

FRESH BREEZE

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Photos by
Porsche

The Cayenne S Hybrid is the first Porsche that can “sail.” That does not mean its new drive system is in line for a nautical patent, but rather that it runs on the power of two hearts.

Drivers will have to accept that the pointer on the tachometer often does not move. When they take their foot from the accelerator in the new Cayenne S Hybrid, they might be forgiven for thinking everything is shutting off—for the pointer on the tachometer moves down to zero. But the car keeps rolling. Project Director Dr. Michael Leiters knows why he is partial to still engines in moving cars. “It saves fuel,” he says, “more than 30 percent over the new—normal—Cayenne.” This is made possible by the new electric assembly, which can serve alternately as a motor or a generator. It is supplemented by a 240-cell nickel metal-hydrate battery pack installed beneath the luggage compartment. This ensemble is governed by the Hybrid Manager—a computer system clever enough to pilot a plane. In the Cayenne S Hybrid, this computer handles three times more data than would be usual for a conventional engine, around 20,000 parameters instead of the approximately 6,000 sufficient to keep a gasoline engine running with accurate ignition and fuel-injection mapping. After all, the drive system of the Cayenne S Hybrid offers five different driving modes. ▶

Interior view:
Much is new in the new Cayenne



PREMIERE

CAYENNE S HYBRID



- 1 V6 engine
- 2 Power electronics
- 3 Eight-speed automatic transmission
- 4 High-voltage battery
- 5 Converter with lockup clutch
- 6 Separator clutch and electric motor



TECHNICAL SPECIFICATIONS CAYENNE S HYBRID

Displacement:	2,995 cc
Total power:	279 kW (380 hp)
Maximum torque:	580 Nm (428 lb.-ft.)
Top track speed:	242 km/h (150 mph)
Acceleration:	0–100 km/h (0–62 mph) in 6.5 sec.
Power transmission:	3.0-liter supercharged V6 plus electric motor with full-time all-wheel drive
CO₂ emissions:	193 g/km
Fuel consumption (NEDC):	8.2 l/100 km (34.4 mpg)

Technical details may vary from country to country.

For the driver everything remains the same. The Cayenne S Hybrid runs normally. It has an automatic gearshift lever whose commands for the new eight-speed transmission are restricted to “forward” and “reverse.” But behind the scenes of the drive management system, a few superbly engineered processes from the almanac of cutting-edge control technology are running.

These five functions are the following:

1. **All-electric drive: operates up to approximately 60 km/h (37 mph);**
2. **Regenerative braking: the electric motor becomes a generator and charges the battery;**
3. **Driving and charging: the gasoline engine powers the vehicle and the generator to provide electric power;**
4. **Sailing—a vigorous coasting mode in which the gasoline engine “shuts down” while the car is running—at speeds up to 156 km/h (97 mph);**
5. **Start-stop function: the engine is off while the car is at a standstill; start-up generally takes place electrically, and the combustion engine turns on afterwards.**

The effect is amazing. Nearly half of the total fuel reduction is achieved through the hybrid manager, which helps shift the engine’s operating point—a complex case of thermodynamics. Every gasoline engine coasts with relatively unfavorable

fuel consumption when in congested traffic, for example, because it strains against the almost completely closed throttle valve. As soon as the generator starts charging the batteries in this state during hybrid operation, the fuel economy improves because the engine can work more effectively when the throttle valve is somewhat more open.

The system also saves a lot of fuel when electric power from the charged battery is fed back to the drive, which can enable the combustion engine to take a break from its work while the car is still moving. That back-and-forth shift of a few millimeters on the throttle valve plus a few amperes from the battery combine to account for 44 percent of the reduction in fuel consumption. The 3.0-liter V6 engine in the Cayenne S Hybrid features a compressor that is located in the V of the engine block. Together they produce impressive power figures: 245 kW (333 hp) and 440 Nm (325 lb.-ft.) of torque alone are enough to ensure fleet performance. And whenever the 228-volt battery is charged, the electric drive can boost acceleration. This can add up to 34 kW (47 hp) or 300 Nm (221 lb.-ft.) of electric power to the output of the combustion engine.

Smoothly gliding, the Cayenne S Hybrid follows the commands of the driver. When called upon, this spacious five-door SUV will accelerate anywhere from mildly to furiously. The hybrid model differs in a few other details, as well. Its air-conditioning compressor and power-steering pump are run electrically, so they also can run when the gasoline engine is off. The thermal management system for the “activated” water pump uses the same approach as a cold engine that pumps no coolant through the circuit. This means the engine warms up more quickly, especially for short or city drives, which in turn lowers fuel consumption yet further. A welcome side effect is that the interior can be heated up more quickly.

All hybrid technology, however, offers a single support function which drivers can use if they wish, but do not have to. As Dr. Leiters explains, “It’s so much fun to keep breaking one’s own fuel consumption record that even the more hasty test-drivers have started switching on their own to the low-fuel option. They are totally enthralled by the Cayenne S Hybrid, thanks to the irresistible charm of its technology.” A new era is dawning, one that will be charged with excitement—with an impressive 288 volts, guaranteed. ◀