Evolution of Formula 1 Engine

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An F1 car is designed to precisely test the limits of a machine. A car that goes at 200 mph for 3 hours nonstop with one person with the capabilities of pushing the speed humanity thinks possible. For a car to go at such high speeds it needs the ability to stay put on the ground by a force called "downforce", a force created by essentially pressing the car on the ground whether that be with the use of the front wing which diffuses air that the car runs through, creating low pressure beneath the car and suctioning it to the ground; or the rear wing with a curved top, essentially having the air stopped in the way and changing the direction of it to downwards, aka pushing the car down. As well as some of the most high powered and technically advanced engines to ensure maximum power.

1 Introduction

Formula 1 is the highest point in all of motorsport with a highly selective system with the 20 best drivers in the world. All competing for the most coveted price, the FIA Formula 1 Drivers Championship. With 10 teams on the grid fighting for funding and advancements in cars with the team winning the FIA Constructors Championship receiving $100 million. Watching a Grand Prix car is an incredible experience with cars reaching a max speed of 300 kmph and accelerations of 0-60mph in 2.6 seconds and 60-120mph in less time while perhaps braking: 60mph to zero in about 1.5 seconds and 15 meters. Making it a combination of the most skilled drivers and technically advanced machines to push the limits of speed.

2 Executive Summary

[3] Formula 1 is an innovative and highly competitive motorsport comprising the most technologically advanced cars whose innovative evolution has benefited not just racing but several other industries. The Hybrid technology used in current F1 cars is a blend of both fuel and electricity to derive maximum power from the engine. One of the most common criticisms that F1 faces is the huge carbon footprint that it poses producing around 256,000 tons of CO2 per season, the KERS was implemented which used excessive exhaust gases to help power the car as well as pave the way for several industries in trying to reduce their carbon footprint; like buses and taxis in the UK. [17] The innovations in aerodynamics as well as telemetry and data analysis in real time have been a great boon to the aviation industry as they also look to reach a stage of environmental sustainability. To further the cause of sustainability the new regulations are imposing the use of a pure sustainable fuel with virtually no carbon emission as well as an attempt to improve racing and make it more competitive by removing the MGUH unit. By making these changes F1 is looking at a more sustainable future.

3 How Does an F1 Car work?

An F1 car is designed to precisely test the limits of a machine. A car that goes at 200 mph for 3 hours nonstop with one person with the capabilities of pushing the speed humanity thinks possible.

For a car to go at such high speeds it needs the ability to stay put on the ground by a force called "**downforce**", a force created by essentially pressing the car on the ground whether that be with the use of the front wing which diffuses air that the car runs through, creating low pressure beneath the car and suctioning it to the ground; or the rear wing with a curved top, essentially having the air stopped in the way and changing the direction of it to downwards, aka pushing the car down.

Now it isn't that the car goes in a straight line and doesn't require any real movement, but the complete opposite. These cars are specially designed to be able to perform such precise maneuvers and still move at such high speeds. This is only capable of the **suspension** the car has. This works in the form of suspension rods and wishbone arms which are flexible and built to resist intense heat that is produced by the engine with a specialized rod which twists under tension to make it stronger than your average car. With a stronger version at the rear as it is more susceptible to greater amounts of heat.

When making these sharp turns their **braking** capabilities are extremely high with 2 master cylinders and hydraulic reservoirs which after use create enough pressure against the wheel to stop the car with a car shroud that prevents excess heating.

The **engine** for this car is extremely powerful with a V6 cylinder working mechanism that uses small pistons to compress gases which drive the interconnected turbine wheel and connect to the crankshaft. This also creates excess heat which is cooled with the help of the sidepods and their openings to let in cool clean air. The engine also has two very important components in the MGU [H]/[K]. The **MGUH** converts excess heat from the engine acting as a charger for an onboard battery. The **MGUK** converts the electrical energy from the battery to power the crankshaft adding 160 horsepower to the car. [17][4]

All of this comes together and connects to the "cot" known as the **monocoque** which is essentially the connecting piece to every part of the car. It has the halo which as the name suggests is a ring that runs above the driver connecting to the base of the opening to the turbine; acting like a shield for the driver in the case that the driver crashes into the barricade or with another car it keeps heavy chunks away from the diver's head. This was seen primarily in the latest seasons when Zhou was inverted and slid in Silverstone, when Max went into the barricade at 51g (51 times the force of gravity) at Silverstone and when Max and Hamilton dumped at Monza causing Max's car to go airborne landing on the halo of Hamilton's car.

