# Audi MediaCenter



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Audi in 2021 Formula E

# Audi fights for World Championship title with e-tron FE07

In the 2021 season, Formula E will be held as an official FIA World Championship for the first time. For Audi, the commitment in the fully electric racing series is not just a sporting competition on the highest international level, but also perfectly supports the brand's transformation towards sustainable and digital premium mobility.

"Motorsport has always been of decisive importance for Audi and its technology development. That is also where our most famous slogan 'Vorsprung durch Technik' comes from," says Allan McNish. As Team Principal of Audi Sport ABT Schaeffler, he is responsible for the Audi brand's Formula E commitment. "Looking at rallying, touring cars, Le Mans or now Formula E, we have always linked the relevance of the technology transfer from motorsport to the road," says the three-time Le Mans winner.

At the end of 2017, Audi was the first German automobile manufacturer to enter Formula E with a factory-backed commitment. By winning the teams' classification and finishing runner-up in the drivers' championship in its first season (2017/2018), Audi managed a dream start to the company's all-electric motorsport era. Following second place in the teams' classification and third in the drivers' championship in the fifth season, the squad finished the sixth season, which was shortened due to the corona pandemic, in sixth place in the standings.

The Formula E commitment with the Audi e-tron FE07 is a perfect fit for Audi's "Roadmap E" for the road: By 2025, the brand is planning the market launch of more than 30 electrified models. It began in 2018 with the all-electric Audi e-tron, followed by the Sportback version and, at the beginning of the new 2021 season, by its spectacular sporty counterpart, the e-tron GT. McNish: "Competition on the race track to accelerate development for customers, this combination is firmly anchored in Audi's DNA."

With twelve teams, 24 drivers and a total of ten manufacturers, including the four German premium brands with Audi, BMW, Porsche and Mercedes, Formula E is entering its first season as an official FIA World Championship. Audi Sport ABT Schaeffler has reorganized itself for the World Championship debut and, after six years, changed its driver pairing for the first time: Lucas di Grassi, the most successful Formula E driver in terms of points and podium finishes, will be joined on the grid by three-time DTM champion René Rast.



For the development and fielding of the e-tron FE07, Audi relies on consistency and trustful collaboration with a proven track record of many years. The powertrain with its centerpiece, the Audi MGU05 motor-generator unit, was developed at Audi Sport in Neuburg an der Donau. Trackside preparation and fielding will be handled by ABT Sportsline. The squad based in Kempten was successful in Formula E as a privateer team from 2014 to 2017 and subsequently handed their slot on the grid over to Audi.

Since 2018, Audi Sport has also been working closely with the British Envision Virgin Racing team in Formula E. As was the case in the past two years, the customer team is fielding two additional Audi e-tron FE07 cars for its drivers Robin Frijns and Nick Cassidy.



The Audi RS e-tron GT

# Spearheading the electric offensive

Audi presents the production-based RS e-tron GT as the sporty and technological spearhead of its electric offensive and the first fully electric RS model from Audi Sport GmbH. Audi driver Lucas di Grassi tested the Gran Turismo sports car.

Lucas di Grassi is a pro all the way – both at the wheel and off the race track. In 2014, the native Brazilian won the inaugural race of the then newly launched Formula E, followed three years later by the title win with Audi Sport ABT Schaeffler. On 32 occasions, di Grassi stood on the podium for Audi in the past six years, which makes him the most successful driver in the electric racing series.

Powerful performance is a hallmark of the RS e-tron GT prototype as well. It is a superior Gran Turismo with exceptional handling characteristics and performance in the RS version. The production-based RS e-tron GT is an example of the brand's premium mobility and fulfills the customers' demand for high performance. Its dynamics, its precision and its high efficiency make it a trailblazer with a strong character that shapes the future of the brand.

The professional racer's thinking goes far beyond motorsport, too. Lucas di Grassi is an international UN ambassador for clean air, so technological innovation and sustainable climate protection are a natural pairing in his book. Needless to say, the technology enthusiast from Monaco has a keen interest in Audi's next electric car project, the e-tron GT.

"The car is fun! Obviously, such a Gran Turismo is totally different to a race car. Even so, there are plenty of parallels, especially the powerful acceleration which, just like in our case, is fully available for a long time," says di Grassi. "I particularly like the car's handling. You know, for me as a race driver, comfort is not so important. But the car's grip and precision in cornering are really impressive."

The Audi RS e-tron GT prototype provides a prospect for the derivatives of the brand's first all-electric model range rolling off the assembly line in Germany at Audi's Böllinger Höfe facility at the Neckarsulm location. The low-volume manufacturing operation, in which the Audi R8 has been produced so far, has been extended, upgraded and converted for its new task. The integrated assembly of two cars with completely different powertrain technologies on one line is unique in the Volkswagen Group.



Electric mobility at Audi

# Roadmap E: Audi under the banner of electric mobility

Audi is changing into an electric mobility corporation. By 2025, the brand is planning to launch more than 30 electrified models accounting for 40 percent of sales, thus marking Audi's consistent pursuit of sustainable mobility.

Audi is in the process of becoming a corporation offering fully  $CO_2$ -neutral premium mobility – with the aim of assuming the leading role among competitors. To achieve this, the manufacturer is accelerating its electrification roadmap and company-wide decarbonization. As early as by 2025, the carbon footprint of the vehicle fleet across the entire lifecycle is planned to be reduced by 30 percent compared to 2015.

Sustainable mobility is increasingly becoming the focus for modern premium customers. Therefore, it is only logical for electric mobility to form one of the key pillars of the corporation's new brand strategy. Audi has earmarked 50 percent of its marketing budget for topics centered on electric mobility. The company intends to also enhance the customer's emotional experience of this new form of drive technology, reduce potential reservations and inspire enthusiasm.

The first steps have been taken: The Audi e-tron is the worldwide market leader in its segment. Audi's first fully electric production model is equally popular with customers and media around the world, as documented by numerous awards and comparison tests.

With the e-tron GT, the Q4 e-tron and the Q4 Sportback e-tron, Audi looks on an exciting year of 2021. In 2025, Audi's portfolio will already comprise more than 30 models with electric powertrains, including 20 all-electric ones. Audi has increased its sales forecast for fully electric vehicles and models with plug-in-hybrid powertrains and now expects electrified automobiles to account for roughly 40 percent of worldwide sales in 2025.

