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## **Clever combination: the Audi plug-in hybrids**

**Ingolstadt, September 23, 2019 – In all-electric operation, they are locally emissions-free, efficient and sporty all at once: The new plug-in hybrid models for the medium-size to luxury class constitute an important element of Audi's electrification strategy. They combine a gasoline engine with a powerful electric motor and a lithium-ion battery. This combination of sportiness and efficiency is unique in the competitive environment: Thanks to their high overall system performance, the plug-in hybrids convince customers with their sporty driving performance. At the same time, the predictive operating strategy adjusts the electric and conventional drive types such that customers benefit from a great electric range and low gasoline consumption.**

### **Audi's plug-in hybrid initiative: models and equipment variants**

Audi is expanding the portfolio of the A7, A8, Q5 and Q7 model series consistently: with plug-in hybrids ranging from the medium-size class to the luxury class. A novelty in the premium segment: Audi is offering two model variants of the PHEV models Q5, A7 Sportback and Q7: a comfort model and a performance version with a greater system performance and sporty equipment options. The A7 Sportback\* and the Q5\* have a 2.0 TFSI motor under the hood. Given that the four-cylinder variants have a system output of up to 367 metric hp and the six-cylinder variants have an output of up to 456 metric hp, the Audi plug-in hybrids are among the most powerful vehicles in the competitive field.

The new PHEV models from Audi fascinate customers with their versatile character. On curvy roads, they impress with sporty and dynamic driving performance, enabled by the combination of quattro drive, a torquey electric motor and a powerful gasoline engine. They enable locally emissions-free mobility in the city and extensive stretches with a long range and reduced consumption on long-distance journeys. This makes them ideal for commuters and company car drivers in particular. The electric-only range accounts for more than 40 kilometers (24.9 mi) in the WLTP cycle for every model. With the E license plate under the German Electric Mobility Act, owners also enjoy tax advantages and municipal road privileges.

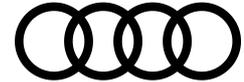
### **Powertrain and battery**

In line with the vehicle segment and vehicle type, Audi is relying on custom-made powertrains for its plug-in hybrids. Given that the aim was to generate the optimum system output for each model, the focus during development was on the harmonious interaction of the different drive components.

**The equipment, data and prices stated here refer to the model range offered for sale in Germany. Subject to change without notice; errors and omissions excepted.**

\* The fuel consumption values of all models named and available on the German market can be found in the list provided at the end of this MediaInfo.

\*\* Fuel consumption and CO<sub>2</sub> emission figures given in ranges depend on the tires/wheels used as well as the selected equipment



The PHEV models of the Q5 55 TFSI e quattro (combined fuel consumption in l/100 km<sup>\*\*</sup>: 2.4–2.0 (98.0–117.6 US mpg); combined CO<sub>2</sub> emissions in g/km<sup>\*\*</sup>: 53–46 (85.3–74.0 g/mi)) and A7 Sportback 55 TFSI e quattro (combined fuel consumption in l/100 km<sup>\*\*</sup>: 2.1–1.9 (112.0–123.8 US mpg); combined CO<sub>2</sub> emissions in g/km<sup>\*\*</sup>: 48–44 (77.2–70.8 g/mi)) are 5.6 seconds and 250 km/h (155.3 mph) product lines are fitted with a 2.0 TFSI that outputs 185 kW (252 metric hp) and 370 Nm (272.9 lb-ft) of torque. The system torque already reaches its maximum of 500 Nm (368.8 lb-ft) at 1,250 rpm. The PHEV models with a four-cylinder combustion engine also deliver a sporty performance paired with low consumption. The Q5 55 TFSI e quattro (combined fuel consumption in l/100 km<sup>\*\*</sup>: 2.4–2.0 (98.0–117.6 US mpg); combined CO<sub>2</sub> emissions in g/km<sup>\*\*</sup>: 53–46 (85.3–74.0 g/mi)) accelerates from zero to 100 km/h (62.1 mph) in 5.3 seconds and reaches a top speed of up to 239 km/h (148.5 mph). The values for the A7 Sportback 55 TFSI e quattro (combined fuel consumption in l/100 km<sup>\*\*</sup>: 2.1–1.9 (112.0–123.8 US mpg); combined CO<sub>2</sub> emissions in g/km<sup>\*\*</sup>: 48–44 (77.2–70.8 g/mi)) are 5.6 seconds and 250 km/h (155.3 mph).

The power for the electric motor is generated by a liquid-cooled lithium-ion battery located beneath the luggage compartment floor. It stores 14.1 kWh (Q7: 17.3 kWh) of energy at a voltage of 385 V.

#### **The plug-in hybrids are equipped with quattro drive as standard**

Maximum traction, even with poor road surface and weather conditions, and high agility, even with a sporty driving style: As is typical for Audi, quattro drive is a must in the plug-in hybrids. The power is transmitted via all four wheels as standard in all new plug-in hybrid models, in the six-cylinder models with permanent quattro and in the four-cylinder models with quattro ultra. With quattro ultra, the vehicle is generally powered via the front axle, with the rear axle being activated via the clutch predictively and depending on the situation. This is particularly efficient in calm driving situations and also safe and dynamic when necessary. The other PHEV models are equipped with a quattro center differential with purely mechanical regulation that distributes the torque between the front and rear axles at a ratio of 40:60 in normal driving operation. When required, it transfers the majority of the drive torque to the axle with the better traction.