The key aspect of the machine is the engine. The engine is located behind the driver in the monocoque using fuel to generate huge amounts of power.

An engine consists of crankshafts, camshafts, pistons, cylinders, a combustion chamber, connecting rods, spark plugs, valves and a cylinder block.

The piston travels to the end of its range; when the piston goes down it allows air and fuel to be injected into the cylinder through the intake port creating an air and fuel mixture, next the valves close and the piston comes back up compressing the mixture and an electric spark (from the spark plug) ignites the mixture as the piston descends with the newly formed pressure; this causes the rod that is attached to the piston to send this power to the crankshaft which rotates and using the axels causes the car to move. When the piston rises again the exhaust port is open and the used mixture is pushed out. [4]

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Fig. 1 Formula 1 monocoque

Fig. 2 Crankshaft & Pistons

The camshaft is the area above the cylinder of combustion which has springs that push open valves into the chamber in turns causing the recoil of this to rotate the adjoining cam gears which are linked to the crankshaft with the help of a belt or chain that moves as the gears do. [4]

The crankshaft translates the power generated by the piston out of the engine. It is designed to have counterweights to balance out against the pistons for smooth revolutions. The engine block connects to a flywheel which connects to the transmission. [4] Air enters through the air filter and then into the intake manifold where it mixes with fuel to create the solution seen in the piston cycle, before getting sucked into individual cylinders through intake ports.

4 Engines & Configurations

4.1 V & i.

***V** engine setup refers to having two cylinders in a V shape connecting to a rod that runs through the base and to the crankshaft. Whether it is a V12, V10, V8, or V6 it will have 6,5,4,3 rows with two cylinders per row. V engines don't have the same balance of force that an i shape has so it needs to use counteractive measures such as placing weights on the shaft to rid the unwanted inertia created..*

Fig. 3 V6

Fig. 4 i4

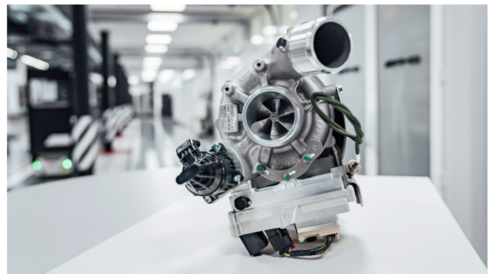

Fig. 5 Turbocharger

***i** refer to the inline setup where each cylinder is put in a straight line with each piston having a mirrored ring order to its counterpart on the other side. Creating a very balanced force generated. .*

4.2 Turbo. Turbo uses the used heated exhaust from the engine to drive the turbine which connects to another compressor wheel which sucks in more air which is then pushed into a chamber that becomes narrower and compresses the air as it passes along it. This air has a rise in temperature due to an increase in pressure and is run through an intercooler before it is sent back to the engine for the 4-stroke cycle.

Turbo also has setup types to increase the power and efficiency of the engine.

4.2.1 Twin Turbo. To prevent turbo lag (delay between hitting the boost and feeling the extra power), a twin-turbo is a system where two turbos are connected to an engine to increase power output, especially for V-shaped engine setups. This had to be set up to reach the further end of the engine to ensure balance in power generation because the stroke cycle had different ring rates.

4.2.2 Sequential Turbo. Compared to parallel turbochargers, sequential turbos use a smaller turbo to spool up until a larger turbo spools up to provide a greater amount of power. Nullifying the turbo lag.

4.3 Superchargers. Superchargers use a long belt that runs from a gear at the end of the crankshaft to deliver power to opposing rotors which generate pressure and increase air intake. This air exits the supercharger through the discharge housing port right beneath it which leads it to the valve and enters the cylinder.