With its company-wide sustainability roadmap, Audi has set itself the goal of progressively achieving CO<sub>2</sub> neutrality across the entire vehicle lifecycle – from production to use and disposal of the Audi models. With consistent CO<sub>2</sub> reductions and by switching to renewable energies, unavoidable emissions are compensated for. The company is driving the target it has set for itself of achieving carbon neutrality of all worldwide production locations by 2025. By 2050 at the latest, Audi intends to achieve company-wide carbon neutrality.



The Audi e-tron FE07 for Formula E

# More than 95 percent efficiency for success

From zero to one hundred in 2.8 seconds, more than 95 percent efficiency within the entire car and preparation for any contingency in every detail, this describes the Audi e-tron FE07 that has been developed by Audi Sport, including its new Audi MGU05 motor-generator unit.

The Formula E regulations are tight and pose a real challenge to the engineers: Besides the software, the electric powertrain is the only area of the Formula E car that the registered manufacturers are largely free to develop. It consists of the MGU, the inverter including the functional software, the transmission and parts of the rear suspension.

"The coming seventh Formula E season will be the first to be held as an official FIA World Championship," says Stefan Aicher, Head of E-Powertrain Development at Audi Sport. "However, at Audi Sport, we're celebrating a premiere all of our own: The Audi e-tron FE07 has an all-new electric powertrain that was developed in-house for the first time." While in recent years a continually optimized version of the powertrain, jointly developed with technology partner Schaeffler, was always used, work on the new MGU inverter unit for the coming world championship started from scratch. "We went to the limits in all areas of this project," comments Aicher.

The result is a new centerpiece named the Audi MGU05: an electric one-speed drivetrain with an internal rotor concept, external magnets, a highly efficient cooling system and six electrical phases. Moreover, the engineers led by Stefan Aicher managed to clearly save weight once again compared to the previous unit by using lightweight materials and intelligent integration inside the vehicle. "We were able to directly reinvest these savings in the new MGU for the benefit of enhanced efficiency. Even so, the new MGU inverter unit weighs less than 35 kilograms. This was an exceptional achievement by the whole team," says Aicher.

Efficiency is the key factor of success in Formula E. "That is why we are leaving no stone unturned to reduce the energy loss within the system to an absolute minimum," says Tristan Summerscale, Formula E Project Leader at Audi Sport. The extensive work done on in-house test benches was a decisive factor in achieving this objective. In numerous tough testing cycles, the entire powertrain was stressed to its limits in order to raise the entire high-voltage system to a maximum performance level. The outcome was successful: "We have achieved an overall efficiency of more than 95 percent for our powertrain. The new MGU inverter unit has an efficiency of even more than 97 percent in all relevant driving conditions."



The compact size combined with high performance is particularly impressive. "If you compare our MGU with an internal combustion engine delivering a comparable power output of 250 kW, our efficiency is not only twice as high, but our weight of less than 35 kilograms is also much lighter," says Tristan Summerscale. "This clearly shows what an efficient solution an electric powertrain is."

In addition to performance and efficiency of the new powertrain, the development of the Audi e-tron FE07 emphasized reliability and safety of the entire car to ensure that the new rear end would be able to handle all of the forces on the race track. Audi Sport puts the car through its paces in numerous tough tests to assure its suitability for racing. One of them involves a lateral load of up to eleven metric tons on the rear structure through the suspension. In other words, roughly the weight of six or seven passenger cars acting on the race car without impairing the structural design of the rear end.

Electric power is supplied to all of the Formula E teams by an identical 385-kilogram McLaren battery. The lithium-ion battery sits between the driver's seat and the powertrain, has an available capacity of 52 kWh and is recharged within the space of 45 minutes. Since the fifth season, the race cars have been using a brake-by-wire system in which the braking actuator and transfer to the rear wheels are decoupled and electronically controlled. Consequently, brake force distribution is always set for optimal performance and enhanced recuperation efficiency.

Like in Formula One, the driver sits in a carbon fiber monocoque developed according to FIA safety standards. CFRP crash structures at the front, rear and sides ensure maximum safety. In addiiton, there is the Halo system above the cockpit that adds protection for the driver's head while displaying to the spectators the power mode of the car using a colored LED strip. The minimum weight of a Formula E car is 903 kilograms (including a minimum weight of 80 kilograms for the driver and seat). The electric race car accelerates from 0 to 100 km/h in 2.8 seconds. Top speed on a Formula E track is around 240 km/h.

Preparation for the race days takes place in the ultra-modern simulator at the Neuburg headquarters using a Formula E chassis surrounded by monitors and a screen with a 240-degree curvature for a panoramic view. As a result, the movements of the monocoque and the visual aspects of the track simulation are continuing to get even closer to reality.



<u>Technical Data</u>

# Audi e-tron FE07

# As of: November 2020

Model	Audi e-tron FE07 (2021)
Vehicle	
Vehicle type	Single seater (ABB FIA Formula E)
Monocoque	Spec spark chassis in composite fiber construction made of carbon
	fiber with aluminum honeycomb core, tested for strict FIA crash
	and safety standards, front, rear and side crashers from CFRP, front
	and rear roll bars, additional cockpit protection Halo
Body	Spec Spark carbon body,
	spec aerodynamics
Motor/battery	
Motor Generator Unit (MGU)	Audi MGU05
Power output practice and qualifying	Max. 250 kW (340 hp)
Power output race	Max. 200 kW (272 hp)
Attack Mode	Max 235 kW (320 hp)
FanBoost	Max. 250 kW (340 hp)
Battery	Rechargeable Energy Storage System (RESS) from McLaren Applied
	Technologies, approx. 385 kg (wet), lithium-ion cells,
	usable battery capacity 52 kWh (regulations),
	charging time approx. 45 minutes
Motor controller	Bosch ECU
Driveline/transmission	
Type of drive	Rear-wheel drive
Transmission	High-efficiency 1-speed racing transmission
Drive shafts	Constant velocity joint shafts
Chassis/steering/brakes	
Steering	Rack-and-pinion steering, removable steering wheel with quick
	release, digital display, recuperation paddles and
	FIA marshalling indicators
Suspension	Front and rear independent suspension on lower and upper
	steel wishbones, pushrod system, front torsion bars, rear spring
	suspension, two shock absorbers front and rear, adjustable
	stabilizers front and rear, adjustable ride height, toe and camber,
Brakes	two-wheel retention tethers per wheel Hydraulic dual-circuit brake system, light metal
DIAKES	calipers, front and rear carbon fiber brake discs, electronic-control
	brake force distribution, "Brake-by-Wire" on rear axle
Rims	Aluminum rims,
KIIIIS	
	front 9 x 18 inch and rear 11 x 18 inch, minimum weight per wheel front 6 kg, rear 7 kg
Tires	Profiled road-like tires, specially developed for Formula E,
lies	Michelin Pilot Sport, front 245/40 R18, rear 305/40 R18
Dimensions/Weight	
Length	5,200 mm
Width	1,800 mm
Height	1,250 mm
Wheelbase	3,100 mm
Minimum weight	903 kg (incl. driver minimum weight 80 kg with seat shell)
Performance	
0–100 km/h	Approx. 2.8 seconds
Top speed	240 km/h
iop speed	



