Technology Evolves Under Pressure

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Sport is a Testing Ground for Technological Innovation: The EV Tech-Powered Race that Everyone is Talking About

Mobility technology is on the move. As the field continues to diversify, it’s also breathing new life into the world of motorsports. But have you heard of the red-hot international racing series that is redefining the concept of formula racing?

ABB FIA Formula E World Championship (hereafter Formula E) is a racing series that uses only electric-powered cars and is dedicated to promoting a sustainable future. After a successful Japanese debut in 2024, Formula E will make its return to Tokyo with two days of racing on May 17 and 18.

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Photo: Formula E

Japanese companies have been especially active in this arena for global technological competition, with companies such as Yamaha Motor, TDK, Teijin, and N AGASE providing technology and sponsorship that leverages their respective strengths.

But what exactly is Formula E, which aims to bring sustainability to the world of motorsport racing, and what do these Japanese companies hope to achieve through their involvement? To find out, we sat down with the head of sustainability at Formula E and representatives of four participating companies.

A Race Born with Mother Earth in Mind

“Formula E is more than just a form of entertainment. It’s a motorsport that was created for the good of the planet,” says Julia Pallé, who leads Formula E’s sustainability efforts.

As Pallé points out, Formula E is a racing series designed to reduce environmental impact and promote a sustainable future. Not only are all vehicles powered by electricity, most importantly, 100% of that electricity is generated from renewable energy sources.

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Asked why it makes sense to address environmental issues through motorsports, Pallé offered the following explanation.

“Despite being a viable mobility option for reducing environmental impact, EVs have yet to be adopted on a wide scale, and there is much that could be done to improve this in terms of technological advances, changes in consumer awareness, and government policies. We believe that motorsports can significantly contribute to these efforts.

Through R&D efforts in a world where one second can mean the difference between winning and losing, we are making discoveries and producing results that improve the performance of all EVs. At the same time, we are providing an opportunity for people to have fun while also considering a more environmentally friendly lifestyle.

Another appeal of Formula E is that it can be held on temporary street circuits in urban areas because the vehicles used do not emit loud noises or exhaust. Since races can be held in the middle of major cities, they also provide great suggestions on how to adapt infrastructure in those cities to better promote EV adoption."

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Photo: Formula E

Of course, the environmental efforts of Formula E go far beyond simply trading out conventional cars for EVs.

By eliminating single-use plastics at its events, implementing a comprehensive recycling system, and reducing its freight-related CO2 emissions by cutting down on its use of air cargo flights for transporting equipment needed for its races, Formula E also prioritizes environmental sustainability in its everyday operations. As a result of these efforts, Formula E has been selected as the number one ESG sport in the world for three consecutive years.

Formula E is currently one of the most popular motorsports in the world, with roughly 20,000 fervent motorsports fans showing up to the first-ever race held in Tokyo last year.

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Japanese companies are prominent players in the cutting-edge arena of Formula E.

As Pallé notes, Formula E also serves as a testing ground for state-of-the-art EV technology, and it is there that Japanese companies—including leading manufacturers such as Yamaha Motor, TDK, Teijin, and NAGASE—are refining their own technologies through a process of trial and error.

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Profile

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For example, Yamaha Motor, which specializes in the manufacture of mobility options such as motorcycles and industrial robots, supplies the Lola Yamaha ABT Formula E Team with its electric powertrains(*) and software for energy management.

Note (*): Electric powertrain is a generic term for the devices installed in EVs that convert electricity to into mechanical motion.

“Energy management is a critical aspect of Formula E,” says Yamaha Motor's Satoshi Nakamura.

Satoshi Nakamura, Yamaha Motor

“In regular racing, drivers compete in cars with full tank of fuel to see who can finish fastest. In Formula E, however, a fully charged battery only gives drivers enough energy to run through about 50—60% of the race. The rest of the race cannot be completed unless drivers harvest kinetic energy back from the motor using regenerative braking. That is why it is crucial for the teams to have an energy management strategy to prevent their battery from dying in the middle of a race.

Because Formula E is built around the idea of sustainability, it is not only about how fast you can go but also how efficiently you can maximize your usable energy. For a manufacturer of diverse range of mobility options like Yamaha Motor, electrifying powertrains and improving energy efficiency are certainly issues that need to be addressed. We hope to forge and perfect new EV technology in collaboration with Lola under the high-pressure environment that is EV racing.”

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The Lola Yamaha ABT Formula E Team race car, Lola T001

According to Nakato Koike of TDK, a diversified electronic components manufacturer that has partnered with the Neom McLaren Formula E team since 2024, “Working with a Formula E team also broadens how engineers think.”