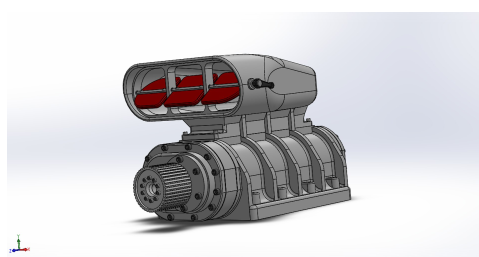

Fig. 6 Supercharger Roost

5 Formula 1

[6]

5.1 Early Days (1947-1953). The early days of F1 were in the 1950s with FIA being formed and all cars requiring either a 4.5-litre naturally aspirated engine or a 1.5-litre supercharged engine with a cap on the maximum horsepower of 400. Cars were front-engined until 1955 with the best performing car being the Alfa Romeo 158 known as the “Alfetta” with a max speed of 180 mph and a 0-60 in 4sec. The Alfetta was a supercharged i8 capable of generating up to 350bhp; weighing around 711 kg The fuel consumption of these cars was ridiculous as it was needed to cool the engine as well as averaging 1.5 miles per gallon. With a manual gearbox, the car wasn’t very technologically advanced as compared to today’s car that we are used to.

5.2 Rise of Ferrari (1953-1966). In the era known as the rise of Ferrari, the FIA changed the regulation to 2.5 litre naturally aspirated engines or a 1.5 litre supercharged engine. With a maximum range of 290 hp. One such engine like the Ferrari Lampredi engine took advantage of the change to compete with Alfa Romeo which was a V12 2.5 litre naturally aspirated engine.

During this time the Maserati i6 engine became very popular with a 170bhp and 2-litre displacement making it light and powerful compared to the other engines at the time. [6]

In 1961 the FIA changed the regulations to improve safety that the cars didn’t have. Banning any modifications to air input essentially banning supercharged engines. During this time the maximum engine capability was a 1.5 litre N/A producing 150 bhp and rising to 220 bhp by the end of this era.

With Ferrari, Lotus and BRM fighting it out for the championship for this period.

5.3 Cosworth Era (1967-1985). [18] The Cosworth era was the time when there was no change to engine regulations for 20 years. The FIA stated a 3-litre N/A or a 1.5-litre turbocharged with a maximum of 510 bhp due to the reluctance of the paddock against the previous engines. With a limit of 12 cylinders.

At this time the Ford Cosworth DFV, a 3 litre V8 (Double Four Valve) engine became the preference for the paddock. Made by Colin Chapman, the driver for Lotus at the time The Cosworth DFV engine was naturally aspirated, the V-configuration of the Cosworth engine angled the cylinders upwards and left ample space under the car for the necessary under-body prole which massively increased downforce and gave more efficient aero balance, thus increasing cornering potential and straight-line speed. Lotus turned to Ford at the start of this era and dominated the eld winning 7 constructors championships in a row. At this time Ford decided to change tactics and look to monopolise F1 by allowing other teams to use their engines. All except Ferrari who put all their resources into developing an engine to fight the Ford. By the time Ferrari could pose a potential threat to Ford, they racked up nearly 100 wins. The Cosworth DFV engine was a significant innovation in F1 because it allowed for more affordable and accessible racing.

5.4 Turbo Era (1977–1988). Renault was the first team to use a turbocharged engine in 1977 with the RS01, 1.5 litres V6 turbocharged engine, which at the time was an ambitious project which had a tendency to go up in flames almost every race giving it the nickname, “The Yellow Teapot”; it took 2 seasons for the team to score their first points after much-required modifications. The change to the turbo happened for the rest of the grid at the South African Grand Prix in 1979 which was a high-altitude race at 1500 metres above sea level, making the air too thin for most of the N/A engined cars causing them to lose around 20-25% of their power output while the turbo performed at maximum capability indicating that the time had come to leave the naturally aspirated engine era behind with teams like Ferrari, Alfa Romeo adopting turbochargers as well as other manufacturers like: BMW, Honda and Porsche.

Fig. 7 Ford Cosworth DFV Engine

The change from N/A to Turbo was very well received and almost all teams used a turbo except a few choosing the Cosworth engine.

But the turbos were far superior with 1000 hp in qualifying trim and 800 hp in race trim. The FIA to ensure a level playing field decided to try to reduce the cost of production for these new engines by limiting the amount of fuel they can carry from 200 down to 150 litres, as well as putting a restriction on the power output of the car to between 600 & 700 hp. [6]

With these new regulations, Honda immediately capitalised on what was considered a slow car turning it into an indomitable force that gave Senna, Prost, and Pique multiple driver championships. With several high-speed crashes and driver casualties, the FIA banned the turbocharged engine and ended the Turbo era with the newly issued 3.5-litre Atmospheric engine for the upcoming seasons.