Lucas di Grassi (Audi e-tron FE07 #11)

# The record man

Lucas di Grassi is one of the fixtures in Formula E. With 32 podium finishes, 10 victories and 796 points under his belt, he is more successful than any other driver in the electric racing series. Even off the race track di Grassi is a spirited ambassador of electric mobility.

Lucas di Grassi and Formula E have belonged together from the get-go. Even before driving his first kilometers in the electric race car, he was working on the basics and processes of the racing series together with its founder, Alejandro Agag. Since then, di Grassi has been a fixture in the field of entrants. He is still one of only two drivers – Sam Bird being the other one – to have been on the Formula E grid and in each race from day one.

When looking at the Formula E statistics, there is no getting around Lucas di Grassi's name either: With 796 points, 10 victories and 32 podium finishes under his belt, he is the most successful driver in the field after six seasons. Unforgotten have been his victory in Formula E's inaugural race in Beijing in 2014, his driver-title win in 2016/2017 and the teams' championship in 2017/2018.

His passion for technology and innovation play an important role in di Grassi's private life as well. As a founding member of and consultant to Roborace, he is driving the development of autonomous vehicles. A new project pursued by the Brazilian is the eSkootr Championship (eSC), a racing series for electric scooters. As a co-founder and sustainability ambassador of the series, di Grassi has been advancing sustainable urban micromobility since 2020.

As a UN climate ambassador, the Brazilian has been active in environmental protection and furthering the cause of enhancing the climate. For the Formula E documentation "The Race for Clean Air," Lucas di Grassi visited a megacity that is in one of the top spots of the world's bad-air quality ranking: the Indian capital New Delhi. On the ground, di Grassi obtained a personal impression of the conditions, talked with people affected by it and learned about projects that are planned to improve the situation. In the documentary "And We Go Green" that takes viewers behind the scenes of Formula E, Lucas di Grassi was one of the protagonists, too.

Outside the cockpit, Lucas di Grassi enjoys high recognition in the paddock: with the media as an authentic conversation partner who rarely minces his words, with fans, because he grants nearly every wish for a photo or signature and, last but not least, with the engineers of his team, because he not only delivers strong race results, but



also advances the development of the race car with his experience and precise feedback.

Lucas di Grassi lives in Monaco together with his wife, Bianca, and children, Leonardo and Beatriz. For the native Brazilian, the Côte d'Azur with its pleasant weather and ideal opportunities for sports is the perfect place to live.



**Biography** 

# Lucas di Grassi (BR)

Date of birth: August 11, 1984 Place of birth: São Paulo (BR) Residence: Monaco (MC) Marital status: married to Bianca, one son (Leonardo), one daughter (Beatriz) Height/weight: 1.80 m/75 kg Motorsport since: 1997 (Audi driver since 2012) 1997-2001 Kart, Pan American Kart Champion (2000) 2002 2nd Brazilian Formula Renault Championship 2003 2nd South American Formula 3 Championship 2004 British Formula 3 Championship, 3rd GP Macau, Formula 3 Masters 2005 1st GP Macau, 3rd Formula 3 Euro Series, 3rd Formula 3 Masters, Formula 1 test 2006 GP2 Series, Formula 1 test 2007 2nd GP2 Series, Formula 1 test driver 2008 3rd GP2 Series, Formula 1 reserve driver 2009 3rd GP2 Series, Formula 1 reserve driver 2010 Formula 1 2011 Formula 1 tire test driver, ILMC tests 2012 Formula 1 tire test driver, Nürburgring 24 Hours, 3rd WEC São Paulo (Audi R18 ultra) 2013 3rd Le Mans 24 Hours (Audi R18 e-tron quattro) 2014 2nd Le Mans 24 Hours, 4th FIA World Endurance Championship (WEC) (in Audi R18 e-tron quattro at each event) 2015 3rd FIA Formula E, 1 victory, 4th FIA World Endurance Championship (WEC) (Audi R18 e-tron quattro) 2016 2nd FIA Formula E, 3 victories, FIA World Endurance Championship (WEC), 1 victory (Audi R18), 3rd Le Mans 24 Hours (Audi R18) **2017** 1st FIA Formula E, 2 victories 2018 2nd ABB FIA Formula E (Audi e-tron FE04), 2 victories 2019 3rd ABB FIA Formula E (Audi e-tron FE05), 2 victories 2020 6th ABB FIA Formula E (Audi e-tron FE06) **2021** 7th ABB FIA Formula E (Audi e-tron FE07)

www.lucasdigrassi.com.br; facebook.com/lucasdigrassi; twitter.com/LucasdiGrassi (@LucasdiGrassi); instagram.com/lucasdigrassi; youtube.com/LucasDiGrassi



René Rast (Audi e-tron FE07 #33)

# The DTM champion as a Formula E rookie

René Rast is getting off to a fresh start in Formula E. Following another title win in the DTM and his successful Formula E debut for Audi in Berlin last season, Rast is now contesting his first full season in the fully electric racing series.