For most people, hearing the name TDK most likely invokes images of the popular cassette tapes from the 1980s. Today, however, the company's business primarily centers on the development of advanced components such as multilayer ceramic chip capacitors (MLCCs) and temperature sensors.

As part of its “TDK Transformation” Long-Term Vision, TDK aims to contribute to society in three key markets: 1) Automotive, 2) ICT, and 3) Industrial Equipment/Energy amid social trends such as green transformation and digital transformation.

Nakato Koike, TDK

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Specifically, voltage management, noise reduction, and thermal management—all areas in which TDK excels—are crucial aspects of EVs, which include 10,000 MLCCs on average.

“Objective of our partnership is first and foremost　honing our technology and contributing to the team’s success,” says Koike. “At the same time, we also get a lot of inspiration from working with the Neom McLaren Formula E team. Given their experience with competition in the unpredictable world of racing, their approach to technological development is very different from our own as a component manufacturer. We’re looking forward to future breakthroughs coming from this shift in thinking.”

The Neom McLaren Formula E Team race car

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Sustainability Can Be Entertaining

Materials manufacturer Teijin has been supporting the Envision Racing Formula E Team since 2020, providing drivers with racing suits made from its flame-retardant meta-aramid fiber, Teijinconex®, which can withstand temperatures of up to 400 degrees Celsius.

While passing rigorous tests in line with FIA (Federation Internationale de l'Automobile) standards, the company succeeded in reducing the weight and improving the comfort of the drivers' suits. This has opened the door for new applications for Teijinconex®, which until now had primarily been used for firefighting uniforms.

Racing suits worn by the drivers of the Envision Racing Formula E Team are made of Teijin's Teijinconex® aramid fiber.

Teijin's motivation for participating in Formula E goes beyond just supplying technology, however.

"The Teijin Group has set its sights on two important social issues: climate change mitigation & adaptation, and achievement of a circular economy," says Teijin's Yukari Ando.

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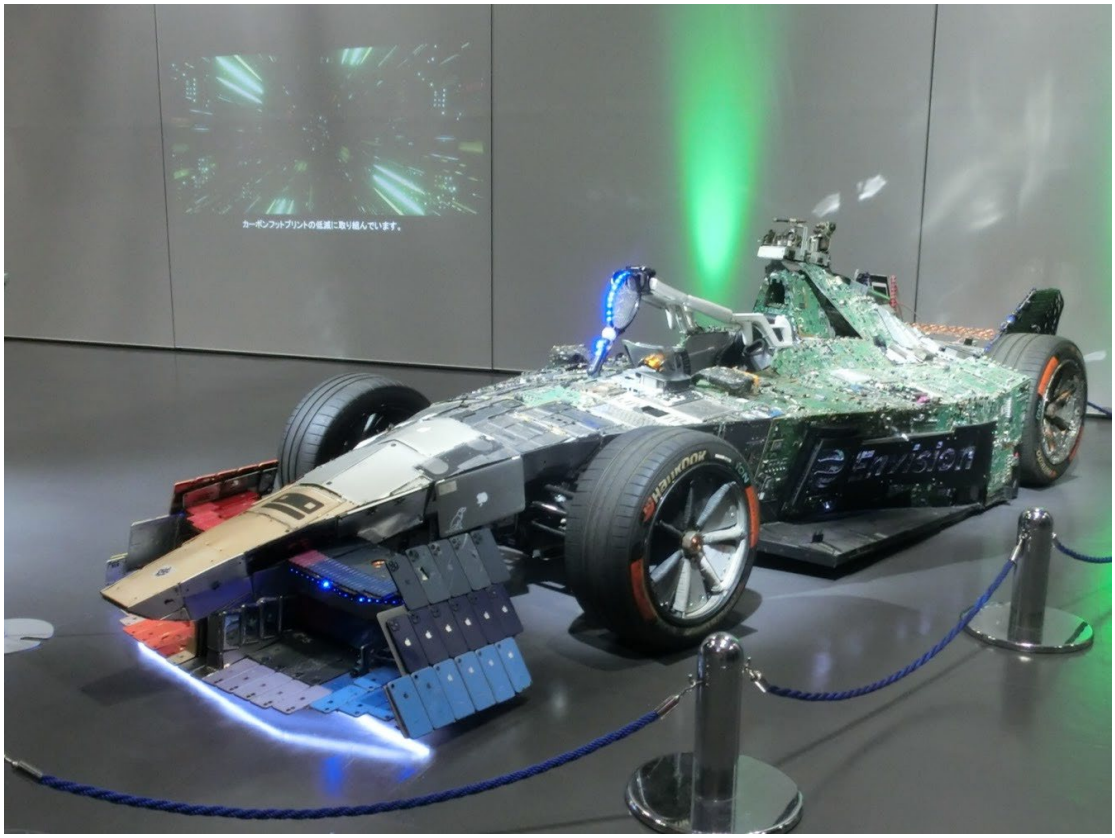
“Through their mission, Race Against Climate Change®, our partners at Envision Racing put nearly as much effort into raising awareness of environmental issues as they do into winning races. This is something that really resonates with us at Teijin. They also bring attention to these issues in very creative ways. For example, to raise awareness around the issue of e-waste, they have been promoting a full, functioning replica of a Formula E car they built entirely out of discarded e-waste.”



