

Formula 1 cars more hybrid than hybrids from today

Regenerative braking is not new to Formula 1. Hybrid technology was first introduced to the race series in 2009 with 'Kinetic Energy Recovery System' (KERS), whose influence has been increased by regulation over the years.



2014 Renault Formula1 engine 400

However, today is the day when cars both ERS systems, and far more energy storage, start pre-season testing in Jerez, Spain.

"The 2.4 litre normally-aspirated V8 engines of 2013 produced around 750bhp, with an additional 80bhp available for around six seconds per lap from KERS. The 2014 V6s put out around 600bhp. However, the two ERS systems (ERS-K and ERS-H) will give drivers an additional 160bhp [120kW] or so for approximately 33 seconds per lap," said the race organisation. "Unlike in 2013, the driver no longer has to push a button to active ERS – the power is simply delivered to the rear wheels via the throttle pedal. Therefore, whilst you could still lap relatively competitively without KERS in 2013, an ERS problem in 2014 will be much more debilitating to performance."

The two parts of ERS are : 'motor generator unit – kinetic' [MGU-K], and 'motor generator unit – heat' [MGU-H]), plus an 'energy store' (ES) and control electronics. Renault describes its energy store as a "battery". It is unclear if there is a super-capacitor element as well. It must weigh between 20 and 25kg.



2014 Renault Formula1 power system

MGU-K, like KERS, uses a motor-generator to deliver power (120kW) for acceleration and extract energy instead of friction brakes for deceleration.

MGU-H also uses a motor-generator, connected to the turbocharger. Energy extracted can be used to feed the

MGU-K directly, stored for later use by the MGU-K, or stored to be feed back into the turbocharger.

“Unlike the MGU-K which is limited to recovering 2MJ of energy per lap, the MGU-H is unlimited. MGU-H also controls the speed of the turbo, speeding it up to prevent turbo lag or slowing it down in place of a more traditional wastegate,” said Formula 1.

A maximum of 4MJ per lap can be returned to the MGU-K and from there to the drivetrain. “That’s ten times more than with 2013’s KERS,” said Formula 1.

Although the cars are expected to be just as fast as before, they will be more efficient.

Accordingly the amount of fuel allowed per car per race is now limited to 100kg, with a flow limit of 100kg/hour.

Last year fuel was unlimited, with around 160kg consumed and a flow of around 170kg/h.

“While the cars will likely be run at the limit of fuel flow during much of practice and qualifying, it will have to be a different story during races when cars are running for well over an hour,” said the organisation.

The minimum weight of car and driver has been increased by 48kg from 2013, up to 690kg to compensate for the new power unit and associated systems.