In the DTM, there was no getting around him on the path to success: In his four years as a regular driver in the touring car championship, he won the drivers' title three times and set numerous records. Now a new chapter begins in the German's career as a race driver. For the first time since 2004, he will be on the grid again in a single-seater race car. In the final rounds of the 2019/2020 Formula E season, he demonstrated that he should not be underestimated here either. Rast instantly impressed with his first appearance in the Super Pole, his first points and his first podium finish.

For Audi, the logical consequence was filling the cockpit of the second Audi e-tron FE07 with Rast. Even though this will be his first full season in the electric racing series, Rast is not a classic rookie. His first stint in a Formula E car was in Berlin, in 2016, still in the first-generation car back then. In the motorsport world, the German is particularly known for his meticulousness. He leaves nothing to chance, analyzing everything down to every detail to find the tenths that are still missing. This, not least, is reflected in his successes in the DTM, in which 24 victories and three titles have made him the most successful Audi driver in history, as well as in his victories in the 24-hour classics on the Nürburgring Nordschleife, at Daytona and at Spa-Francorchamps.

Within the Volkswagen Group, René Rast's unusual career took him from the Polo Cup all the way to Le Mans and now, via the DTM, into Formula E. As many as three times he won the Porsche Supercup held as part of the Formula One supporting program. Since 2011, he has been active under the banner of the four rings. At the wheel of the Audi R8 LMS GT3 sports car, he is regarded as the benchmark and a guarantee for success, which includes the ADAC GT Masters title win.

Rast's aspiration for his first year as a regular driver in the electric world championship is clear: "My goal is to build on the performances I delivered in the rounds in Berlin and to achieve further podium finishes. Naturally, I've also firmly set my sights on my first victory," says Rast. As previously in the DTM, the German will be on the grid in car number 33: "33 is my trademark and has brought me a lot of luck so far. I think it looks cool and a double number is easy for anyone to remember."



Off the race track René Rast is a family person. Time with his loved ones helps the German recharge his batteries between races: "When I spend time with my family I can unwind. That's when I mentally get away from motorsport. One or two days after a race weekend are usually enough for me to be able to recuperate and subsequently fully focus on the next race again." With his partner, Diana, and their son, Liam, he lives in Bregenz on the Austrian side of Lake Constance.





**Biography** 

# René Rast (D)

Date of birth: October 26, 1986 Place of birth: Minden (D) Place of residence: Bregenz (A) Marital status: partner Diana, one son (Liam) Height/weight: 1.79 m/64 kg Motorsport since: 1996 (Audi driver since 2009) 1996-2002 Kart 2002 1st German ICA Junior Kart Cup 2003 Formula BMW ADAC 2004 Formula BMW ADAC 2005 1st ADAC Volkswagen Polo Cup 2006 2nd Seat León Supercopa 2007 10th Porsche Carrera Cup, 8th 24 Hours Nürburgring 2008 1st Porsche Carrera Cup, 6th Porsche Supercup 2009 2nd Porsche Supercup, VLN (Audi R8 LMS) **2010** 1st Porsche Supercup, ADAC GT Masters 2011 1st Porsche Supercup, 5th Porsche Carrera Cup, ADAC GT Masters (Audi R8 LMS) **2012** 1st Porsche Supercup, 1st Porsche Carrera Cup, 1st 24h Spa (Audi R8 LMS ultra), 1st GT Class 24h Daytona, ADAC GT Masters (Audi R8 LMS ultra) 2013 2nd GT class 24 Hours Daytona (Audi R8 GRAND-AM), 6th FIA GT Series, 6th ADAC GT Masters, Blancpain Endurance Series (each Audi R8 LMS ultra) **2014** 1st ADAC GT Masters, 1st 24 Hours Nürburgring, 1st 24 Hours Spa, 6th Blancpain GT Series (each Audi R8 LMS ultra) 2015 2nd FIA GT World Cup Macau (Audi R8 LMS) 2016 1st GTD class 24 Hours Daytona (Audi R8 LMS), 5th LMP2 class FIA Endurance World Championship WEC, 3rd 24 Hours Spa (Audi R8 LMS), 23rd DTM (Audi RS 5 DTM) 2017 1st DTM (Audi RS 5 DTM), 3 wins, 3rd 24 Hours Daytona 2018 2nd DTM (Audi RS 5 DTM), 7 wins, 1st Nations Cup Race of Champions **2019** 1st DTM (Audi RS 5 DTM), 7 wins **2020** 1st DTM (Audi RS 5 DTM), 15th ABB FIA Formula E (Audi e-tron FE06) **2021** 13th ABB FIA Formula E (Audi e-tron FE07)

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# <u>Statistics</u>

# The Audi drivers in Formula E\*

	René Rast	Lucas di Grassi
1st Formula E race	Berlin 2016	Beijing 2014
Races	22	84
Championship titles	0	1
Victories	0	12
Podiums	2	35
Points	107	883
Pole positions	0	3
Fastest laps	2	8
Laps driven	678	2.953
Kilometers driven	1.743	7.033

\* As of after race 15 of season 7



#### Team Audi Sport ABT Schaeffler

# Never change a winning team

Audi Sport, ABT, Schaeffler – the name of the German team says it all: Ever since entering Formula E in 2014, these three brands have been forming a strong trio in various constellations and, after six seasons, are one of the most successful outfits in the series' high-caliber international field.

Audi Sport ABT Schaeffler has been part of the Formula E family from day one. Prior to the seventh season no other team has scored more podium finishes. Consistency within the team is one of the secrets of its success: many of the engineers and mechanics have been on board from the get-go and the partners, Audi Sport, ABT and Schaeffler, work hand in hand.

Since August 2014, the Competence Center Motorsport in Neuburg an der Donau has been the headquarters of Audi's Motorsport Department. In the modern complex of buildings, Audi engineers also develop the Formula E race cars including the powertrain. This centerpiece, named Audi MGUO5 for the seventh season, has been developed completely by Audi here for the first time. Besides test benches and a race track simulator the Audi Sport ABT Schaeffler team uses the track in Neuburg for rollouts and functional checks.