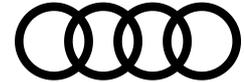
In all new plug-in hybrid models from Audi, the electric motor of the hybrid powertrain is integrated in the transmission and positioned between the combustion engine and the transmission. The hybrid module consists of the electric motor and a separator clutch that connects the TFSI engine with the powertrain. The separator clutch is located directly upstream of the transmission: The Q5 and A7 are fitted with the seven-speed S tronic, while the other models feature the eight-speed tiptronic.

#### **Battery management: recuperation, gliding and boost**

The powertrain strategy is tuned so as to provide the driver with the most versatile driving experience possible. It is maximally efficient with a large amount of electric driving while the boost and torque electric motor also make it very sporty when necessary.

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The electric motor performs most of the decelerations in everyday driving. Starting from medium-heavy brake operations in the area above 0.3 *g*, the electric motor and the hydraulic wheel brakes work together. Sophisticated vehicle tuning ensures that the transition between the alternator and wheel brakes (“blending”) is barely perceptible and that the power in the brake pedal is easy to modulate. The control of the powertrain allows a recuperation power of up to 80 kW during brake operation.

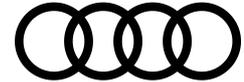
The electric motor assists the combustion engine through the boost function, whose characteristic depends on the drive program selected. Depending on the model and engine configuration, it now reaches 500 Nm (368.8 *lb-ft*) (Q5, A7) and 700 Nm (516.3 *lb-ft*) (Q7, A8), respectively—200 Nm (147.5 *lb-ft*) more than the TFSI can achieve alone.

When the driver takes their foot off the accelerator, drive management selects the best of the three possibilities for the situation: In the speed range up to 180 km/h (111.8 *mph*), the new PHEV models can glide with the TFSI engine deactivated. The combustion engine responds quickly and is started up almost imperceptibly by the electric motor alone.

In transmission stage “S”, which is preselected in the “dynamic” drive select profile, the electric motor always remains active in overrun mode and recuperates energy. In the other settings that involve cooperation with the predictive efficiency assist, recuperation takes place whenever it is more sensible from an energy perspective than gliding operation. Recuperation ranges up to around 0.1 *g* of deceleration and a charging capacity of 25 kW.

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### **The predictive efficiency assist (PEA) and predictive operating strategy (PBS)**

The predictive operating strategy is the technological centerpiece of the PHEV models. It enables the vehicle to achieve a long electric range and excellent recuperation power. The customer can clearly feel the ride comfort and ease of operation.

The PEA regulates the drive and recuperation behavior depending on the situation on the basis of immediate and nearby parameters of the predictive route data. These include upcoming town signs, intersections, roundabouts, the topography, which includes corners, uphill and downhill gradients, known speed limits, but also vehicles driving in front that are detected by the radar sensor. It informs the driver by means of corresponding displays and provides a haptic impulse via the accelerator pedal to remind them to take their foot off the gas.

The PBS regulates the drive and recuperation behavior throughout long-term route planning. It takes sections on the route that are driven on highways, on country roads and in cities into account when calculating the most efficient powertrain strategy, as well as the current traffic situation along the route, known speed limits and topological data. The PBS is activated automatically with the route guidance of the navigation system. The PBS constantly evaluates the route data, taking real-time events like traffic jams or dense city traffic into account, and adapts its calculations to the driver's style. Based on this data, the PBS creates a plan for the entire route with the aim of driving with maximum efficiency, using electric power in the city and reaching the destination with an almost empty battery. After all, the aim is to use as much electric energy as possible.

The driver can choose from three driving modes:

Besides Hybrid mode, which runs as standard when route guidance is active, the driver can also choose between the EV and Battery Hold modes. In EV mode, the car is driven exclusively electrically as long as the driver does not depress the accelerator past a variable, perceptible pressure point. EV mode is the base setting each time the vehicle is started. In Battery Hold mode, battery capacity is held at the current level. Nevertheless, there are also purely electric sections in this mode, too.

### **Comfortable climate: thermal management and the heat pump**

The new plug-in hybrid models are equipped with sophisticated thermal management that enables a long electric range and speedy interior temperature control. The TFSI engine, its ancillary equipment and the transmission are cooled by a high-temperature circuit.

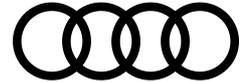
The battery, the charger, the electric motor and the performance electronics are cooled via a low-temperature circuit.

A heat pump that can generate a heat output of up to 3 kW with 1 kW of electric energy is integrated in the thermal management of the A7, A8 and Q5. It is coupled with the refrigerant circuit of the air conditioning system and uses the waste heat of the high-voltage components to heat the interior.

