How Sustainability Could Trigger a Golden Era of Formula 1

By Wolfgang Philipp

Formula 1 created several golden eras of racing – the front-engine era with legends like Juan Manuel Fangio at the wheel, the subsequent revolution of the "Garagistas" with their Cosworth DFV engine, and the turbo era with 1,500 horsepower in qualifying.

Ironically, the transition to environmentally friendly mobility could trigger a new golden era of racing. In this article, we take a look at the essence of Formula 1 and how the need to evolve could revolutionize the legacy of the sport.

THE FORMULA OF FORMULA 1

The key ingredient of the formula second to none is a mindset of winning at the highest level of competition. Engineers, drivers, entrepreneurs, and spectators are attracted by a world of superlatives in technology, talent, and money. The stopwatch pushes the boundaries of human and machine.

The relentless competition for victory has produced the brightest and darkest moments of motorsport. Regulations have reset the rules many times to keep the risk at bay and the technology relevant for the manufacturers. This time, the regulators face the greatest challenge – the future of the sport. How can the thrill of Formula 1 be preserved while keeping it a beacon of technology in the new era of mobility?

THE PASSION: RACING

In the beginning, it was only about racing. Gentlemen drivers competed in their private cars. Soon specialization led to professional drivers, teams, and the Grand Prix, but the only interest was to finish first.

When the manufacturers discovered "win on Sunday, sell on Monday," commercial interest came to the sport. Now the prize was much bigger than a trophy and some cash – racing became a selling platform. TV magnified the audience exponentially. The platform became so relevant that non-automotive brands also started to pay significant amounts of money to get their logo in the picture.

THE FUEL: COMMERCIALISM

Commercial interests stepped up the competition and led to the direct involvement of manufacturers, soon at the expense of the private teams. While the privateers have to make a living through the sport, the global brands see it as a highly effective marketing platform. Mercedes-Benz estimates the advertising value "for Mercedes and all the partners on the car" at approximately 4.5 billion dollars.[1]

This two-class society affects the sport significantly. The last private team to win the championship was Brawn GP in 2009.[2] Other private teams like Williams, one of the glorious names in Formula 1, are now to be found at the back of the grid. Their decline has led to phases of long-term dominance of individual manufacturers. Red Bull won all championships from 2010 to 2013, and Mercedes-Benz from 2014 to 2020.

Even the new annual cost cap of $145 million in 2021 and ultimately $135 million in 2023 still leaves a significant advantage to the manufacturers, as the "race driver fees and the costs of the team's three highest paid personnel"

[1] "Mercedes advertising value rockets to $4.5 billion," planetf1.com, last accessed in September 2021.
[2] Brawn GP took over Honda's team and their already fully developed car for the following season when Honda had to step back from Formula 1 overnight amidst the financial crisis. The car would dominate 2009 by profiting from a cleverly exploited gap in the regulations. Brawn GP was taken over by Mercedes-Benz in 2010.

are not included.[3] Not to mention the additional significant synergies in development that the "sister teams" of Red Bull, Mercedes-Benz, and Ferrari can achieve.

THE CATALYST: POLITICS

While the manufacturers might drive the sporting regulations, they are themselves driven by political interests. The current hybrid engines are already testimony to environmental sustainability. The shift to electric mobility in passenger cars and all-electric strategies for the near future[4] will shine a new light on the upcoming regulations. The car manufacturers need a more electric approach to avoid a disconnect with their passenger cars. On the other hand, Red Bull needs a setup that guarantees spectacular entertainment.

THE CHALLENGE: THE FUTURE OF MOTORSPORTS

Despite all of the divergent sporting, commercial, and political interests, Formula 1 is more relevant and attractive to manufacturers, teams, and fans than ever. Social media and tailor-made content for the novice and the expert viewer alike brought the entertainment value to a new level. The Volkswagen Group is considering entering Formula 1. And the new regulations are a great chance to cement the role of Formula 1 as the pinnacle of motorsports in a new era of mobility. The big question is how.

THE SECRET BEHIND THE GOLDEN ERAS

The golden eras in Formula 1 all share another key ingredient: technological freedom.

The pursuit of speed and reliability and the freedom to think openly led to breakthroughs such as the mid-engine layout, the discovery of the ground effect, the power explosion with turbo engines, the carbon chassis, and active suspension. While the latter is forbidden today, the others changed Formula 1 – and motorsports – forever.

Technological freedom has been reduced dramatically in the last few decades, mostly to keep safety at pace with the constant progress in speed. The intention of cutting costs reduced the technological options even further by specifying technological requirements in more and more detail. Today, the freedom remains in regulation gaps that, once discovered, will be forbidden, such as the recent Mercedes' DAS system or Red Bull's flexi wings.

The new era of mobility and the quest for sustainability are the greatest chance to open up the regulations again, by shining a new light on the pursuit of speed – in the form of efficiency and sustainability.

A HOLISTIC APPROACH TO FORMULA 1

From a holistic perspective of technology, talent, and money, the former takes on an entirely new significance in the new era of mobility. Its sole purpose should no longer be entertainment and complying with current sustainability standards. Formula 1's technology has to become a shaper of future mobility once again. The technological change has to happen from the inside of Formula 1, with the full potential of its intellectual and monetary power, not from the outside through political decisions.

A SIMPLE QUESTION: WHICH TECHNOLOGY IS FASTER USING THE SAME AMOUNT OF ENERGY?

The last century of mobility conquered speed, comfort, and safety. In our era of mobility, the new currency is energy and efficiency. Formula 1 has always been a showcase of the latest technology in practice. Which competition platform could drive the development in electric mobility, e-fuels, and hydrogen better than the pinnacle of motorsports?