“Recover E”, the world's first full-size replica of a GEN3 Formula E racing car made entirely from discarded electronic waste

“Sustainability messaging can easily come off as over-earnest and preachy,” Ando says.

“That is why I am so amazed by the team’s ability to come up with such great ideas. They’ve taught me how important it is to communicate in exciting and positive ways if you want to move people's hearts.”

As part of their partnership, Teijin and the team hold an annual environmental awareness event called “Race Against Climate Change® Live Tokyo,” which brings together experts and business leaders in the field of sustainability to address issues related to circularity and the circular economy.

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Yukari Ando, Teijin Limited

NAGASE, a major chemical trading firm in Japan, has sponsored the Andretti Formula E Team since 2022 as part of its global branding activities, rather than providing direct technical support.

When asked the motivation behind her company's participation in Formula E for branding purposes, NAGASE's Yu Aoto explained, "We were attracted by the opportunity to demonstrate to the world how serious the NAGASE Group is about sustainability. Despite our more than 190-year history, NAGASE is still not a brand that is widely recognized outside of Japan. As overseas operations began to account for larger shares of our revenue and workforce, and as we became more invested in full-fledged global branding, we made the decision to sponsor Formula E and Andretti because we saw common ground in how seriously they take the issue of sustainability."

Yu Aoto, NAGASE

"Over the course of the season, Formula E races are held in around 10 different cities worldwide, including in Brazil, Mexico, Indonesia, and other countries in the Global South, where NAGASE is focusing its efforts," says Aoto.

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“Sponsoring Andretti has given us an opportunity to promote NAGASE through Formula E racing events in these countries. While as a trading firm our aim is to achieve net zero carbon emissions across the entire supply chain, we have also learned a lot from Formula E's approach to environmental issues.”

Andretti Formula E Team race car

“For example, to minimize race-related CO2 emissions, Formula E has taken measures to ensure the efficiency of its logistics, including cutting down on travel distances by scheduling races at venues that are closer together,” says Aoto.

“We believe that there is a lot we can learn from them to better improve our own environmental impact from a logistics and operations standpoint.”

The company has also taken a unique approach to sponsorship, and aims to provide long-term value by creating points of contact with various stakeholders through Formula E. For instance, at the 2024 Tokyo E-Prix, the company invited 30 students from a metropolitan high school to a garage tour on the day before the race, and has been providing young aspiring engineers with opportunities to interact with its team's engineers and see actual racing cars up close.

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Twenty-four students from Tokyo Metropolitan Sogo Kouka High School participated in last season's garage tour

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Contributing to Society Through Technological Advancement

So, what kind of impact do these companies hope to make on the world by providing technology and support to Formula E?

“Our corporate misson is to be a ‘*kando*[*] creating company’,” says Yamaha Motor’s Nakamura. In other words, a company that moves people.

“While we are fully committed to crafting thrilling rides, through our work with Formula E, we have been reminded once again that this excitement and sustainability are not at all mutually exclusive ideas. The technological advances made for Formula E are ultimately transferred back into society for the benefit of the entire planet. As the race itself is continuously upgraded each year, we also want to evolve agilely and continue generating value."

[*]Kando is a Japanese word for the simultaneous feelings of deep satisfaction and intense excitement that one experiences when encountering something of exceptional value.

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The Formula E Tokyo E-Prix will soon make its return to Tokyo.

Formula E is more than just an entertaining racing competition; it provides spectators with a valuable opportunity to consider the future of mobility and what a sustainable society looks like.

■ Find out more about Formula E Tokyo E-Prix here
■ Find out more about the four Japanese companies involved in Formula E at the links below:
・Yamaha Motor Co., Ltd.
・TDK Corporation
・Teijin Limited
・Nagase & Co., Ltd.

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