MoU with Govt. of Telangana for setting up a C-LFP active battery material production unit. The 3GWh per annum capacity facility with an investment of ₹210 Cr will be expanded to 10 GWH/PA with ₹750 Cr by 2030.

Electrolyte

Indian companies such as **Neogen Chemicals and Gujarat Fluorochemicals** have recently invested & started manufacturing electrolytes for lithium-ion batteries in India.

Separators

Daramic (an Asahi Kasei Group company) currently manufactures PE separators in India for Lead Acid Batteries. They are believed to be future-ready for a transition into Li-ion batteries. Daramic plans to start a greenfield project for lithium-ion battery separators. Once the local demand increases, Asahi Kasei Group company is expected to have aggressive plans for separator manufacturing in India.

Strategy of cell component manufacturers in India

Due to the lack of domestic demand for the above cell material, the first target for any company entering cell component manufacturing is obtaining approval for their products from global cell manufacturers such as Panasonic or LG Chem. Becoming a supplier to such players gives them a substantial advantage and acceptability. Furthermore, as global cell players enter different geographies, they can accompany them to capture other markets.

The second requisite is export to lead demand. Anode manufacturers in India are making manufacturing plans based on not the Indian scenario but the global scenario since the domestic market for local cell manufacturing companies is expected to take at least three to four years to mature in India.

Availability of raw materials and India's treaties with the world

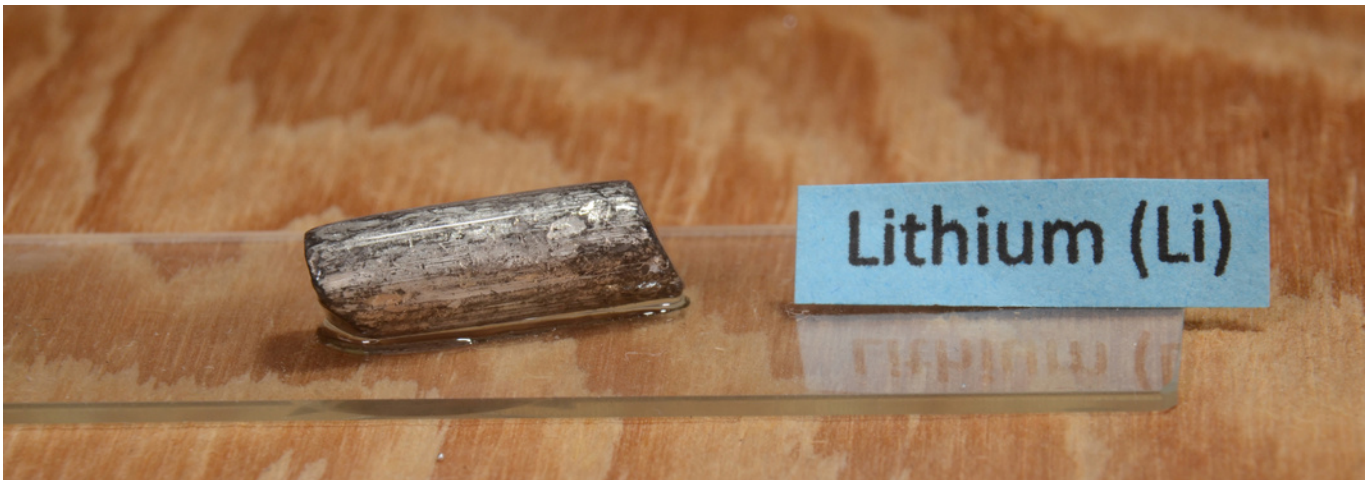
Availability of Raw Materials in India

India currently imports most of the crucial metals required for Lithium-ion cathode production in the country yet has great potential for anode production

Cathode	Lithium	• **India currently imports all its lithium.** • The Atomic Minerals Directorate have estimated lithium reserves of 14,100 tonnes in a small patch of land in Southern Karnataka
	Cobalt	• **India currently imports all its cobalt.** According to the Bureau of Mines, there is no cobalt production yet. • India is reported to have ore resources of 44.9 million tonnes, the potential is yet to be tapped.
	Manganese	• According to Geological Survey of India, total manganese reserves are estimated at 167 million tonnes. • About one-fifth of the world's manganese ores are found in India.
	Nickel	• As per National Mineral Inventory (NMI) database, resources of nickel are estimated at 189 million tonnes. • Odisha has the largest share of nickel ore in the country at 175 million tonnes (93%) followed by Jharkhand & Nagaland.
	Iron	• **India is abundant in iron ores.** The prominent ores of iron found in India are Hematite and Magnetite. According to NMI, the reserves of the ores are: • Hematite: Approximately 18,000 million tonnes, Magnetite: Approximately 10,500 million tonnes
	Phosphate	• India is **deficient** in Apatite & Rock Phosphate availability and is majorly dependent on imports • As per NMI, the total reserves of apatite are 24 million tonnes and of rock phosphate are 46 million tonnes.
Anode	Graphite	• **India has graphite reserves of 11 million tonnes** and resources of 158 million tonnes. • There are 3 graphite mine belts, mainly distributed in Andhra Pradesh and Orissa.
Electrolyte	Fluorspar	• As per NMI database, the total reserves/resources of fluorite are 17.89 million tonnes. • Gujarat accounts for 66% of the total reserves, followed by Rajasthan 29%.

Source: Nomura Research Institute

There is a need to have G2G (government to government) collaborations for raw material access. Institutions like the National Aluminium Company (NALCO), Hindustan Copper (HCL), Mineral Exploration Corporation (MECL), National Mineral Development Corporation (NDMC) and others are working towards establishing such collaborations. To ensure a steady supply of raw materials for Lithium-ion battery production in the country, India will be obtaining lithium and cobalt in countries like Australia, Argentina, Bolivia, and Chile.



