

# TOTAL

GRAND PRIX TRAVEL GUIDE 2010

TOTAL PARTNER OF

RENAULT  Team

# THE JOURNEY CONTINUES

Offering our customers more efficient, cleaner petroleum products, enhancing engines and improving fuel economy are key challenges for TOTAL, and we can't do it alone. We're partnering with carmakers — Renault in particular — to come up with appropriate solutions.

We've been a part of the motor racing world for more than 30 years. Sharing a commitment to innovation with Renault, TOTAL is working to identify key progress drivers, especially where the fuel and lubricant pairing is concerned. The extreme conditions of Formula One racing provide an unrivalled proving ground for tomorrow's products.

All of us here at TOTAL are pleased to offer you this Travel Guide, which we hope will be your constant companion during the season.

**May the best man win!**

A handwritten signature in black ink, appearing to read 'P. Caloni', with a horizontal line extending to the right.

**Pierre-Gautier Caloni,**  
Vice President Corporate Image

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# POWERING RENAULT AROUND THE WORLD



**Fuel is at the centre of the biggest regulatory change to Formula One this season. There will no longer be refueling during the race. As a consequence, TOTAL has developed a new fuel.**

TOTAL supply the fuel and other fluids that keep the Renault F1 Team a well-oiled machine.

Elf, which merged with TOTAL in 2000, has enjoyed a successful relationship with Renault for more than 30 years, and continues to supply Renault with lubricants under its Elf brand. A number of small teams within the TOTAL Group work on its F1 project, drawing experts from different areas to concentrate on fuel development and testing, lubricants, greases, analysis, production and logistics.

TOTAL's Formula One project is headed by Group scientific delegate, Philippe Girard.

**How has the new no-refueling regulation affected fuel companies?**

Philippe Girard: If you keep in mind that 10kg on the car reduces lap times by 0.3-0.4secs, you can imagine that the new regulations have a strong consequence on the fuel profile. Now, for the first time, the focus will be on fuel consumption. That will be key to success.

In order to offset some of the extra fuel weight, the fuel companies have developed a lighter fuel. We have found a compromise between the density of the fuel and the power content.

**Has this had an effect on the way the cars are designed? Despite the fuel being lighter, the tanks are still bigger.**

Yes, last year tanks were 120-140 litres, depending on the car. This year they are approximately 230 litres. So the reservoir has pretty much doubled in size, and that's had an effect on the design of the chassis and body. It must be much longer, by 15 to 20cm.

**With no refueling, how will this affect the temperature of the fuel?**

Because of its proximity to the engine, over the course of an hour and a half the fuel will get very hot, especially in climates like Malaysia. Teams may experience some problems. That is another issue - how to insulate the fuel tank to keep it cool. The tank itself is the responsibility of team engineers, but for the fuel companies it means it's difficult to reduce the fuel density below 0.725. We can't safely go lower than that, without causing problems for the fuel pump. A road car's fuel density is about 0.75.

**Was the no-refueling rule made to make Formula One greener?**

Yes and no - it was a safety issue primarily, to reduce the chances of an accident in the pitlane, and also to make the racing more interesting. With a heavier car you need to manage your brakes and tyres better. And with some cars and drivers adapting better than others, I think we will see more overtaking. But ultimately yes, the lighter fuel and the essential focus on fuel economy does send out a positive eco message.

**You are part of FOFAP: What is FOFAP? And can FOFAP do more to reduce F1's emissions?**

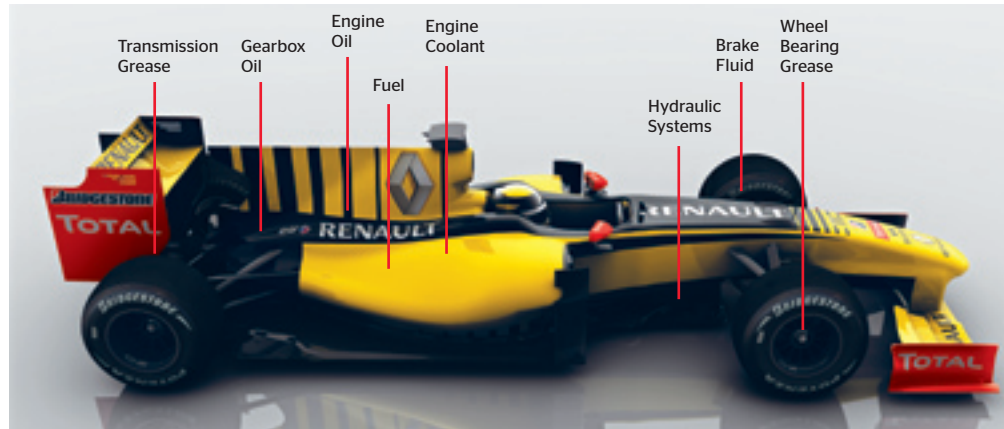
FOFAP stands for the Formula One Fuel suppliers' Advisory Panel. It's an association of all the fuel companies involved in F1, and we are here to advise the FIA on their proposals.