5.5 V10 Era (1989-2005). With the change in the FIA banning the turbos, the 3.5-litre atmospheric engine gave teams and manufacturers the choice between i and V configurations up to 12 cylinders. The most common choice between teams was the V10 which was the perfect balance of power output and car balance with around 600 hp at the start of the V10 era. Honda and Renault were the two teams to select the unexplored V10 and immediately showed results having swept the other teams on the board in qualifying and races. Ford and Ferrari stuck with V8s and V12s which had proven to be very reliable engines for them.

Renault decided to continue their dominance with their engine RS1 which won 6 consecutive constructors’ championships with Williams and Benetton from 1992-1997.

As a new regulation on the air intake capacity changed from 3500 to 3000cc Ferrari also changed to the rampant V10 in 1995 which started the insane dominance Ferrari would enjoy from 1999 to 2004 driven by Michael Schumacher and Rubens Barrichello until the resurgence of the Renault driven by Fernando Alonso. With the increase in the allowed horsepower to 800, the Renault RS25, an 800-900 hp V10 engine with a 3-litre capacity & RS26, V8 750 hp 2.4-litre engine. The comeback by Renault was unbelievable and we would see this again in the V8 era. [6]

5.6 V8 Era (2006-2013). The V8 era had the introduction of 2.4 litre V8 engines that had between 2400-2200 cc to improve fuel consumption and efficiency, an issue that F1 was struggling with during the brute force era of turbos and V10s. Ferrari returned to their dominance with the Ferrari F2007, a V8 N/A engine producing 750-800hp & Ferrari F2008, another V8 N/A with virtually the same engine specs. This was cut short by the newly formed

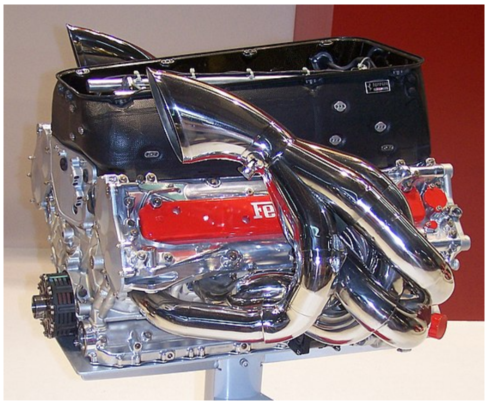

Fig. 8 Ferrari V10 Engine
[19]

Fig. 9 RS27 V8 Engine
[16]

Brawn team using a Mercedes BGP 001, 2.4-litre engine producing 750hp. But their success was also cut short by Red Bull. Renault found Adrian Newey, the mastermind behind the dominance of the V8 era. The car was capable of over 750hp with the help of the RS27. This was exemplified in the next three seasons where they would go on to win consecutive drivers' and constructors' championships creating one of the most dominant engines and cars ever seen in Formula 1.

The V8 engines also contributed to a more level playing field among the teams. While dominant teams like Ferrari and Red Bull thrived, the regulations allowed for a degree of parity, enabling mid-field teams to compete more competitively making racing better and more enjoyable. The V8 era came to an end in 2014 to make F1 more technologically advanced and sustainable.

5.7 V6 Turbo-Hybrid Era (2014-present). Turbochargers returned to F1 after a highly anticipated period of 26 years. Current FIA regulations limit engine output to 15000 RPM with a 1.6 litres 90° V6 engine. With a max capacity of around 1000 horsepower with around 800 horsepower coming from the engine while the rest is supplied from the MGUK. V6 Hybrid Engines with Energy Recovery Systems (ERS) were implemented as a part of the hybrid era these are highly sophisticated and technologically advanced, allowing for improved efficiency, energy recovery during braking, and more strategic racing due to the management of electrical power which was used in the MGU K/H replacing the old Kinetic Energy System (KERS).

