

## Driving India's EV Revolution: ENNOVI's Vision for a Sustainable Future

In an interview with Semiconductor For You, Mr. Satvinder Singh Sabharwal, Director of India Sales and Marketing from ENNOVI, shares the company's vision for transforming India's EV ecosystem. Committed to affordability and sustainability, ENNOVI offers advanced battery and interconnect solutions tailored to India's unique needs, including 2-wheelers, 3-wheelers, and 4-wheelers. The company focuses on enhancing charging infrastructure, localized manufacturing, and regulatory collaboration to drive EV adoption. With innovations in battery life, safety, and efficiency, ENNOVI aims to accelerate India's transition to a greener, energy-efficient, and accessible electric mobility future.



*Satvinder Singh Sabharwal, Director of India Sales and Marketing, ENNOVI*

**Semiconductor For You:** ENNOVI is positioned as a leader in electric mobility. Could you share your vision for the electric mobility ecosystem in India over the next five years?

**Satvinder:** At ENNOVI, we envision India becoming one of the two biggest markets for electric mobility before 2030. India has enormous room to grow, considering that car penetration is currently 26 per 1000 people and the forecast is that electric vehicles (EVs) will have a modest 30% share of the market by 2030. As EV adoption continues to rise, we aim to play a key role in accelerating this transition by providing cutting-edge battery interconnect technologies, power interconnects and customized signal interconnects. Our focus will be on developing cost-competitive offerings tailored to the market's needs, including 2-wheelers, 3-wheelers, and 4-wheelers. We are committed to the India Automotive industry's vision for growth and sustainable practices to ensure a greener, more energy-efficient automotive ecosystem for the future.

**Semiconductor For You:** Affordability is a significant factor for EV adoption. How is ENNOVI innovating its battery technologies to make electric mobility more accessible in India?

**Satvinder:** At ENNOVI, we are committed to making electric mobility more accessible through continuous innovation in battery interconnect technology to reduce cost and improve reliability. By investing in new product solutions and process technologies, we aim to help electrify faster. Additionally, our focus on scaling up production and forming strategic partnerships with local suppliers helps reduce the overall cost of EVs, making them affordable for the average consumer in India.

**Semiconductor For You:** Beyond battery solutions, what role is ENNOVI playing in enhancing India's EV charging infrastructure, and how are your products tailored to fit within India's unique infrastructure needs?

**Satvinder:** ENNOVI is focussed on offering interconnect solutions for vehicle and battery systems, including rechargeable batteries and swappable batteries. We engage with battery gigafactories to understand the roadmap for charging technologies and design battery interconnect solutions specifically to help achieve roadmap goals. Our interconnect solutions support 400V charging as well as the high-speed charging requirements of 800V vehicle architectures.

**Semiconductor For You:** What sustainable practices does ENNOVI implement in its battery production and supply chain? How do these efforts align with India's goals for a greener automotive sector?

**Satvinder:** At ENNOVI, sustainability is at the core of our operations. We focus on a circular economy approach, incorporating materials and practices to minimize waste and environmental impact. As an example, our operations are 90%-or-more based on renewable power sources. We ensure that our supply chain is built on sustainable practices, sourcing materials ethically at all times and locally when possible and reducing emissions during production. These practices align with India's broader environmental goals, supporting the transition to a green automotive sector.

**Semiconductor For You:** As regulatory support is essential for electric mobility growth, how does ENNOVI collaborate with policymakers to ensure favorable regulations? Are there specific regulatory advancements you believe are key to accelerating EV adoption in India?

**Satvinder:** ENNOVI actively collaborates with policymakers to create a supportive regulatory framework for electric mobility. We advocate for local production to serve local requirements. We engage with regulatory bodies to support the local industry with tax incentives, subsidies for EVs, and investments in charging infrastructure. Furthermore, we believe that developing clear battery recycling and safety standards, along with stronger infrastructure policies, will play a critical role in accelerating EV adoption in India.

**Semiconductor For You:** During your recent participation in the India Battery Show Expo, what were the main insights shared on the panel regarding India's electric mobility challenges and opportunities?

**Satvinder:** At the India Battery Show Expo, the key discussions revolved around the challenges of expanding EV penetration, reliability of current EV vehicles, and consumer concerns about charging infrastructure. However, there were also exciting opportunities in government policy support, technological advancements in battery efficiency, and reliability assessment, which present a promising future for EV adoption in India and boost the confidence of end customers. During the show, we emphasized the importance of technological invocation and industry collaboration to overcome these challenges.

**Semiconductor For You:** ENNOVI operates in a global market. How does your approach differ in India compared to other regions, especially in terms of technology adaptation and product design?

**Satvinder:** Our approach in India is unique in focusing on specific vehicle verticals and customer offerings. Unlike our other global markets, India's high growth potential for EVs is currently in 2-wheelers and 3-wheelers. However, demand for EV 4-wheelers is also starting to pick up recently with new launches. One of our global technology centers is based in India, leveraging the high quality of talent with the understanding of our customers' needs.

Regarding technology and product design, it means adopting certain parts of our product offering for locally available materials, components, and production processes. For example, ENNOVI pushes for alternative solutions for signal communication, like our in-house flexible die-cut circuit (FDC) technology, which avoids alternative flexible printed circuit (FPC) parts being shipped from other countries. Another example is the adoption of local customer manufacturing preferences, such as allowing for spot welding of our products (versus laser welding) to decrease customer front-end investment. Additionally, we prioritize local manufacturing to ensure cost-effectiveness and build long-term support for our customers.

**Semiconductor For You:** Can you discuss some of the R&D efforts at ENNOVI focused on extending battery life, reducing charge times, or improving safety standards for EV batteries?

**Satvinder:** ENNOVI's R&D efforts are focused on enhancing battery life. Our patented designs cover the high- and low-voltage parts of the EV system. For example, our cell contacting systems for cylindrical cells include our U-turn design approach, which distributes current more evenly across the battery module, avoiding hotspots and, therefore, increasing cell life.

On the safety front, we invest heavily in research to ensure that our interconnect systems meet the highest standards of protection against overheating. One example is the inclusion of new materials to prevent thermal runaway.

**Semiconductor For You:** Are there any upcoming product launches or technological advancements from ENNOVI that you're excited about, particularly in the Indian context?

**Satvinder:** We are excited to introduce our flexible laminated technology, which is designed specifically for battery interconnects used for India's EV market. These interconnects make assembly easier, improve the quality of assembly, and reduce development cycle time. All of this together also helps OEMs become more cost competitive.

Another upcoming launch will innovate our laminated interconnect offering, eliminating glue and providing an evolution that further reduces both cost and environmental impact. This solution is scalable and addresses the needs of the 2-wheeler, 3-wheeler, and 4-wheeler verticals.

**Semiconductor For You:** What strategies does ENNOVI employ to educate and build trust with consumers about the reliability and benefits of EVs and battery technology in India?

**Satvinder:** ENNOVI employs a multifaceted approach to educate consumers about the benefits of EVs and battery technology. We host online informational webinars, are actively involved in industry conferences, and provide technology demonstrations at various exhibitions throughout the year.