We are in favour of better energy usage. For the last three years, FOFAP has pushed to modify the rules to make F1 fuels as representative as possible of the solutions we can develop for the future.

We think hybridization is the future of F1. The teams have stopped KERS development, but it's not banned. You can still use 60kw KERS if you want it, but the added value is peanuts. If the KERS power were increased it would become more advantageous and more eco-friendly, but engine manufacturers need to recover more freedom to develop such eco-technologies. This, and fuel saving, is the future.

**Could F1 ever be 100 percent green?**

There are two areas on which the sport should focus to cut emissions. The first is the cars, and we can play a role in that. The second area of focus is logistics. The FIA have calculated that on a GP weekend, one or two percent of the total emissions are caused by the cars. At least 98 percent is due to people coming to the



- Fuels are designed to comply with stringent FIA regulations and target performance by improving:
  - Engine power
  - Reliability and cleanliness
  - Consumption reduction
  - Contribution to CO2 emissions reduction
  - Bio-components

- Engine oil / gearbox oil target reliability and performance improvements:
  - Performance through friction reduction
  - Engine protection
  - Heat evacuation
  - Seals protection
  - Part cleanliness

- Transmission and bearing greases ensure that metal parts that are in contact move against each other freely, avoiding failures. An F1 car wheel can rotate at more than 3,000 RPM at full-speed.

- Hydraulic and brake fluids are 100 percent specially designed for the demand of modern F1: fast shifting of gears, power steering, or slowing down from 300km/h to standstill in under 80 metres. This calls for special products.

- Coolants protect against the phenomenon of corrosion that affects the special alloys used in engine parts. Anti-corrosion and heat extraction are the main properties contributing to engine block reliability

race, team logistics and broadcasting. The cars consume just one or two percent of the energy.

To give you an idea, the quantity of fuel burnt during a race weekend, by the F1 cars themselves, is a total of 10-13 cubic metres. That's not a lot, really. That's less than half a fuel truck. A flight from London to Shanghai requires 100 tonnes of fuel – that's three trucks worth. With that quantity, you could fuel two-thirds of a season's grand prix racing. And we are further committed to increasing fuel economy and reducing emissions.

**In what other areas of the Renault F1 car do TOTAL products have a hand?**

We are developing all the intermediate compounds where two mechanical parts

make contact. Wheel bearings, for instance, and transmission cups. We have developed coolants for the engine, plus hydraulic and brake fluids. Last year we were supplying coolant for KERS and fluid for the adjustable front wings, but there is no call for that now. The cars still have adjustable front wings, but they are now electrical. They were hydraulic at the start of 2009, but the loads at many tracks were too much for this system, so it was replaced by small electrical motors.

**In practical terms, what is TOTAL's role on a race weekend? You have a mini-laboratory at the back of the Renault garage.**

Yes, we have a track-lab. We take samples before and after each engine shut-off and, of course, after each track session, to

analyze the different fluids. The samples are small – just a few cubic centimetres. And we need to test each drum to check that they fulfill the rules. If one compound is missing, or reduced, perhaps through evaporation, Renault could be thrown out of the race. So it's very important to check everything. We can see immediately if there's a problem. We have two devices: The Chromatograph, to analyse fuel, and Spectrometry, which analyses lubes.

**Does F1 act as a test bed for more efficient fuels at the pump?**

Absolutely. Our philosophy of development is that we're using the same teams of experts across common range products and Formula One. We are pushing to develop new methodologies for F1, and then we adapt them for future product range evolutions for the end user. Our research and development in F1 is fed back, and results in the production of fuels that optimize the engine care, fuel consumption and ultimate performance of our road-going customers.

**Just for fun, Philippe, what would happen if you put F1 fuel in a road car?**

It would work! If you use lighter compounds in your road car, you will immediately feel the improvement in the engine. There will be no adverse effect. The additives we are using in both cases, Formula One and regular, to clean the combustion chamber are very similar. And in the area of additives we feed back information from our findings in F1, which makes its way to the pump.

But the cost per litre, between F1 and regular fuel, is a little bit different! This is mainly due to the small volume in batch process manufacturing, more frequent and deeper lab controls, and drum delivery instead of bulk.

The fuel we use in F1 is specific to the Renault engine, but it would boost your car's performance too.