This era began the rise of Mercedes who won 7 consecutive drivers' and every constructors' championships in the V6 turbo-hybrid era from 2014-2021. Mercedes who had been experimenting with Turbo-Hybrid engines in the past took full use of this advantage. This was seen in the next 40 races where only 5 of them were without a Mercedes driver finishing P1.

The era had become stale to the point where the excitement was

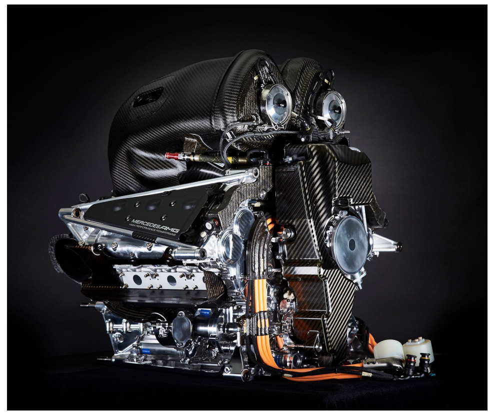

Fig. 10 Mercedes-AMG M11 EQ Performance Engine 2021

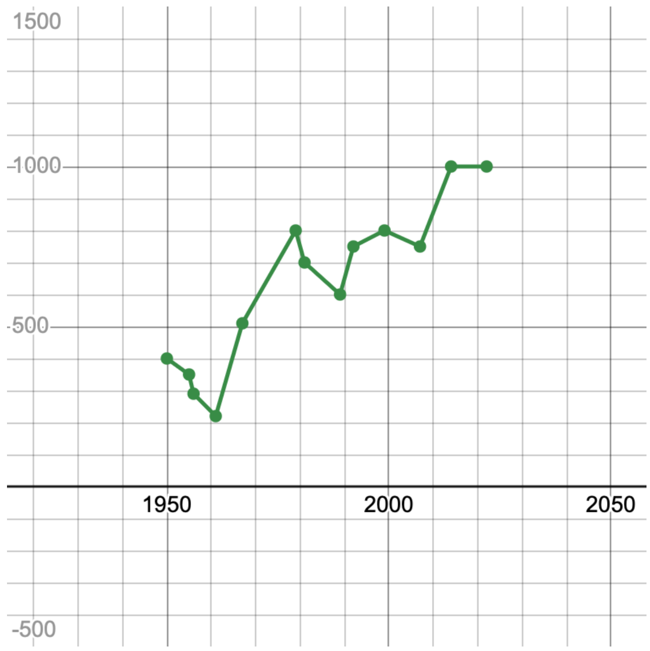

Fig. 11 BHP per Year comparison

mainly seen after 2015 when in 2016 both drivers, Nico Rosberg and Lewis Hamilton had an all-out scrap throughout the season on who would win the drivers championship. Almost as if Mercedes forgot that there were other teams in the competition.

In the span of 8 years, Mercedes won 120 races, in a sheer display of dominance and force. The greatest of these engines are the W06, Mercedes-Benz PU106B Hybrid from 2016 and the W11, Mercedes-AMG F1 M11 EQ Performance from 2020, a piece of machinery that produced well over 1000hp in race trim. [6]

As this was happening Red Bull found success in 2021 with their RB16B Honda RA621H, 1.6-litre engine putting up a fight against the Silver Arrows which came to a grand finale in the final race of the season where Red Bull won the drivers' championship capping off the Turbo-Hybrid era.

5.7.1 Fuel Flow & RPM. [10] The fuel flow in F1 currently calculated using

$$Fuel\ Flow = (RPM * 0.009) + 5.5$$

with a limit of 100 kWh. The fuel used in Formula 1 is E10 fuel, which contains 10 percent renewable ethanol with the rest being regular gas. 1 gallon of fuel weighs around 2.72 kg capable