A joint venture company, Khanij Bidesh India (KABIL) Ltd., has been created by the Ministry of Mines. National Aluminium Company (NALCO), Hindustan Copper (HCL), and Mineral Exploration Corporation (MECL) are three companies that are a part of this joint venture.

In 2020, KABIL signed a non-binding MoU with a non-disclosure agreement with three State-owned Argentinian organisations in July, September and December for information sharing regarding prospective mineral acreages. KABIL has also signed an MoU with Australia's Critical Minerals Facilitation Office (CMFO) to collaborate on lithium and cobalt identification projects in Australia

State-owned NMDC (National Mineral Development Corp) is looking to mine lithium, cobalt and nickel through Legacy Iron Ore Ltd in Australia. NMDC owns a 90% share in Legacy Iron Ore Limited. NMDC will bring back its entire quota to India to meet the growing lithium requirement because of the rising domestic sales of electric vehicles. NMDC is also looking for cobalt, nickel and gold mines in various geographies, including Africa.

Hence, once these G2G collaborations pick up, India will solve major challenges with respect to raw materials access for cell manufacturing.

Conclusion

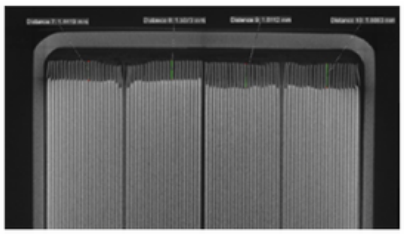
India is currently heavily dependent on imports for lithium-ion batteries, which account for a significant portion of the cost of electric vehicles and energy storage systems. To reduce dependence on imports and promote domestic manufacturing, the Indian government has launched several initiatives to support the local production of lithium-ion batteries.

As of today, there are several domestic and international companies that have set up lithium-ion battery pack manufacturing plants in India. The production of lithium-ion cells in India is still in its early stages, but it is expected to grow rapidly in the coming years due to the government's initiatives to promote domestic manufacturing and the increasing demand for electric vehicles and energy storage systems.

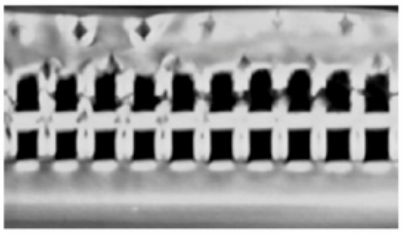
Special Thanks to Mridul Agarwal, Associate Consultant at Nomura Research Institute Consulting and Solutions, for his extensive contribution to this analysis.

Structural analysis of Li-ion Cells
using X-Ray imaging tools

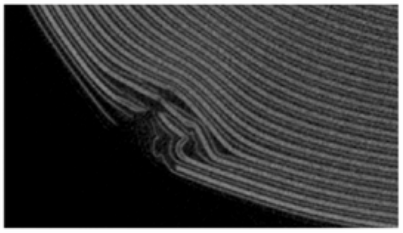
Seeing beyond



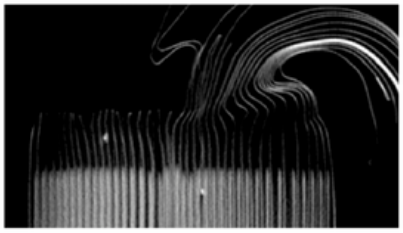
Overhang measurement



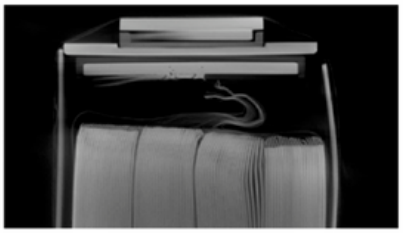
Inspection of weld quality in pouch cell



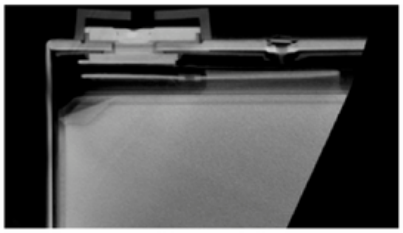
Electrode defects like gaps and cracks



Identification of metal inclusion



Tab defect inspection



Defects such as folded and damaged electrodes

Quality Assurance for Cells and Battery packs

A wide range of imaging and metrology tools are needed to enable quality control of Cell and Battery packs. ZEISS produces 2D X-ray and Computer Tomography (CT) systems to assess and correlate structural and dimensional characteristics.

X-ray Imaging devices helps provide relevant data to enable cells/battery **Safety and Performance** for new energy vehicles.

Contact us at info.metrology.in@zeiss.com | +91 80 4343 8102

Investment Commitments Secured by Indian EV Companies in FY 22-23

TIREX	USD 2 M	APR 2022
ATHER	USD 128 M Series E	MAY 2022
BLU SMART MOBILITY	USD 25 M Series A	MAY 2022
GREAVES ELECTRIC MOBILITY	USD 220 M	JUN 2022
statiq	USD 25.7 M Series A	JUN 2022
BATX	USD 1.6 M Seed Funding	JUN 2022
MATTER ENERGY	USD 10 M	JUN 2022
BatterySmart	USD 25 M	JUN 2022
TURNO	USD 3.1 M	JUN 2022
METASTABLE MATERIALS™ WASTE AS ORES	Undisclosed amount Seed Funding	JUL 2022

SPORT UTILITY VEHICLES	USD 250 M	JUL 2022
EVIFY	INR 80 lakhs Seed Funding	AUG 2022
River	USD 11 M Series A	AUG 2022
êxponent	USD 13 M Series A	AUG 2022
ULTRAVIOLETTE	USD 10 M Series D	AUG 2022
cygni	USD 12.5 M Equity and Debt	AUG 2022
ABHINAVA RIZEL	USD 25 M	SEP 2022
EULER Sustainable. Electric. Future.	USD 60 M Series C	SEP 2022
yulu	USD 82 M Series B	SEP 2022
esmito	INR 10 Cr	SEP 2022