Allan McNish is the team principal and thus the face of the squad. The Scotsman was an active race driver for a total of 32 years, having celebrated his biggest successes in the sports prototypes of the Audi brand, including two of his three victories in the 24 Hours of Le Mans and win of the FIA World Endurance Championship (WEC). In 2015, McNish became the coordinator of all motorsport activities of the Audi Group. In this role, he was instrumental in preparing Audi's factory-backed commitment in Formula E before being appointed as team principal of the Audi Sport ABT Schaeffler Formula E team in 2017 when Audi officially entered the championship. He is assisted by Tristan Summerscale as the project manager.

Schaeffler is one of the co-founders of the team and one of the most notable and successful players in Formula E. Since the development of the powertrain was permitted in 2015, Schaeffler has been contributing its know-how to the development of the cars as the team's technology partner. In this capacity, the company demonstrates its expertise in forward-thinking technologies also in the innovative electric racing series and presents ideas for sustainable mobility for tomorrow.

Preparation and fielding of the two Audi e-tron FE07 cars are in the proven hands of ABT Sportsline. The family business and the brand with the four rings have known and





valued each other for many decades. With Audi as a strong partner, ABT pursues the maxim of being better than the competition – both on the road and on the race track. From 2014 to 2017, ABT was active in Formula E as a privateer team, celebrated the drivers' title with Lucas di Grassi in 2017 and subsequently handed its slot on the grid over to Audi. As Director of Operations, Florian Modlinger is responsible for the Formula E project at ABT.



Envision Virgin Racing

# Envision Virgin Racing on the grid with Audi e-tron FE07

For the third season in succession, Audi Sport's own factory-backed team is joined on the grid by the British Envision Virgin Racing team using the newly developed Audi e-tron FE07 including its powertrain.

On board from day one: Like the Audi Sport ABT Schaeffler team, the British Envision Virgin Racing team has been in the field of the racing series ever since Formula E's inaugural event. Together with Audi Sport ABT Schaeffler, Envision Virgin Racing is the only squad to have stood on the top step of the podium in all six seasons so far. With a track record of eleven victories and 29 podium finishes, the team from the United Kingdom numbers among the most successful squads in Formula E history.

The seventh season will see a change in the driver lineup: Racing alongside Audi factory driver Robin Frijns, who is entering his third season with the British team, will be the New Zealander Nick Cassidy. The 26-year-old, who drove for Envision Racing during the rookie test in Marrakesh in March 2020, is now tackling his first season in Formula E.

The customer team's two Audi e-tron FE07 cars are identical to those of Audi Sport ABT Schaeffler. Their centerpiece is the powertrain around the Audi MGU05 motorgenerator unit. Whereas the rest of the car is identical for all teams, the manufacturers demonstrate their technical expertise in the powertrain. The Formula E regulations stipulate that manufacturers make the entire car including the individual powertrain technology and related support available also to other teams for a defined price.



# 2014–2021: Audi Sport ABT Schaeffler in Formula E

# Time travel through the history of Formula E

Since entering Formula E in 2014, Audi Sport ABT Schaeffler has been an integral part of the electric racing series and after six years is one of the most successful protagonists of the series. A journey through time.

# Season 1 (2014/2015)

When 20 Formula E cars start in Beijing in September 2014, a vision becomes reality. Formula E is the first all-electric racing series to be held in the world's major cities. And the idea immediately arouses the interest of many teams and drivers: A total of 10 teams field 35 drivers from 15 different nations over the course of the season. Since the battery capacity is not yet sufficient for a complete race distance, each driver has two racing cars at his disposal.

Lucas di Grassi enters the history books with a victory at the premiere of Formula E. Throughout the season di Grassi and the team remain protagonists, constantly fighting for victories and podiums. Lucas di Grassi and the team finish the season in third place in the championship, while Daniel Abt comes eleventh in the drivers' championship.

# Statistics Audi Sport ABT Schaeffler

Races: 11, victories: 1, podiums: 7 Team Championship: 3rd (165 points) Driver Championship: 3rd Lucas di Grassi, 11th Daniel Abt

# Season 2 (2015/2016)

In the second season of Formula E, the teams have more freedom to develop their own powertrain. From now on, the individual teams can develop their own combinations of electric motor, transmission and power electronics. The chassis and the standard battery remain the same for all teams. The engine power is increased from 170 to 200 kW in practice and from 150 to 170 kW in racing.

Also in the second year of Formula E at the top: Lucas di Grassi and his team. The Brazilian is fighting close duels with the Swiss Sébastien Buemi throughout the season. Both drivers travel to the season finale in London with a chance of winning the title. In the end, Buemi wins the title by a narrow margin of two points. Audi Sport ABT Schaeffler also ends the season in second place in the team classification.



# Statistics Audi Sport ABT Schaeffler:

Races: 10, victories: 3, podiums: 10 Team Championship: 2nd (221 points) Driver Championship: 2nd Lucas di Grassi, 7th Daniel Abt

# Season 3 (2016/2017)

After the runner-up in the drivers' and teams' championships, the goal for the 2016/2017 season is clear: to finish the year one place higher in both championships. The schedule includes a total of twelve races in eight cities, including premieres in Hong Kong, Marrakesh, Montreal and New York City. Audi Sport ABT Schaeffler shines through the entire season with its consistency. With a few exceptions, di Grassi finishes each race at least in the top four, and Daniel Abt also regularly collects points. Lucas di Grassi's chases to make up ground in the season opener in Hong Kong and victory in Mexico City remain unforgettable. At the season finale in Montreal the Brazilian arrives just ten points behind, which he turns into an 18-point advantage and thus the title win.

# Statistics Audi Sport ABT Schaeffler:

Races: 12, victories: 2, podiums: 7 Team Championship: 2nd (248 points) Driver Championship: 1st Lucas di Grassi, 8th Daniel Abt

# Season 4 (2017/2018)

In the 2017/2018 season, Audi is the first German car manufacturer to compete in Formula E with a factory team. For Audi Sport ABT Schaeffler, the start to the fourth season is marked by bad luck and breakdowns. Daniel Abt's first Formula E victory in Mexico City and Lucas di Grassi's first podium of the season in the following race at Punta del Este mark the turning points of the season for the Audi squad. Podiums in Rome, Paris, Berlin and Zurich follow.