The idea is simple: every team gets the energy equivalent of 200 kg of petrol for the race weekend. Whether they use it as e-fuel, electricity, or hydrogen is up to them.

V8 engines, 4-cylinder hybrid powertrains, and all-electric concepts can fight it out on track. While the safety standards are not up for discussion, the rest is up to the teams, the manufacturers, and the drivers to show which package will win the Grand Prix.

[3] "What is the 2021 F1 cost cap and how will it be enforced?" formula1.com, last accessed in September 2021.
[4] "Mercedes-Benz Strategy Update: electric drive," daimler.com, last accessed in September 2021.

IN A NUTSHELL: THE REGULATIONS FOR A NEW ERA OF FORMULA 1

To ensure a valid basis for development and fair competition, the car's dimensions, tire dimensions, safety requirements, and minimum weight stay the same as of the final regulations for 2022.

Every car gets the energy equivalent of 200 kg of petrol for the complete weekend, of which 50 kg is for Friday's practice sessions, 50 kg for Saturday's practice and qualifying, and 100kg for Sunday's race. The Grand Prix distance remains the same as of 2022. Unused energy from one day cannot be carried over to the other days. Refueling, recharging, or swapping the batteries during the race is not allowed. The energy (e-fuels, hydrogen, electricity) is officially provided by the FIA.

The powertrains can use any ratio of petrol, diesel, electricity, and hydrogen within the mentioned energy equivalent. Three updates to the powertrain are allowed per season.

To enable competition between manufacturers and private teams, all powertrains must be available for any non-manufacturing team along with the latest upgrades for a $15 million flat rate annually.

The budget cap of $135 million per team per year as of 2023 remains and includes the drivers as well as top management.

The best balance of performance is transparency. All of the data generated by a car during the weekend is available to all teams.

Just like the powertrains, aerodynamics is a key component to efficiency and is not subject to restrictions – allowing the cars to significantly save energy and the manufacturers to transfer relevant technology to series production.

Finally, the tires as an important field of innovation are provided by multiple competing manufacturers, except for the rain tires, which are provided by one manufacturer and optimized to limit the spray. Heating the tires is permissible – using the car's energy contingent.

The energy contingent for the race weekend is also the most important parameter for security. If the cars get too fast over the years, the energy can be simply cut down.

THE GOLDEN ERA OF SUSTAINABILITY

Manufacturers with hybrid cars will compete against smaller teams with screaming V8 petrol engines. Electric cars will demonstrate their advantage on smaller circuits like Monaco, while the 300 km high-speed Grand Prix of Monza will probably favor e-fuel-powered combustion engines in the short term.

Advancements in battery technology will continually shift the ratio to more electric powertrains. New technology will constantly emerge, fail, and succeed.

THE DRIVERS: FROM FASTEST REACTION TIME TO MASTERY

A new skillset will be required from the drivers. Fitness and reaction time will become less dominant, while understanding the technology and working closely with the engineers will make the difference. It will be more like in Niki Lauda's days, when a driver's input still could make the car seconds faster or slower. Experienced swashbucklers will stay longer (or even join the grid again), next to today's teenage talents.

THE MANUFACTURERS: FROM PRESTIGE BRANDS TO PIONEERS

Manufacturers will finally be able to showcase their distinctive brand technology in front of billions of spectators again. Independent engine suppliers like Cosworth could return to Formula 1. The race against time will become series-relevant.

THE TEAMS: FROM PLAYERS TO SHAPERS

Studying the rulebook for loopholes will no longer be necessary. It will be up to the engineers to find the most efficient and fastest ratio of petrol, electricity, and hydrogen and push the boundaries of aerodynamics.

The car's dimensions, safety requirements, and minimum weight as in the present regulations will provide a great reference and make sure that no one will be slower than before or fall back completely.

This new challenge will give the best talent attracted to Formula 1 a greater goal than merely racing against the clock: they will drive mobility forward.

THE RACING: A NEW LEVEL OF ENTERTAINMENT

The racing will offer a new level of excitement. Heterogeneous technological platforms will lead to different approaches in the race beyond today's strategic options. Battles will cost valuable energy, back markers might come back later in the race, everyone will struggle to find the sweet spot of speed and efficiency.

Each racetrack will hand new cards to the teams, who have to prove themselves on contrary layouts like Monaco and Monza. It might even be possible to overtake in Monaco again.

THE FANS: FROM SPECTATORS TO PROFITEERS

The fans will not only experience the dawning of a new era of motorsports. They will also get a direct insight into technology and the progress being made over time.

Ultimately, they will profit from efficient and sustainable mobility.

THE SERIES: FROM ENTERTAINMENT TO A PLATFORM OF FUTURE MOBILITY

Finally, Formula 1 will become a platform for future mobility beyond entertainment. It will be future-proof regardless of upcoming inventions – they will automatically appear or even originate in Formula 1 – and stay ahead of time rather than dragging behind.

TECHNOLOGICAL FREEDOM: THE DNA OF FORMULA 1

The allure of Formula 1 is in the competition of technology, talent, and money. The development of that technology, the constant progress, and resulting shifts of power make this series so unique. Without the factor of technology, it would only be a faster Formula 2.

Today's regulations have not limited the costs of technological competition, only its playing field. Millions of dollars are spent for the slightest improvements, for the smallest advantage on track. The mindset of winning always finds areas to optimize, whatever money is available. The key is to shift the potential of this mindset and focus it in the desired direction: on efficiency and sustainability.

THE CLOCK IS TICKING

The new regulations beyond 2025 will determine the future of Formula 1 for the coming decades.

Will we continue on the path to increasingly neutral technology which nonetheless costs millions of dollars or will we bring back the technological freedom and become a relevant mobility platform for many more manufacturers to join?

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