VECMOCON TECHNOLOGIES
USD 5.2 M
Pre - Series A
OCT 2022

Revfin
Smartest, Fastest Electric Vehicle Loans
USD 10 M
Series A
Equity and Debt
OCT 2022

EMOTORAD
INR 24 Cr
Pre - Series A
OCT 2022

MOEVING
USD 2.5 M
NOV 2022

ELECTRA EV
USD 25 M
NOV 2022

yulu
USD 9 M
Debt
NOV 2022

chargeup
Bharat's Largest Battery Swapping Network
USD 7 M
Pre - Series A1
NOV 2022

Corrit Electric
USD 9 M
Series A
NOV 2022

CLEAN ELECTRIC
USD 2.2 M
Seed Round
NOV 2022

VAJRAM ELECTRIC
powered by eBikeGo
USD 1.5 M
Seed Funding
NOV 2022

ULTRAVIOLETTE
Series D
NOV 2022

MOTOVOLT	INR 16 Cr Pre - Series A	NOV 2022
Tsuyo	INR 100 Cr for 51% stake	DEC 2022
TRNL ENERGY	INR 7.5 Cr	DEC 2022
AMU Leasing Pvt. Ltd.	Undisclosed amount in Debt Funding	JAN 2023
ElectricPe	USD 5 M Pre - Series A	JAN 2023
CHARA	USD 4.75 M Pre - Series A	JAN 2023
LOG9 PIONEERING RESPONSIBLE ENERGY	USD 40 M Equity and Debt Series B	JAN 2023
SIMPLE	USD 20 M Bridge Round	FEB 2023
ZYPP	USD 25 M Equity and Debt Series B	FEB 2023
TURNO	USD 13.8 M Series A	FEB 2023

VIOMA

Pre - Series A

FEB 2023

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eVera Be The Difference

USD 7 M
Pre - Series A

MAR 2023

Mahindra Rise.

INR 600 Cr

MAR 2023

Pointo

USD 3 M

MAR 2023

CHARGE+ZONE

USD 54 M
Equity and Debt
Series A1

MAR 2023

EVIFY

USD 200,000
Seed

MAR 2023

THE ENERGY COMPANY

Undisclosed
Pre Seed

MAR 2023

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UNDERSTANDING THE H2-ICE TECHNOLOGY FOR SUSTAINABLE HEAVY-DUTY VEHICLES

Recently, Reliance and Ashok Leyland unveiled a heavy-duty truck (19-35 Tonne) based on H2-ICE technology, i.e. an **ICE engine powered by hydrogen**. The vehicle was flagged off by Prime Minister Narendra Modi in Bangalore at India Energy Week. Other prominent players working on this technology are Cummins and Toyota.

*We had a chat with **Mr Abhilash Savidhan - Lead, Hydrogen Systems at Reliance Industries**, to understand the relevance of H2-ICE technology for heavy vehicles.*

Is H2-ICE a new technology?

H2-ICE is not really a new technology. Many people have tried it earlier. However, the technology was not mature enough to handle the properties of hydrogen. Now there is a renewed interest in hydrogen for ICE engines.

For cost-conscious countries like India, shifting over to battery electric vehicles or fuel cell vehicles for the heavy-duty segment is impractical right now because of the huge costs involved. Plus, when it comes to heavy-duty vehicles, there is also a payload sacrifice in battery electric vehicles because of the heavy weight of the batteries.

Hydrogen-ICE makes a lot of sense as we just have to modify the engine to use a much cleaner fuel. **The emissions from H2-ICE vehicles are limited to nitrogen oxides and maybe very few elements of hydrocarbons because of engine oil.**

What is the current level of technology readiness for H2-ICE vehicles?

Various companies are working on Hydrogen ICE vehicles, like Reliance & Ashok Leyland, Cummins, and Toyota, to name a few. The technology is ready; however, **what needs to be ascertained is whether the vehicles are durable and reliable for the intended life of the vehicle, which is 10 lakh km or 10 years.**

Hydrogen is a very small molecule, and leakage is an issue that needs to be taken care of. It is important to make sure that the right sealing technologies are in place. Another issue is that hydrogen element attacks metals like steel. Its small molecule gets into the structure of the steel, which needs to be controlled. The selection of material is of critical importance. As far as performance is concerned, it's possible to get diesel-like performance when it comes to power and acceleration. Long-term durability for the intended design life of the engines needs to be established, which various OEMs and technology providers across the world are working on and are in advanced stages of maturity levels for deploying into the markets.

What would be the additional infrastructure requirements for H2-ICE vehicles?

First, we should understand the minimum distance heavy-duty vehicles cover daily, which is close to 500 kilometres for one filling. The infrastructure has to be brought in. We cannot escape that, but the **dynamics for H2-ICE vehicles infrastructure are very different from EV charging**, particularly for heavy vehicles where you cannot afford to have long downtimes. That is the advantage fuel cell electric vehicles, or even hydrogen ICE vehicles have over the infrastructure requirements of the electric vehicle.

For long-distance buses or heavy-duty trucks, you need mega chargers for quick charging, which would be a huge stress on the grid. But when it comes to hydrogen infrastructure, we can have hydrogen production hubs in different parts of the country. From these hydrogen production hubs, hydrogen can be sent to the dispensing stations, either by using tube trailers or pipelines, where hydrogen can be compressed and dispensed. Plus, hydrogen can be 100% green once we start using photovoltaics and electrolyzers for local production of green hydrogen in the production hubs.

In terms of the economics of operation, how will it compare with diesel vehicles?

That depends upon the pricing of hydrogen. The chairman of Reliance made an announcement for hydrogen in one of the AGMs - **one decade, one dollar, one kilo**. So over the next decade, the price can be brought down to $1 for one kilo. If that happens, I think the advantage over diesel will be huge - maybe 30% or 40% or more.

Any insights into purchase price comparison vis-a-vis diesel vehicles?