The home race in Berlin remains unforgettable. Audi Sport ABT Schaeffler celebrates a one-two victory with both drivers Daniel Abt and Lucas di Grassi. The pole position as well as the fastest race lap for Daniel Abt make the maximum points score perfect. After an impressive recovery, the team secures the team championship after twelve races around the globe with four victories and eleven podium places with a narrow points advantage of only two points.

# Statistics Audi Sport ABT Schaeffler:

Races: 12, victories: 4, podiums: 11 Team Championship: 1st (264 points) Driver Championship: 2nd Lucas di Grassi, 5th Daniel Abt



# Season 5 (2018/2019)

With the second-generation car, Formula E 2018/2019 starts the new season with the biggest change to date: for the first time in the series' still young history, only one car per driver is used due to the improved battery capacity. Audi Sport ABT Schaeffler starts the new season as defending champion, which once again provides plenty of variety and exciting racing – from the hottest race of the year with 37 degrees Celsius in Santiago de Chile to pouring rain and hail in Paris.

Two of the season's highlights: the heartbeat finale at the Mexico City E-Prix, where Lucas di Grassi wafer-thinly clinched Pascal Wehrlein's victory on the start-finish straight, and di Grassi's victory at the home race in Berlin. After 13 races on five continents with nine different winners from eight teams, four drivers from three teams still have a chance to win the title before the season finale. With ten podium finishes, one pole position and eight additional points for the fastest race lap, the Audi e-tron FE05 is the most successful Formula E racing car of the season.

# Statistics Audi Sport ABT Schaeffler:

Races: 13, victories: 2, podiums: 5 Team Championship: 2nd (203 points) Driver Championship: 3rd Lucas di Grassi, 7th Daniel Abt

# Season 6 (2019/2020)

Due to the Covid 19 pandemic, the cars in Formula E are also standing still after five race weekends. The solution to be able to choose a champion after all: an adapted, compact racing calendar with six races in just nine days on three different track layouts in Berlin.

Audi Sport ABT Schaeffler meets the challenge with René Rast at the side of Lucas di Grassi. With three podium finishes, two of them in Berlin, Audi Sport ABT Schaeffler ends the season in sixth place. With 43 podiums, the team remains one of the most successful in Formula E history. In addition, Lucas di Grassi leads the drivers' leader board with 32 podium places and 796 points.

# Statistics Audi Sport ABT Schaeffler:

Races: 11, podiums: 3 Team Championship: 6th (114 points) Driver Championship: 6th Lucas di Grassi, 15th René Rast



# ABB FIA Formula E World Championship

# From a startup to a world championship

Just six years after it was established, Formula E has evolved from a motorsport startup that was looked at with a mocking smile here and there into an official FIA World Championship with renowned manufacturers. One of its secrets of success: the series combines spectacular racing with sustainability messages.

When Formula E unveiled its race car at the International Motor Show (IAA) in Frankfurt in the fall of 2013, founder Alejandro Agag and FIA President Jean Todt met with considerable skepticism: Can an all-electric racing series holding its events downtown while pursuing completely new approaches really work? Will there be any teams, sponsors and drivers whose enthusiasm can be inspired for this new type of motorsport?

Since then, the idea that Agag and Todt had outlined back then on a napkin in an Italian restaurant has turned into a success story: International automobile manufacturers and sponsors have come on board and Formula E has evolved with media and fans into one of the absolute hot spots in the motorsport world and beyond. The number of television viewers, coverage in social media channels and the number of online and offline news articles has been increasing from year to year.

Formula E is pursuing new paths in many areas, starting with the selection of the venues: Instead of on traditional race tracks, which are usually located away from conurbations, Formula E races in the hearts of cities whenever possible. In the past, they included fascinating metropolises such as Paris, Rome, New York City, Hong Kong, London and Buenos Aires. The calendar is complemented by popular race tracks like the one in Mexico City, exceptional venues like the former Tempelhof airport in Berlin and exotic locations like the Sanya tourist resort in China.

Formula E's appearance during the 2019/2020 season was a good example of flexibility, ingenuity and even courage. While other series kept changing their calendars, Formula E chose to stop its races with a "red flag" at the end of February. In August, the season ended in Berlin with six races held within the space of nine days – accompanied by a meticulously crafted hygiene concept and a positive message that was disseminated across all channels and is still in effect: #PositivelyCharged.

Formula E spectators experience close-up motorsport presented in a contemporary, compact form: They flock to the venues on foot, by bicycle or public transportation and within a few hours get to witness a tightly packed program: Free practice sessions, qualifying and the races are held almost directly back to back. During the few breaks the drivers go to the E-Village, where many attractions focused on electric



mobility and forward-thinking technology topics are presented to visitors, for autograph sessions and interviews.

Formula E is generally more adept than anyone else in combining top-caliber racing with sustainability messages: It is the only sports series worldwide that has achieved a net carbon-neutral footprint ever since it was started in 2014. Partnerships with the United Nations, the UN Children's Fund UNICEF and other organizations provide the battle against climate change to which Formula E has committed itself with additional emphasis. Audi driver Lucas di Grassi supports the activities in his role as an official UN ambassador for clean air on numerous occasions.

Formula E's sustainability standards also include a reliable strategy for all parties involved: To keep the series attractive and affordable going forward, promoters and the FIA have developed a binding roadmap that clearly defines the guidelines for the coming years. This is to ensure that even as the number of manufacturers involved keeps growing, two things will continue to be in the foreground: the racing and an exclusive focus on developments that are also relevant for transfer into production.

As a result, central elements such as the chassis, battery, tires and brakes will remain specification parts for all teams and manufacturers in the coming years. Only the powertrain consisting of the motor, transmission, parts of the suspension and the related software will continue to be open to proprietary developments in the future. In addition, parameters such as the permitted power output in qualifying and the races, and maximum recuperation will progressively be raised. The roadmap is binding for the coming years and so provides planning certainty for all the teams.





# **Regulations**

# The Formula E format

#### Sequence of events on a race weekend

Shakedown	(Day before the race) 15 minutes, three laps		
	per driver, 110 kW		
Free practice 1	45 minutes, 250 kW		
Free practice 2	30 minutes, 250 kW		
Qualifying	4 groups of 4 minutes each, one timed lap with 250 kW		
Super Pole	1 lap each for the 6 fastest drivers, 250 kW		
Race	45 minutes plus one lap, 200 kW		

Double-header events are held on two days. Each race day is treated like a stand-alone E-Prix.