### **Convenient charging**

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The standard equipment includes the charging system compact with a cable for domestic and industrial power sockets, as well as a control panel. Upon request, Audi also provides a lockable wall mount. When using a connection with an output of 7.4 kW, it takes around two-and-a-half hours to fully charge the 14.1 kWh battery, and it takes around six-and-a-half hours to charge it using a 230 V domestic power socket.

A mode 3 cable with a type 2 plug, which is also standard equipment, is used for charging the battery at public charging terminals. A charging service owned by Audi, the e-tron Charging Service, grants access to a large number of public charging stations in 19 European countries on request. Customers can use a single card to charge at terminals from numerous different providers.

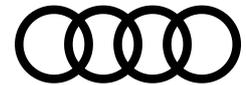
The myAudi app allows customers to use the services from the Audi connect portfolio on their smartphones. This includes: Checking the battery and range status, starting charging procedures, programming the charge timer and getting an overview of the charging and consumption statistics.

Another function of the myAudi app is pre-entry climate control prior to departure. This is possible because the air conditioning system compressor and the auxiliary heater in the car are powered electrically. Customers can specify the exact temperature to which the interior is to be heated or cooled. Depending on the model and equipment, heating of the steering wheel, seats, mirror, windshield and rear window as well as the seat ventilation can be activated via the pre-entry climate control.

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\*\* *Fuel consumption and CO<sub>2</sub> emission figures given in ranges depend on the tires/wheels used as well as the selected equipment*



**Fuel consumption of the models listed**

*(Fuel consumption, electricity consumption and CO<sub>2</sub> emissions figures given in ranges depend on wheels/tires and the chosen equipment level)*

**Audi A7 55 TFSI e quattro:**

Combined fuel consumption in l/100 km: 2.1–1.9 (112.0–123.8 US mpg);

Combined electrical consumption in kWh/100 km: 18.1–17.5;

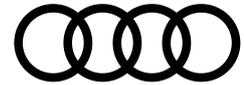
Combined CO<sub>2</sub> emissions in g/km: 48–44 (77.2–70.8 g/mi)

**Audi Q5 55 TFSI e quattro:**

Combined fuel consumption in l/100 km: 2.4–2.0 (98–117.6 US mpg);

Combined electrical consumption in kWh/100 km: 19.1–17.5;

Combined CO<sub>2</sub> emissions in g/km: 53–46 (85.3–74.0 g/mi)



The specified fuel consumption and emission data have been determined according to the measurement procedures prescribed by law. Since 1st September 2017, certain new vehicles are already being type-approved according to the Worldwide Harmonized Light Vehicles Test Procedure (WLTP), a more realistic test procedure for measuring fuel consumption and CO<sub>2</sub> emissions. Starting on September 1st 2018, the New European Driving Cycle (NEDC) will be replaced by the WLTP in stages. Owing to the more realistic test conditions, the fuel consumption and CO<sub>2</sub> emissions measured according to the WLTP will, in many cases, be higher than those measured according to the NEDC. For further information on the differences between the WLTP and NEDC, please visit [www.audi.de/wltp](http://www.audi.de/wltp).

We are currently still required by law to state the NEDC figures. In the case of new vehicles which have been type-approved according to the WLTP, the NEDC figures are derived from the WLTP data. It is possible to specify the WLTP figures voluntarily in addition until such time as this is required by law. In cases where the NEDC figures are specified as value ranges, these do not refer to a particular individual vehicle and do not constitute part of the sales offering. They are intended exclusively as a means of comparison between different vehicle types. Additional equipment and accessories (e.g. add-on parts, different tyre formats, etc.) may change the relevant vehicle parameters, such as weight, rolling resistance and aerodynamics, and, in conjunction with weather and traffic conditions and individual driving style, may affect fuel consumption, electrical power consumption, CO<sub>2</sub> emissions and the performance figures for the vehicle.

Further information on official fuel consumption figures and the official specific CO<sub>2</sub> emissions of new passenger cars can be found in the "Guide on the fuel economy, CO<sub>2</sub> emissions and power consumption of new passenger car models", which is available free of charge at all sales dealerships and from DAT Deutsche Automobil Treuhand GmbH, Hellmuth-Hirth-Str. 1, D-73760 Ostfildern, Germany and at [www.dat.de](http://www.dat.de).

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The Audi Group, with its brands Audi, Ducati and Lamborghini, is one of the most successful manufacturers of automobiles and motorcycles in the premium segment. It is present in more than 100 markets worldwide and produces at 18 locations in 13 countries. 100 percent subsidiaries of AUDI AG include Audi Sport GmbH (Neckarsulm), Automobili Lamborghini S.p.A. (Sant'Agata Bolognese, Italy) and Ducati Motor Holding S.p.A. (Bologna, Italy).

In 2018, the Audi Group delivered to customers about 1.812 million automobiles of the Audi brand, 5,750 sports cars of the Lamborghini brand and 53,004 motorcycles of the Ducati brand. In the 2018 fiscal year, AUDI AG achieved total revenue of €59.2 billion and an operating profit before special items of €4.7 billion. At present, approximately 90,000 people work for the company all over the world, more than 60,000 of them in Germany. Audi focuses on sustainable products and technologies for the future of mobility.

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