I think once we are into local mass production for all the components and child parts required for hydrogen, such as regulators, the valves etc., we can achieve cost parity with diesel. The big cost right now is the storage cost. For storage, carbon fibre tanks are used, which are all imported. If we can localise this, we can have huge cost savings to bring parity with diesel.

What are your thoughts on LNG for heavy-duty vehicles?

In my opinion, it makes more sense to go with hydrogen because LNG again has import dependencies.

Any estimate as to how long it will take for H2-ICE technology to come on the road?

Most of the OEM or technology providers working on hydrogen ICE are in very advanced stages. I see the technology coming on the roads in maybe the **next one or two years.**

I also believe that India should graduate to fuel cell technology in the next 10 years. **H2 ICE technology is going to be a bridge between the current diesel vehicles and the hydrogen fuel cell vehicles, which will come up eventually.** Fuel cell vehicles are slightly more efficient than hydrogen ICE. They should be adopted once the technology becomes affordable as we start manufacturing fuel cells and the balance of plant and child parts here in India.

The views expressed are personal.

EVreporter.com

Product Feature

CHOGORI FC CONNECTOR PRODUCT SERIES

The connectors in Chogori's FC connector product series are used for **Electric 2W and 3W battery swap applications**. The connectors come in 2 socket sizes for different power requirements and allow EV charging and discharging variations based on system design and application requirements.

The power sockets are **Chogori patents** for high current transmission capabilities, and the connectors are a hybrid design that comes with both power and signal.

FC04 PRO Connector for battery swapping applications

- In **FC04 Pro**, the power uses **5.7mm sockets** for **single-direction insertion** with 10 signal pins.
- The product is rated for **80V DC, 100A for power and 5A for signal**.
- The wire gauge for power can cable up to 25mm².

- In **FC09**, the power is using **3.6mm sockets for bi-direction insertion** with 10 signal pins.
- The product is rated for **72V DC, 40A for power and 5A for signal.**
- The wire gauge for power can cable up to 13mm².

FC09 Connector for battery swapping applications

FC09 Connector is designed for bi-direction insertion. The usable signal transmission would be based on 5 signal pins.

Enquiries

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EVreporter.com

Product Feature

CHOGORI FC CONNECTOR PRODUCT SERIES

The FC connector product series uses -

- **High-strength thermoplastic resin with an operating temperature range of -40°C ~ 105°C**
- **Conductors are plated in silver or gold**
- **Battery side connector IP67**
- The FC connectors can withstand **≥5,000 mating cycles**
- **Flammability rating UL94V-0, RoHS and REACH compliant**

About Chogori

CHOGORI®
Focused on Your Connections

Founded in 2007, Chogori Technology Co. Ltd. designs and manufactures a wide range of environmentally sealed and rugged connectors for harsh environments and outdoor applications.

The high-technology enterprise integrates design, R&D, manufacturing, sales, and technical services. Chogori has a team of 700 employees and 53,000 square feet of production space in Shenzhen and Dongguan, China. Chogori applies Toyota's Lean management philosophy and has established International Industry Standard Laboratory, where all products are validated according to USCAR2 & 37 specifications and DFMEA validation as per customer requirements.

Enquiries

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- **Visit us - http://www.chogori-tech.com/**

JUPITER WAGONS GETS READY FOR INDIA'S ELECTRIC COMMERCIAL VEHICLE MARKET

The electric commercial vehicle market in India is heating up. After electric L3 and L5 cargo three-wheelers, a new range of four-wheeler commercial EVs is expected to enter India's logistics space. The Auto Expo 2023 witnessed many companies showcasing four-wheeler commercial vehicles, including Jupiter Electric Mobility (JEM).

Mr Vivek Lohia, Managing director at Jupiter Wagons, shares about their EV plans.

JEM showcased two commercial electric vehicles at the AutoExpo 2023. Please tell us more about both of your EV products.

Jupiter Electric Mobility's JEM Tez and EV Star CC have GVWs of 2.2 Tons and 7 Tons, and payload carrying capacities of 1 and 4 tons, respectively.

- **The one-tonne payload vehicle (TEZ)** has been completely designed by us indigenously, and we are planning to launch it commercially in the **third quarter of this year**. It will come with two battery options - LFP and LTO. The vehicle has a range of 180 km and comes with a fast charge option with the LTO battery. It can be charged within two hours and then run for another 180 km. For the LTO battery pack, 10 years warranty and a lease on the battery will be provided, so the customer doesn't have to pay the cost of the battery. We are also giving our customers a buyback option after 3 years. The vehicle has about 80W peak motor as well as a 23% gradient which gives it a lot of torque.

- **The four-tonne payload vehicle (EV Star CC)** - We are planning to launch the bigger vehicle also this year. We are introducing two battery sizes - 60 kW and 120 kW. The 60 kW battery will give a range of 200 km, while the 120 kW battery will give a range between 250 to 300 km. The vehicle can be fast-charged in two hours.

The vehicles are going to be completely connected, and we are creating our own data centre to monitor all the vehicles and their data constantly. In terms of maintenance, we are looking at a pre-emptive approach.

Where are you planning to manufacture both of these vehicles?

Both of the vehicles will be manufactured in Indore. We already have an existing manufacturing facility, which we are augmenting to produce both of these vehicles.

As I said, we are planning to launch the smaller vehicle in the third quarter. The bigger vehicle, initially, will be imported in a completely knocked-down form as it has been designed with the Green Power Motor Company, and this model has been successfully running in the North American market. More than a thousand of these electric vehicles are running today in North America. We are very hopeful that by next year we will be able to start manufacturing these vehicles in India. The plan is to use India as the global sourcing hub for Green Power and not only for the Indian business but for their global business as well.

What kind of response have you got since your showcase at AutoExpo? Is there any order book or number you can share?

The response has been very positive, and we are overwhelmed in terms of the response we have received from the market. However, right now, as a company, we are not taking a firm order book. We'll only start taking firm orders closer to the launch when we can give definite timelines to our customers.