#### Practice

Each race day has two free practice sessions in which the full power of 250 kW may be used. There is only one 45-minute free practice on the second race day at double-header events.

#### Qualifying

The 24 drivers are divided into four groups according to the current championship standings. The group of the top six in the championship always begins. Each group has four minutes to achieve the best possible times. Following the so-called "outlap" from the pit lane and one or two warm-up laps at 200 kW of power output, a single "flying" lap may be driven at full power of 250 kW. The six fastest drivers, irrespective from which group, participate in the Super Pole shoot-out in which each driver sets one timed lap again at full power (250 kW). The grid positions result from the lap times of the Super Pole shoot-out (positions 1–6) and the group phase (positions 7–24).

#### E-Prix

The race – aka the E-Prix – begins with a standing start (no formation lap). The drivers initially stand a few meters behind their actual starting positions before filing into them. The race lasts for 45 minutes plus one lap. The maximum power output in the race is 200 kW.



# Amount of energy

Each driver has 52 kWh of energy available for the race. 1 kWh of this amount is subtracted per minute of a safety car deployment or a full-course yellow period.

# Attack Mode

New since season 5 has been the so-called Activation Zone. When a driver crosses this zone on the track the power output of his car receives a short-term boost to 235 kW. The number of activations and their durations are individually set for each race and announced by the FIA before the race starts. Attack Mode may not be activated during a safety car deployment or full-course yellow period.

# FanBoost

Formula E fans have the opportunity to support their favorite drivers with an advantage in the race. Fans can cast their votes within the 4-day voting window before each respective race, which closes 15 minutes into the race itself. Voting can be done via the Formula E website (fanboost.fiaformulae.com) or the Formula E app. The five drivers with the most votes are awarded the so-called FanBoost, which may be activated from the 22nd minute of the race and provides a short-term power boost to 250 kW.

# Points

The top ten finishers of each race are awarded points according to the official FIA system, analogous to Formula One:

Position 1	25 points	Position 6	8 points
Position 2	18 points	Position 7	6 points
Position 3	15 points	Position 8	4 points
Position 4	12 points	Position 9	2 points
Position 5	10 points	Position 10	1 point

Three additional points are awarded for pole position. The driver with the fastest race lap receives one additional point, provided he has finished in the top ten and did not use the FanBoost on his fastest lap. The fastest finisher of the four qualifying groups is awarded one point.

# Championship

Formula E includes both a drivers' and a teams' classification. The points of the drivers are aggregated from their race results. The points scored by both drivers of a team are aggregated throughout the season and fed into the teams' classification.



# Tires

Michelin, the official tire supplier, provides each driver with three new front and three new rear tires per race day. For double-header events, each driver will be provided with two full sets of tires. The tires are profiled.



**Partners** 

# Audi's partners in Formula E

In its factory-backed Formula E commitment, Audi is able to rely on the support of renowned partners.

# Alpinestars

Alpinestars since 1963 has been developing technologies for racing and today is the world's leading supplier of performance protection gear, clothing and shoes in motorsport. Thousands of hours invested in research and development and tests under the most challenging conditions guarantee the effective performance of the racing suits, shoes, gloves and technical underwear of the drivers of Team Audi Sport ABT Schaeffler.

# Casamoda

The CASAMODA Heinrich Katt GmbH & Co. KG is a globally operating fashion and lifestyle company. The company has developed in recent years from a pure shirt specialist to a lifestyle provider for menswear. CASAMODA equips the entire Audi Sport ABT Schaeffler team, including its two drivers Lucas di Grassi and René Rast, with high-quality and fashionable team clothing.

# Castrol

As one of the world's leading lubricant brands, Castrol has a long tradition of innovation and support of pioneers. With a passion for excellence and a philosophy that has always been strongly focused on cooperation and partnership, Castrol has developed lubricants and greases that have spearheaded technological breakthroughs on land, sea, air and space for more than 100 years.

# HYLA

HYLA is represented worldwide with its unique air and room cleaning system. The air aspirated by the HYLA is filtered through water and cleaned of fine dust, allergens and house dust in the process. At the same time, the HYLA can replace a vacuum cleaner and be used to aromatize rooms as well. Ease of use and long life are hallmarks of the HYLA.

# **ITK Engineering**

ITK Engineering GmbH is an internationally active technology company with customers from the automotive, motorsport, medical device technology, rail and facility engineering, and robotics sectors. As a consulting and development partner ITK realizes customized solutions in the fields of electrical/electronics systems, digitalization, connectivity, automation and propulsion concepts, etc. covering the entire development cycle – from requirements analysis, development and validation





through to integration – and in motorsports takes care of trackside support at testing and race events.

# LGT

LGT is the world's largest private banking and asset management group owned by a family of entrepreneurs. As the family office of the Princely House of Liechtenstein, the company has many years of experience in managing large estates. LGT employs more than 3,000 people at more than 20 locations in Europe, America, Asia and the Middle East.

# **Riello UPS**

RPS S.p.A. (Riello UPS) is one of the global leaders in the production of uninterruptible power supply and standby power supply systems. The products from Riello UPS which are designed and manufactured in Italy are used wherever consistent voltage and reliability are crucial to business success – from desktops through to data centers.

# Schaeffler

The Schaeffler Group is a globally active automotive and industrial supplier. Top quality, outstanding technology and powerful innovation are the basis for the Schaeffler Group's continuing success. With precision-engineered components and systems in engine, transmission and chassis applications as well as rolling and plain bearing solutions for a wide range of industrial applications the Schaeffler Group already makes a decisive contribution today to the "Mobility for tomorrow."

# SONAX

SONAX as an internationally leading car care brand is represented in Formula E for the first time. The brand has been involved in motorsport for decades: Ayrton Senna, Hans-Joachim Stuck, Michael Schumacher, Heinz-Harald Frentzen and Jacques Villeneuve – these names used to race with the SONAX logo featured on their cars or racing suits. The history of SONAX dates back to 1903. At that time, Franz Hoffmann, the great-grandfather of the current owner of the company, in Neuburg an der Donau was in the business of quarrying silica, a very fine-grained mineral used in household polishes.

