

Formula-E and the race for EV innovation

Formula E is earning more than just the plaudits of its growing audience. For manufacturers, it's becoming a real world test lab for EV innovation and adoption.

Temps de lecture : minute

28 November 2023

For over a century, supercharged automobiles have rattled around the tracks of Grand Prix circuits. The likes of Ferrari, Alfa Romeo, Mercedes, and Maserati, for over a century, all line up to prove one simple thing—who can manufacture the best car.

Since those early days, Formula One vehicles have transformed from cars into computers on wheels. But races remain a valuable testing ground for the latest automobile innovation. Over the years, dozens of F1 innovations have made it into widely-available cars, whether that's the use of carbon fibre, brake cooling systems, or even the buttons on your steering wheel.

The newest sibling to the racing family, Formula E, holds a special appreciation among the more environmentally-inclined petrolheads. Formula E is quickly gaining momentum, with audiences growing 17% annually, with 344 million viewers over the most recent season.

But Formula E's significance far outstretches its baying audiences—it plays a central role in electric vehicle (EV) innovation which could prove critical to its wider EV adoption over the next decade.

Formula E—a brief history

It doesn't take an expert to tell you that 20 cars racing around a track for two hours is bad for carbon emissions, not to mention the footprint of the global roadshow that takes place, as well as F1's intrinsic association to the automobile and fossil fuel industries.

Formula E emerged in the early 2010s out of these very conversations, and a heightened awareness of the future of the car industry being electric. It was in fact conceived by Jean Todt, the then-president of governing body FIA and at one time team principal of the Ferrari F1 team, concerned with the growing footprint of the industry and their responsibility to spearhead the electric transition.

In many ways, the sport deliberately mirrors Formula One. 11 manufacturers compared to F1's 10, with 22 drivers across the championship. As well as top car manufacturers like Porsche, Jaguar, McLaren, and Maserati, the circuit also features teams backed by Envision Energy (a wind turbine manufacturer), Mario Andretti (a famous racing driver), and Lisheng Sports (a Chinese digital sports group). In fact, since 2020, the competition has been blessed with FIA world championship status.

One key decision has been to base races solely in city circuits, to showcase the best of electric at the heart of urban life. As Todt said in an *interview* at the time: "For me the electric car is really the future of motoring in the cities. And that's why we begin with hosting races in world cities."

Race to road innovation to date

Formula E was founded on the principle of playing a big part in the wider adoption of EVs. One of the pillars of Formula E's Sustainability

Programme is 'using our global platform to promote electric cars and the part they'll play in addressing air pollution'.

'Race to road' innovation has played a critical role in cutting edge breakthroughs being implemented more widely, improving the experience of EV drivers globally. In under a decade, this has been realised by a number of the manufacturer-led teams.

James Barclay, team principal of the Jaguar TCS racing team, analogises the continuous process of improvements and innovation that every team undergoes after each race. "It's like a mobile phone. Every time you do an update, it's improving something on the functionality of that phone."

Semiconductors are the perfect example of this. Formula E started using silicon carbide (SiC) semiconductors several years ago. In short, this allows drivers to move from AC to DC far more efficiently, giving you greater control over the car at high speeds. Despite being more costly to the manufacturer, SiC semiconductors have become *implemented in the majority of EVs*, as they offer longer driving ranges, faster charging, and lower total system-level cost of ownership.

In motorsports, performance is everything and this is especially true for Formula E racing, where each of the 11 teams must use the same car chassis and battery. As the technology partner to Jaguar's Formula E Racing Teams, Tata Consultancy Services (TCS) continues to leverage its digital expertise to help the racing team improve their performance on the track and win more races.

Within Formula E, TCS collects over 3TB of valuable data and learnings directly from the racetrack in real-time which are used by the racing team to optimise the setup of Jaguar I-TYPE 6 Formula E cars. This has helped the racing team to modify the powertrain, suspension package, energy usage strategy, and software connected to the vehicle.

For the consumer EV market, key racetrack findings have also enabled Jaguar Land Rover to improve vehicle performance with a 20km range increase to the Jaguar I-PACE electric vehicle. This is a direct impact of torque management lessons on the racetrack, improving the performance of road cars and the experience for everyday drivers around the world.

These earnings from Formula E are being used to transform the entire EV manufacturing and charging ecosystem. According to Varun Kapur, Head of Manufacturing & Utilities for the UK and Ireland at Tata Consultancy Services (TCS): “There is a direct correlation in terms of what we are doing here and how it’s going to translate back into the EVs we drive later.” With a shared vision that digital innovations can create a better world, the partnership between Jaguar and TCS is helping to shape a cleaner, more sustainable future for everyone.

Formula E has also been driving forward innovation around circular usage in automobiles. At this year’s Monaco E-Prix, Jaguar TCS and oil manufacturer Castrol partnered to become the first team to use *circular transmission fluid*. This takes the oil from Jaguar’s test and development process, re-refines it to recover its main constituent base oil, and processes it to make fresh transmission fluid.

Impacting F1 and the future

Since the outset of the competition, Formula E has been nurtured to be a key piece of the wider racing industry. Jean Todt describes this in that same interview: “We can expect development in batteries, motor technology and security issues that can be transferred with other series such as F1, WEC etc.”

For instance, Formula E has been net zero since its inception, the first sport and as far as I know the only to do so. So could its standards be applied to Formula One to help it meet its ambitious 2030 net zero target?

This obviously goes far beyond the fuel used to power the cars—logistics, transport, and more—and with Formula E far ahead in terms of this thinking, there's a huge amount to be borrowed.

Beyond the sustainability question, Formula E could be pushing a wider social agenda, in particular around women in sport. Their inaugural season featured two female drivers, and while those numbers have dwindled (there are now none), it demonstrated the possibilities for gender-agnostic motor racing.

The FIA's Girls On Track initiative has tried to get more women involved in the sport, not just behind the wheel but also in the pits and at the development stage. They've been present at a number of Formula E events, aiming to engage girls between 8-18 to understand the different possible career paths.

Motor racing innovation can sometimes veer down more unusual paths—for instance, the Yas Marina Circuit in Abu Dhabi will host the first autonomous race in April 2024, unveiled earlier this year at GITEX GLOBAL 2023.

One thing's for sure, though, is that the sport will continue to evolve almost as quickly as its cars do, and certainly to its benefit. Both Formula One and increasingly Formula E constantly strive to better understand what their viewing audiences are looking for, and frequently find it.

Above all this, consensus is certainly converging around the direction of travel. The future is looking greener.