How many units are you planning to manufacture every year?

Initially, our capacity will be about **500 vehicles per month for the smaller vehicle,** and then, depending on how the market shapes up, we will augment the production. And the bigger vehicle, as I told you, will initially be in the CKD form, and we will set up the production facilities accordingly depending on how the market responds.

Has your team done any analysis as to what you are trying to price this vehicle and the total cost of ownership? If you compare with the corresponding ICE vehicles, how would your vehicle compare?

If you compare it to an ICE vehicle, there is a distinct price advantage which we are giving to our customers. **I think we can guarantee a saving of anything between INR 30,000 to 50,000 per month, depending upon the usability of the vehicle**, which is a huge price advantage. Right now, we are not at liberty to reveal the prices. But I can tell you that our vehicles are going to be very competitive and we are offering a much better product compared to our competition. The customer gets his payback on the vehicle within two to three years.

This segment sells close to 5,00,000 vehicles every year. Over the next five years, we are looking at penetration of at least 10%, which is close to 50,000 to 1,00,000 vehicles.

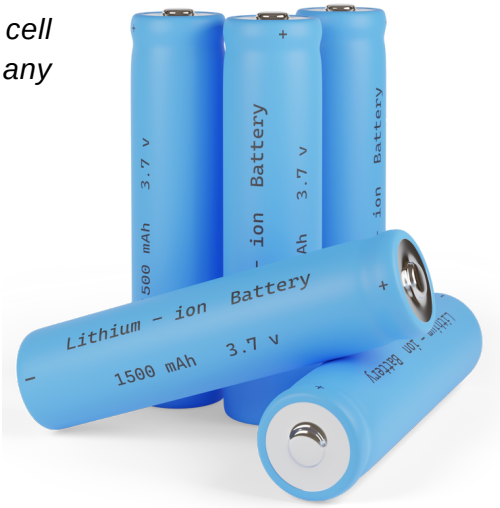
In terms of distribution strategy, are you also looking at institutional clients first, or will you be open for retail as well?

Definitely, we are looking at institutional penetration initially because that's where the market is currently. But we are also opening it up for retail sale, so it'll be a mix of both.

CHALLENGES DURING LITHIUM-ION CELL MANUFACTURING PLANT SETUP - PART 2

PRODUCT MEETING TECHNICAL EXPECTATION OF THE MARKET

Rahul Bollini is writing a series of articles over the next few months explaining the challenges faced during Lithium-ion cell manufacturing plant setup, which should be relevant to any company entering this field.



It is very common to see articles about a new breakthrough technology that could change the whole market. This could be a cell technology, a major component of the cell or even a sub-component of the cell. While part 1 of this series discussed about clearly defining the target market the Lithium-ion cell manufacturing output would cater to, **part 2 discusses the challenges faced during meeting those expectations**. I discuss these typical technical parameters below:

Market Trends

New trends are being observed with existing battery technologies in the international market at a Giga scale. Any company entering cell manufacturing must be aware of these to avoid being left out of global competition. Example trends are as follows:

- **NCA** cells max out at 5Ah discharge capacity in 21700 cylindrical form factor presently, which is being upgraded to 5.3Ah by some manufacturers. Hence it can provide a 6% higher discharge capacity in the same volume and has improved gravimetric energy density (Wh/Kg).

- **LFP** cells in 32700 cylindrical form factor max out at 6.5Ah discharge capacity presently. But it is getting updated to 7Ah in the same 32700 form factor, and there is an addition of a 32800 model, which would have 8Ah.

- **LFP** cells have crossed above 400Wh/L for the first time in some models, such as 33140 form factor, providing 15Ah discharge capacity. This is **by far the highest volumetric energy density that LFP cells have achieved to date**.

- Large LFP cells such as pouch cells have improved from 1C max continuous discharge rate to 2C max continuous rate along with improvement in gravimetric energy density from 160Wh/Kg to above 180Wh/Kg. It is a matter of time before it reaches 190Wh/Kg going forward.

- Large LFP cell demand is shooting up, especially the 280Ah prismatic cells used in BESS (battery energy storage system). Traditionally they offered cycle life that wouldn't allow them to operate beyond 10 years at 90% Depth of Discharge (BESS typical operation). Newer cell models have enhanced the cycle life to function beyond 10 years comfortably.

Customer Qualification Plant (CQP)

This is a term being used by new companies setting up a decent size pilot-scale manufacturing facility after they are sure about what they want to produce. The purpose of this plant is to provide regular samples to its potential customers for testing and validating their products. The purpose of this plant is to confirm the kind of setup that exactly needs to be scaled up to a Giga-scale. **The main challenge with this plant is optimising the recipe of the cell to the required accuracy in order to achieve the required specification**. Most companies face indefinite delays in their QCP, especially those with their own lab-made technology or those collaborating with lab-level technologies. Hence, some companies choose to collaborate with experienced companies who not only have prior experience dealing with such plants but also have experience scaling up to Giga-scale plants and operating them successfully for many years.

Parameters that need to be maintained consistently in QCP are:

- **Discharge Capacity**: It has to be maintained, ranging between minimum capacity and rated capacity at a given C rate of charge and discharge. Consistency in the discharge capacity is very important to battery pack assembly companies, and it is their first step in Quality Control.

- **Internal Resistance**: ACIR (Alternating Current Internal Resistance) and DCIR (Direct Current Internal Resistance) values need to be within the desired range. **The higher values categorise the cells under Solar grade (unfit for electric vehicle application)**.

- **Self-discharge**: During the cell grading process, the self-discharge parameter needs to be within the desired range. The higher values categorise the cells under lower categories such as A- or B grade. It is known as the k value during the grading process, and it refers to the drop in the voltage in a given unit of time (millivolt/day).