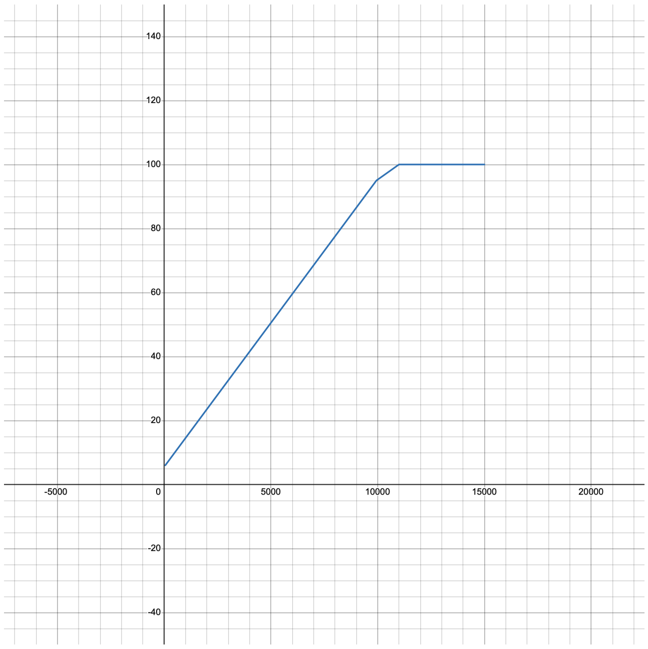

Fig. 12 Fuel Flow vs RPM

of producing 33.7 kWh. Therefore the theoretical yield from a full tank in F1 could yield around $(100) * 36.8 \approx 1240kWh$. Formula 1 uses a pre combustion chamber in each cylinder which creates a miniature cylinder for the entry of greater amounts of air to form a leaner mixture of fuelants with an 18:1 compression ratio running the reaction. In this stage the intake would open to allow a 15:1 ratio with some part of the chamber not being occupied. But upon ignition the gasket would come down to allow greater room for the explosion giving it greater area to generate more power. But due to slight inefficiency in fuel consumption due to the 18:1 compression ratio, 50% efficiency generates.[2]

$$\Rightarrow 620 + 120_{MGUK} = 740 \approx 1000hp$$

5.8 The Next Generation Power Unit Era (2026-). The 2026 Formula 1 Power Unit Era retains the 1.6-litre turbocharged V6 internal combustion engine as the primary mechanical power source, but introduces a fundamentally new energy-based regulatory framework and significantly increased electrical contribution. Fuel is injected directly into the combustion chambers where ignition generates high-pressure gases that drive the pistons and rotate the crankshaft. Unlike the previous turbo-hybrid era which regulated fuel mass flow, the new regulations limit the chemical energy entering the engine[11]. The maximum fuel energy flow is capped at 3000 MJ/h, with a governing curve at lower engine speeds given by

$$EF(\text{MJ/h}) = 0.27 \times RPM + 165$$

for rotational speeds below 10,500 rpm. This ensures that total usable energy is controlled regardless of the energy density of the sustainable fuels now mandated in the sport. Converting this limit to a time-based input gives

$$3000 \text{ MJ/h} = 0.833 \text{ MJ/s},$$

meaning that for a typical 90-second lap the engine may receive approximately 75 MJ of chemical energy. In contrast to the previous era where performance gains were achieved through marginal improvements in fuel mass efficiency, the new system directly incentivizes thermal efficiency and optimized combustion strategies.

The combustion process continues to drive a turbocharger which compresses incoming air to increase cylinder charge density and power output. However, a major architectural change is the complete removal of the MGU-H unit[14], which in the previous era harvested exhaust heat energy and regulated turbo speed electronically. With its removal, turbocharger operation is now governed purely by exhaust flow and wastegate control, simplifying the system while potentially reintroducing transient turbo response challenges. This places increased importance on turbo sizing and engine mapping to maintain drivability and efficiency.

Energy recovery in the 2026 era is focused entirely on the MGU-K system, which is mechanically linked to the crankshaft. During braking phases, the MGU-K functions as a generator, converting kinetic energy into electrical energy which is stored in the energy store. The maximum recoverable electrical energy per lap is limited to

$$E_{ERS} = 9 \text{ MJ per lap},$$

[11] with the allowable change in battery state of charge constrained to

$$\Delta SoC = 4 \text{ MJ}.$$

This represents a substantial increase compared to the previous turbo-hybrid era, where only 2 MJ per lap could be recovered, making regenerative braking a far more significant contributor to overall energy management.