# Würth Elektronik

The Würth Electronics Group with more than 8,300 employees in 50 countries manufactures and sells electronic, electromechanical components, printed circuit boards and smart power and control systems, and is an independent group of companies within the worldwide Würth Group, the global market leader in assembly and fastening technology. The Würth Elektronik eiSos business unit specializes in electronic and electromechanical assembly components.



Audi motorsport history

# From quattro to e-tron

Audi positions itself as the sportiest manufacturer in the premium segment and has a perfect basis to do so: motorsport. Sportiness, advanced technology and emotive design are the basis for the success of the Audi brand. The genes for this have their origin in racing – since 1980.

# The success story began with the Audi quattro

Excluding the era before the Second World War including the legendary Auto Union Grand Prix race cars in the 1930s, the motorsport history of AUDI AG began with the Audi quattro. The dominant victories and two manufacturers' and two drivers' titles achieved with the "original quattro" in the World Rally Championship between 1982 and 1984 were an important factor in the market success of quattro drive.

# quattro victorious in circuit racing as well

After Audi had turned rally racing upside down and stormed up Pikes Peak (USA) with the Sport quattro in record time on three successive occasions, Audi made quattro drive fit for circuit racing as well: initially with the Audi 200 quattro and the Audi 90 quattro IMSA GTO in the United States, in 1990 and 1991 with two championship titles for the Audi V8 quattro in the German Touring Car Championship (DTM) – and ultimately also with the A4 in the production-based super touring cars. In 1996, the Audi A4 quattro won championship titles in seven countries. Between 2012 and 2016, the all-wheel drive system returned to the race track as the e-tron quattro.

# Audi R8 most successful Le Mans sports car in present-day racing

After the dominant quattro drive was banned from touring car racing, Audi switched to sports prototypes and underpinned its slogan "Vorsprung durch Technik" in this motorsport category for 18 years as well. On making its debut at Le Mans, the toughest endurance race in the world, Audi, in 1999, immediately managed the leap onto the podium, in position three. In the following years, the Audi R8 was in a class of its own. From 2000 to 2002, Audi achieved a historic hat-trick, not least thanks to TFSI technology that debuted in 2001 and subsequently made its way into production as well. In 2004 and 2005, customer teams clinched two further overall victories for Audi. The R8 secured its spot in motorsport history with a total of 63 victories in 80 sports car races.



# Title wins following the return to DTM

Following Laurent Aiello's victory with the Abt Audi TT-R in 2002, Audi returned to the DTM with a factory-backed commitment in 2004 and instantly won the title with Mattias Ekström. In 2007, the Swede triumphed again, followed by Timo Scheider in 2008 and 2009 – making Audi the first automobile manufacturer in DTM history to have managed a title hat-trick. Martin Tomczyk completed the success story of the Audi A4 DTM in the 2011 season with another title win – the fifth in total for the Audi A4 DTM. In 2013, Mike Rockenfeller in the Audi RS 5 DTM clinched DTM title number nine for Audi. René Rast caused a sensation in 2017 when he clinched another title for Audi in his rookie year. The new "turbo era" of the DTM in the years 2019 and 2020 then became true Audi festivals: Twice the brand secured the titles in the drivers', team and manufacturers' championship. René Rast crowned himself champion twice more.

# Pioneering achievements with TDI technology

With TDI technology Audi achieved a pioneering feat and, at the same time, demonstrated "Vorsprung durch Technik" once again. In 2006, the Audi R10 TDI featuring a new concept was the first sports car with a diesel engine to triumph in the legendary 24 Hours of Le Mans. In total, TDI technology came out winning eight times at Le Mans. In 2007 and 2008, Audi was again victorious with the R10 TDI at La Sarthe. In addition, Audi won the American Le Mans Series with the diesel-powered racing sports cars three times in succession and, in 2008, the European Le Mans Series as well. With the R15 TDI Audi, in 2010, celebrated a one-two-three result in the fastest Le Mans race of all time and set a new distance record that has not been broken to date. In 2011, 2012, 2013 and 2014, Audi TDI power was again victorious at Le Mans. In 2014, the brand celebrated its 13th victory in just 16 participations. Audi demonstrates "Vorsprung durch Technik" in terms of energy efficiency as well. During the entire TDI era, Audi reduced diesel consumption by 46 percent within the space of one decade.

# First hybrid winner at Le Mans

On clinching the first victory of a hybrid race car in the 24 Hours of Le Mans in 2012, Audi achieved another pioneering feat in the world's most important endurance race. Three consecutive times (2012, 2013 und 2014) the Audi R18 e-tron quattro remained unbeaten at Le Mans. Many other innovations such as Audi Laser Light have been added to these pioneering feats in technology. The drivers' and manufacturers' titles won with the hybrid sports car in the 2012 and 2013 FIA World Endurance Championship (WEC) complete the track record in Audi's sports car era that ended in 2016.



# Audi Sport customer racing for the customers of the brand

With the R8 LMS, Audi Sport customer racing in 2009 developed a race car specifically for use in customer racing for the first time. The GT3 sports car, more than 50 percent of which consists of production parts, instantly impressed. In March 2015, Audi Sport presented the second generation of the successful GT3 sports car and another evolution for the 2019 season. In total, the GT3 sports cars with the four rings have won a 24-hour race on 13 occasions, eight twelve-hour races, plus more than 80 driver championship titles worldwide. Since 2017, the Audi RS 3 LMS, designed for the TCR touring car category, has rounded out the range toward entry-level racing. A year later, the Audi R8 LMS GT4 followed as an ideal race car for entry-level GT racing. Since 2019, the fascinating Audi R8 LMS GT2 – with 640 horsepower the most powerful customer racing sports car – has expanded the program to four models now.

#### "Vorsprung durch Technik" to continue

Audi races with electric power and was the first German automobile manufacturer on the Formula E grid. With four victories and eleven podium finishes in total Audi Sport ABT Schaeffler clinched the teams' championship after twelve races. The commitment in the fully electric racing series that is currently experiencing a boom with the participation of additional manufacturers and partners forms the electric pillar of the motorsport program.





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