- **Energy Density**: The lower gravimetric energy density is a possibility in defined form factors such as 18650 cylindrical cells. The lower volumetric energy density is possible in flexible form factors such as pouch cells. This would mean that the cells are heavier and bulkier than expected, respectively. This can be because of various reasons, such as more dead-weight materials like binder or the use of conductive additives or electrolytes, which can even increase the production cost of the cell.

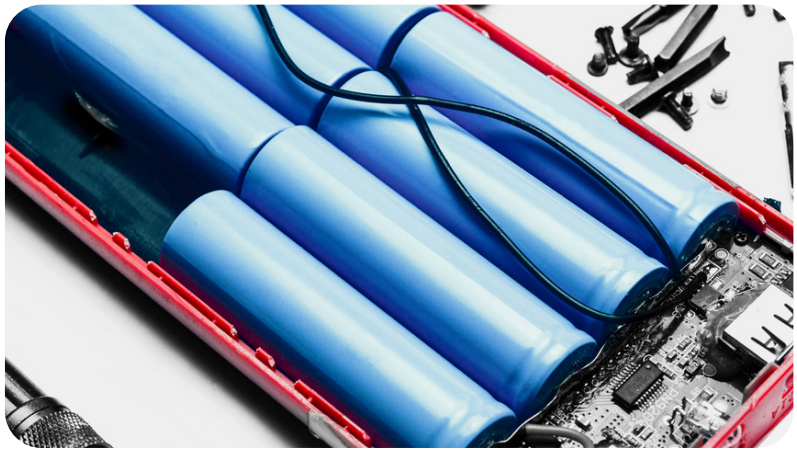
- **Temperature Profile**: It is a fact that there is a temperature rise in the cells during charge and discharge operations, which varies at various C rates of operation. A consistent cell design incorporated manufacturing process in place ensures that the temperature rise of the cells is uniform. The temperature profile is considered a very important factor while building a battery pack because, based on this, thermal management is designed for the battery pack. A higher temperature rise compared to other similar types of cell manufacturers' products in the market discourages the buyer.

Efficient Design

Lithium-ion cell manufacturing is not as difficult at a research level; one can hear about it every now and then. However, achieving the required specifications and meeting the overall expectation as per the market standard can be tedious. Starting with the fact that the market grade specification can't be manufactured in a laboratory, the equipment simply does not support achieving the market standard specification. **This is where a gradual increase in discharge capacity is tested out (in the same form factor, without a drastic increase in internal resistance), where laboratory-level technology is taken to a Mega-scale manufacturing, then to a CQP and then to a Giga-scale.** The gradual increase in the scale calls for gradual improvement in the cell design and process in order to achieve the set target.

Efficient design also means using the best possible resources to achieve the required cell specification.

NMC 532 cathode with graphite efficiently allows for 2.6Ah discharge capacity in 18650, but achieving the same discharge capacity in NMC 811 would be considered inefficient because NMC 811 cathode is expensive and has the potential to provide higher discharge capacity in 18650, say 2.9Ah. Also, NMC 811 works with an expensive formulated electrolyte, adding more cost.



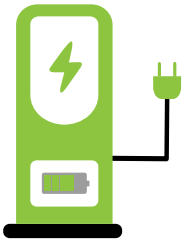
More will be explained about this aspect in part 5, which discusses about the challenges of process optimisation and skilled manpower.

Part 3 will discuss the challenges faced during securing the raw materials and an outlook of what can be utilised from India.

Upcoming parts of this series:

- Part – 3 (Securing Raw Materials)
- Part – 4 (Plant Setup Planning)
- Part – 5 (Process Optimisation and Skilled Man Power)
- Part – 6 (Expansion and Diversification of Portfolio)
- Part – 7 (Evolving to Newer Technologies)
- Part – 8 (Backward Integration)

Rahul Bollini *is an R&D expert in Lithium-ion cells with 8 years of experience. He founded Bollini Energy to assist in deep understanding of the characteristics of Lithium-ion cells to EV, BESS, BMS and battery data analytics companies across the globe. Rahul can be reached at +91-7204957389 and bollinienergy@gmail.com.*



The Union Minister of Heavy Industries, Dr Mahendra Nath Pandey, announced the sanction of **INR 800 crores under FAME II** to the PSU Oil Marketing Companies (OMC) - Indian Oil (IOCL), Bharat Petroleum (BPCL), and Hindustan Petroleum (HPCL) - **for setting up 7,432 public fast charging stations** across the country. The installation is expected to be completed by March 2024. At present, there are about 6,586 charging stations across the country.

As per Uttar Pradesh EV Manufacturing and Mobility Policy 2022-

- A **100 per cent tax exemption** will be given on electric vehicles sold and registered in Uttar Pradesh from Oct 14, 2022, to Oct 13, 2025.
- In the fourth and fifth year of the effective period of the EV Policy notified on Oct 14, 2022, i.e., from Oct 14, 2025, to Oct 13, 2027, a 100 per cent rebate will be given on EVs manufactured and sold and registered in the state.

The benefits cover all electric two-wheelers, three-wheelers, and four-wheelers, Strong Hybrid Electric Vehicle (HEV), Plug-in Hybrid Electric Vehicle (PHEV), Battery Electric Vehicle (BEV), and Fuel Cell Electric Vehicle (FCEV).

The Ministry of Heavy Industries has issued a notification to push the timeline for compliance with Enhanced Human Safety Parameters for EVs (notified in Nov 2022) to Oct 2023, from its original implementation date of Apr 2023. The compliance pertains to eligibility for incentives provided by government schemes such as FAME 2, PLI for ACC manufacturing and PLI for Automobiles and auto components.

Official Delhi EV sales data - 7,917 Electric vehicles were sold in Delhi during March 2023. **EVs contributed 14.8% of overall vehicle sales in the month**, which is the highest among all Indian states. 4W sales contributed to 20% of EVs sold, while 3W (Goods) contributed 12%. To date, 1.12 lacs EVs have been sold under the Delhi EV Policy.