The stored electrical energy is redeployed through the MGU-K to supplement the internal combustion engine during acceleration phases. The maximum electrical power output of the MGU-K is increased to

$$P_{MGU-K} = 350 \text{ kW},$$

[11,14] compared to the previous limit of 120 kW. This corresponds to nearly 470 horsepower of electrical contribution alone, transforming the hybrid system from a supplementary boost mechanism into a dominant performance component. A mechanical torque monitoring limit of 500 N·m is applied to ensure compliance. The greatly enhanced electrical output enables an approximate balance between internal combustion and electrical propulsion during peak deployment phases.

As shown in Fig. 13 illustrates preliminary performance and reliability trends observed during the closed-door Barcelona shakedown test conducted under the 2026 regulations. The plotted lap times represent early indicators of pace, while total laps completed reflect system reliability and energy management stability. Teams achieving high mileage alongside competitive lap times demonstrate effective integration of the new power unit architecture, particularly in managing the increased electrical contribution and energy recovery systems. As testing focused primarily on baseline data collection rather than outright performance, the graph serves as an initial representation of adaptation to the new energy-focused power unit design.

Another defining feature of the new era is the mandatory adoption of 100% sustainable fuels [5,7]. These advanced fuels, including synthetic and bio-derived hydrocarbons, possess differing energy densities and combustion characteristics compared to traditional fossil fuels. The energy-based regulatory framework allows such variations while maintaining competitive fairness. However, this transition requires extensive redesign of fuel injection systems, combustion chamber geometries, and ignition strategies to ensure efficient conversion of limited chemical energy into mechanical work.

Together, these developments redefine the operational flow of the Formula 1 power unit. Energy now enters the system through a

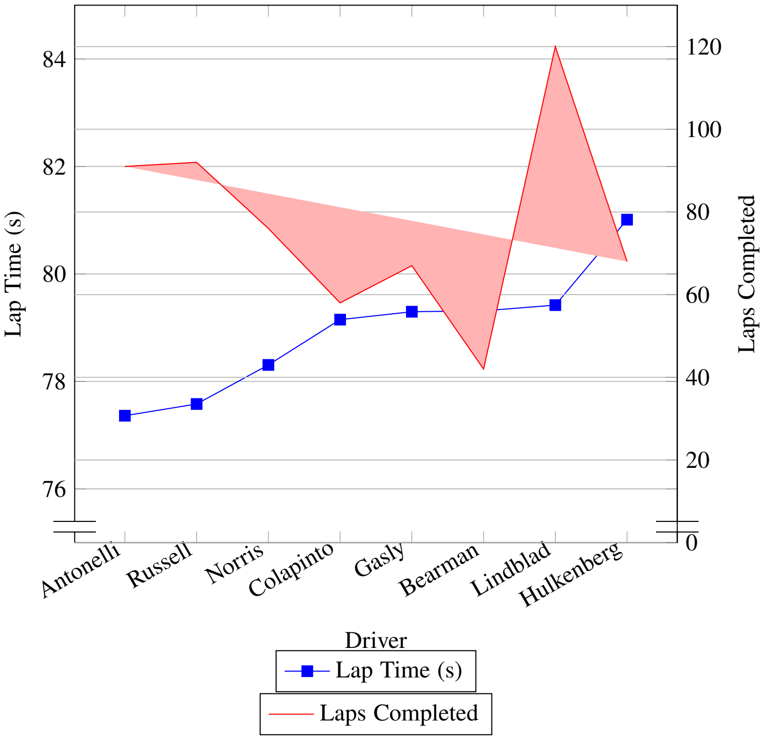

Fig. 13 Unofficial 2026 Barcelona Test: Comparison of Lap Times and Laps Completed

tightly regulated chemical input, progresses through an efficiency-focused combustion process, and is heavily supplemented by large-scale electrical recovery and deployment. The removal of exhaust heat recovery simplifies architecture while shifting the burden of energy harvesting to braking systems. The enhanced role of the MGU-K and expanded regenerative capacity place electrical systems at the core of performance optimization.

Overall, the 2026 Power Unit Era marks a transition from horsepower-driven development toward energy efficiency and hybrid dominance. Success will depend not solely on peak engine output but on the ability of manufacturers to maximize conversion of limited energy into mechanical and electrical power while managing complex energy recovery strategies throughout each lap.