Amendment 3 of AIS-156 (EV battery testing standard) was to be implemented in a phased manner, with Phase 1 in effect from 1st December 2022 and Phase 2 from 31st March 2023. Among leading EV battery pack manufacturers, **Ipower Batteries, Cygni Energy, Amara Raja Batteries, Battrixx, Sieger, Inverted, LiKraft and Trontek** have been reported to receive phase 2 certifications.

Celgard LLC, a subsidiary of Polypore International, has entered into a strategic agreement with lithium-ion battery technology company **C4V** to collaborate on the **development of separator solutions for the lithium-ion battery market** optimized for C4V's high-voltage bio-mineralized lithium mixed metal phosphate (BM-LMP) cathode material.

CELGARD

C4V
Charging Ahead!

International Finance Corporation is investing **INR 600 crores** in a new Last Mile Mobility Company - a wholly owned **subsidiary of Mahindra Group that will be newly incorporated ("NewCo").** The investment will result in an ownership of between 9.97% to 13.64% for IFC in NewCo, which will house the last mile mobility division, including three-wheelers (Alfa, Treo, Zor) and four-wheeler SCV (Jeeto).

As part of Series A1, **CHARGE+ZONE has raised $54M,** of which $8M is debt investment from an infrastructure strategy managed by Blue Orchard.

The funding will finance an immediate roll-out of 286 charging stations serving 1,130 e-buses and e-trucks as well as over 1250 e-car fleets in addition to new expansion targets by CHARGE+ZONE.

bp ventures and an investment fund managed by Morgan Stanley Infrastructure Partners Inc (India) have committed a total of $22 million in equity investment to Magenta Mobility. Magenta Mobility currently operates in seven Indian cities with more than 750 electric 3Ws in its fleet for last-mile delivery logistics. The company plans to expand its fleet to 4,000 3W and 4W EVs nationwide over the next year.

EV battery startup Pointo has raised $3 million in funding for its expansion into 20 districts of West Bengal. The EV Company, **backed by Mufin Finance,** said that 4MW Lithium-ion batteries will be deployed in West Bengal by 2024.

Logistics start-up EVIFY raised $200,000 in seed funding led by **We Founder Circle**. The round also witnessed participation from angel investors like Apurva Arora, Jayesh Gulabani and Rajeev Mehta. The proceeds will primarily be used for the expansion of the company's **operations in Ahmedabad**. EVIFY plans to have 2000 vehicles deployed in Surat, Ahmedabad, Vadodara and Rajkot by the end of 2024.

The Energy Company, building a Full Stack Battery platform, announced that it has secured a **pre-seed undisclosed investment led by LetsVenture**. Sia Angels, WFC, and other marquee angel investors also participated in the round. The company says that it has already tested its product with multiple fleet operators and EV aggregators in Bangalore and Delhi.

Hero Electric announced the release of its latest scooters, **the Optima CX5.0 (Dual-battery), Optima CX2.0 (Single Battery), and NYX CX5.0 (Dual-Battery).** The newly updated Comfort and City speed scooters are now available for purchase at a price range of ₹85,000-95,000 and ₹105,000-130,000, respectively. Hero Electric says that its latest range comes with **advanced Japanese motor technology and German ECU technology.**

Hero Electric crossed INR 1000 Cr turnover in FY 22-23, a 20% increase over the last FY with 1,00,000 unit sales. Ampere Vehicles also shared that they sold 1,00,000 e-scooters in FY23.

In Sep 2022, **Hero MotoCorp** announced they would invest USD 60 million in California-based **Zero Motorcycles** Inc. The company has now announced that it will collaborate with the latter on **premium electric motorcycles, leveraging Zero Motorcycles' expertise** in developing powertrains and electric motorcycles.

Goa headquartered **Kabira Mobility** announced that it has secured a **$50 million investment from its strategic investor, Al-Abdulla Group (Qatar)**. This investment will enable them to accelerate their Pan-India growth and ramp up the production of their electric bike models, KM3000 and KM4000. The company is also expected to unveil KM5000 and Pro variants of KM3000 & KM4000 soon.

West Bengal based Motovolt Mobility acquires a stake in **eROCKIT Group**, a German electric 2-wheeler OEM, investing **one million euros** in eROCKIT AG as a first step. Motovolt plans to make further investments of around 10 million euros in India for the industrialization of eROCKIT products.

Erockit AG is a lightweight electric bike; it is a human hybrid bike which can be operated both through a paddle and an electric motor. The bike comes with a **120 km range per charge** and **is being pre-booked on the company's German website at 12,900 euros.**

Okaya Electric Vehicles announced that it has received ICAT certification for its electric vehicles under AIS 156 Amendment III Phase 2. Okaya EVs are fitted with LFP batteries. The company has also added a buzzer to alert the rider at least 5 minutes prior to thermal runaway.

DAO EVTech, an electric mobility startup with a Make In India focus, **will invest Rs 100 crore in Tamil Nadu** and hire 2,000 people by 2025 as **part of its USD 100 million investment in India**. An event for DAO's new line of electric automobiles was conducted in Chennai. Dr Michael Liu shared the company's plans for expansion in India.

RattanIndia Enterprises acquired Revolt Motors mid-Jan 2023. Between Feb 20 and Mar 31, 2023, **Revolt Motors produced 6500 bikes, surpassing the previous average of 1,500 bikes per month.**

Chennai-based **Aventose Energy** is working on a portfolio of four electric 2W models, which it plans to launch during 2023-24, starting with mass-market scooters S110 and S110-ER. The company had earlier announced S110 back in Oct 2021 and plans to begin sales by June 2023. **S110 is designed for people currently using 100-125cc petrol two-wheelers.** The company is looking for dealership partners in Chennai, Bangalore, Delhi, Ahmedabad and Pune for stage one of expansion.

Specifications	S110	S110 ER
Range (km on road)*	85	120
Torque (Nm Wheel)	156	156
Max Speed (Kmph)	60	60
Weight with battery*	115	121
Drive	PMSM mid mounted	PMSM mid mounted
Motor (Kw Peak/Rated)	2.3/1.9	3.6/3
Battery kwh	1.9	3
Ground Clearance mm	175	175
Tyre F/R	17"/17"	17"/17"
Brakes Front/Rear	CBS Disc	CBS Disc
Swapping option	Yes	Yes
Fixed Charging	Yes	Yes
Battery removable	Yes	Yes
Target ex-showroom (With Fame 2)*	90,000	105,000
* Could vary slightly in final product		

Delhi-based trading organisation **Goyal Aluminium Limited** is diversifying into the EV segment through its associate company, **Wroley E India**, which will manufacture electric scooters. Wroley has secured the necessary approval from the Central Institute of Road Transport (CIRT) and is looking to launch its high-speed electric scooters in April 2023. The company received a land allotment from the Greater Noida Industrial Development Authority to establish the EV plant.

Gentari, through its affiliated entity Amplus Power Supply Private Limited, had **signed an MoU with Tata Motors** in 2022, whereby the latter will deliver **5,000 units of Tata Ace EV over three years**. The MoU includes the delivery of 1,000 units in the first year for deployment in cities such as Delhi, Bengaluru, Hyderabad, Pune and Kolkata.

To mark the delivery of the **first batch of 100 units throughout March and Apri**l this year, a vehicle handover ceremony was held at the 8th Smart Cities India Expo.

Bajaj Auto will unveil its first e-3W in April 2023. The product will be introduced for both the passenger and cargo vehicle categories. "*We will start the sales in April for cargo and passenger electric three-wheeler vehicles. There will be a limited launch as we want to take it step by step, as it is very important to give a stable product to the commercial user,*" said Rakesh Sharma, ED at Bajaj Auto Ltd.

Hyderabad-headquartered **Olectra Greentech** shared that it has received an order for **550 pure electric buses worth INR 1000 crores from Telangana State Road Transport Corporation.**

Anderson Power has launched the new SBS®X-75A Sealed Waterproof Connector Series. It comes with two power contacts rated up to 135A, accepting wire sizes from 12 to 4 AWG (2.5 to 25mm2) along with up to 4 auxiliaries for 24 to 14 AWG (0.50 to 1.5mm2) wire sizes, and durability of up to 5,000 mating cycles. The product is rated **IP68 in the mated condition** or with the use of covers in the unmated condition. It seems these connectors will be suitable for e-3W applications.

Kalyani Powertrain inaugurated its first **micro-factory for the production of electric two-wheelers on March 8, 2023, at Chakan, Pune.** This 68K sqft. micro-factory houses production and assembly lines. The first micro-factory is contracted to **Tork Motors to manufacture electric motorcycles.**

JLNPhenix Energy announced the launch of its first **integrated Powertrain with Battery for four-wheeler retrofitting**.

Faridabad-based Compage Automation said that it has made **India's first Motor made from Indian NdFeB magnets for commercial applications.** The company said that the magnet is built in India and makes 100% Indian PMSM motor.

Sun Mobility has entered into an association with Zomato to power 50,000 e-2Ws across India over the next 24 months using its battery swap solutions for last-mile deliveries. The association has been confirmed in Delhi with an initial fleet deployment.

Battery Swapping solution provider VoltUp has partnered with BSNL to establish battery-swapping stations nationwide. Initially, battery swapping stations will be set up in four locations across Gurugram, enabling an infrastructure of over 150 charging docks. It will be further extended to 30 locations across Haryana and other cities by the end of the year.

The multi-brand electric vehicle platform **BLive** has teamed up with **Chartered Bike** for a nationwide deployment of 10,000 2-wheeler EVs and 1000 3-wheeler EVs over the next 3 years. The total MoU is worth approximately INR 120 Crores. The partnership aims to provide the EVs to last-mile delivery companies, with a deployment focus on Tier II cities.

As per a company release, the EV penetration in Tata Motors portfolio has witnessed an increase from ~7% in Q1 FY23 to ~12% Q4 FY23 of their total sales. The company crossed 50,000 EV sales in FY23 to post a growth of 154% over FY22. Quarterly EV sales of TATA Motors stood at 15,960 (Q4FY23) units, while the monthly EV sale of 6,509 was recorded in Mar'23. The numbers include both domestic and international business sales.

Tata Motors has signed a contract to provide 1000 XPRES-T EVs to OHM E Logistics in Hyderabad for their electric cab transportation services.

As a part of this partnership, the company will commence deliveries of the XPRES-T EV sedans in phases.

BYD India has partnered with Evera – an EV Cab service based in New Delhi, to deliver 100 units of its electric car e6. Evera provides app-based cab services in the national capital region. Evera had closed its pre-Series A funding round at $7 million in Feb 2023, securing investments from IEG - INVESTMENT BANKING GROUP, Germany and Direct Capital- a subsidiary of DEVONSHIRE CAPITAL, Thailand & Westova Global, Singapore.

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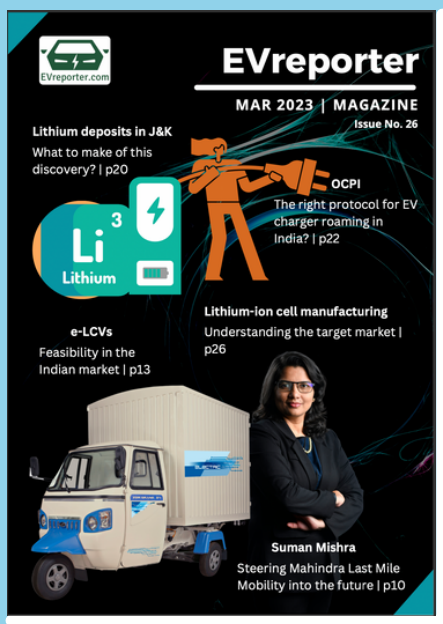

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