6 Future

6.1 Changes in the Future. [7][1]

Formula 1 will be introducing a new fuel that will replace the current E10 fuel which is 10% ethanol and the rest gasoline which managed to produce around 1000 hp. With the induction of the new regulations to go sustainable Formula 1 will look to use a 100% sustainable fuel with the hope of going net zero in carbon emissions by 2030.[5] This transition is supported by the introduction of energy-based fuel flow regulations which limit the total chemical energy entering the engine rather than fuel mass, encouraging greater thermal efficiency and optimized combustion processes.

The advancements in the MGUK will change to allow an improved power output of 350 kW compared to the previous 120 kW limit. In the efforts to make racing more competitive, the MGUK will contribute a significantly larger proportion of the total propulsion, transforming electrical energy from a supplementary boost system into a dominant performance component.

Less fuel, more horsepower: F1 expects the engines to produce over 1,000 horsepower even though they are using less fuel and operating under strict energy flow limits. As fuel loads have gradually decreased over the last decade from 160 kilograms in 2013 to 100 kilograms in 2020, with an aim for around 70 kilograms in 2026, Formula 1 will be looking to reduce overall energy consumption while maintaining high performance levels.

F1 is in its cost cap era. There will be an engine-specific cost cap, which is expected to encourage creative solutions. Some systems were removed, such as the MGU-H, which lacks strong road relevance, with the aim of simplifying power unit architecture and making development cheaper and more accessible similar to the Cosworth Era.[15]

6.2 Potential Flaws in the Future. [9][5]

Manufacturers will need to ensure that the costs of producing the new sustainable fuels remain comparable to fossil fuels while maintaining consistent performance levels. In the early years of the regulations there may be variations in engine performance due to differences in energy density and combustion behaviour. Since these fuels are not directly tuned to previous injection systems, modifications to fuel delivery and combustion chamber design will be required.

An aim for 70 kilograms (154 pounds) in 2026 increases the reliance on the MGUK to compensate for reduced chemical energy input. The MGUK capacity has increased from 120 kW to 350 kW to offset the lower fuel contribution.[12] While the higher electrical recovery limits allow significantly more energy to be harvested per lap compared to the previous era, the increased size of batteries and electrical components introduces additional mass to the car. This added weight may negatively affect handling, acceleration, and overall race performance. To counteract potential performance losses the FIA have introduced “Override mode” to allow drivers to extract additional electrical power at specific points on the track. However, excessive reliance on override modes could lead to energy deficits later in the lap or race, requiring careful energy management strategies.[12][13]

With the removal of complexities such as the MGU-H, turbo lag may return and could make the cars harder to control on corner exits. As exhaust flow is no longer regulated electrically, boost response will depend entirely on mechanical turbocharger behaviour and wastegate control. This may lead to inconsistent power delivery through corners and force drivers to adapt their driving styles, potentially impacting overall race quality.[8][15]

7 Conclusion

As Formula 1’s V6 Turbo Hybrid Era draws to a close, the sport enters a period of major technological transition, prompting speculation regarding the impacts of the 2026 Power Unit regulations. The introduction of energy-based fuel limits, the removal of key components such as the MGU-H, reductions in fuel capacity, and the significantly increased contribution of the MGU-K are expected to fundamentally alter power unit performance and race dynamics. These changes will require teams and drivers to adapt to new energy management strategies and vehicle behaviour.

The shift toward 100% sustainable fuels represents one of the most significant developments in Formula 1’s history. While initial challenges in fuel consistency, combustion optimisation, and system integration are likely during the early years of implementation, continued development is expected to lead to highly efficient and environmentally sustainable racing without compromising competitiveness. The enhanced role of electrical energy recovery and deployment further aligns the sport with modern automotive engineering trends while maintaining high performance standards.

Formula 1 has consistently embraced bold technological innovations throughout its history, from the early supercharged engines of the Alfetta era to the high-revving naturally aspirated V10 engines and the dominance of the modern turbo-hybrid power units. While such transitions have often been met with uncertainty, they have ultimately driven progress and performance improvements across the sport.

As Formula 1 looks toward the future, the 2026 Power Unit Era reflects a commitment to sustainability, efficiency, and advanced hybrid technology. Although the full consequences of these regulations remain to be seen, the evolution of the power unit continues to demonstrate Formula 1's ability to adapt and innovate while preserving the competitive spirit that defines the sport.

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List of Figures

List of Tables