PORSCHE

Porsche e-mobility

Direction: Future

Contents

An electrifying subject for our engineers: the future.

Porsche and e-mobility.

We build sports cars. Always have done. The impulse to move forward, to be faster, to come first is therefore established deep in our genes – not only when it comes to crossing the finishing line, but also, and especially, with new ideas. So it is normal for us to go in new directions.

One new direction is hybrid technology. At Porsche, this chapter commenced in 2010 by the Cayenne S Hybrid.* Designed as a parallel full hybrid, it consistently combines typical Porsche performance with our continuous improvement in engine efficiency.

Our engineers were more than encouraged by this, and went a stage further in thinking about the hybrid. At the same time as the Cayenne S Hybrid, the 918 Spyder concept car also became the overwhelming star at the 2010 Geneva motor show. A plug-in high-performance hybrid with amazing lap times on the Nordschleife and impressively low consumption values. The 918 Spyder will go into series production in 2013.

This consistent future-oriented direction is further supported by the Panamera S E-Hybrid** – a plug-in hybrid in the sports saloon sector which can be charged from an electrical socket that now consolidates all of our know-how, is continuing Porsche's E-Mobility journey. This means the combination of forward-looking drive concepts and clever charging systems and in-car functions that can be controlled from a smartphone. It offers greater efficiency and suitability for everyday use by the driver. But with acceleration and performance that are anything but everyday.

New ideas will bring us to our destination – and then take us further. With e-mobility we are on a journey. Direction: Future.

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1. Cayenne S Hybrid
2. 918 Spyder concept car
3. Panamera S E-Hybrid

* Fuel consumption (in l/100 km) urban 8.7 · extra urban 7.9 · combined 8.2; CO_2 emissions 193 g/km; efficiency class DE/CH B/E

** Fuel consumption (in l/100 km) combined 3.1; CO_2 emissions 71 g/km; electricity consumption 16.2 kWh/100 km; efficiency class DE/CH A+/A

Why do we build sports cars? To get there more quickly.

The route to e-mobility.

Everybody is talking about e-mobility. Finally people are asking for answers to one of the greatest challenges of our time: is there a replacement for our scarce petroleum resources? How can CO_2 emissions be reduced? Can we lower the demand for energy?

The answers lie in sustainable mobility. E-mobility therefore replaces oil with renewable electricity. Thereby reducing fuel consumption, CO_2 emissions and overall energy consumption.

In specific figures, this means that, to cover the same distance, a car running on electricity requires only about one quarter of the energy of a combustion engine.

So far, so visionary. The electric motor – we call it an e-drive – is already making full use of this potential: with immediately available torque for spontaneous response and high performance with the utmost level of efficiency. Now we have to focus on the strength of the battery, because cars that run purely on batteries are still far from achieving the range needed for longer distances.

Only the combination of combustion engine and e-drive with external charging can ensure suitability for everyday use. With plug-in hybrid technology we are already enjoying the advantages of e-mobility today. With the performance that you rightly expect of a Porsche.

A short interim assessment shows that, with our E-Hybrid cars, we are currently at the very edge of what is technically feasible. But we are not resting on our laurels. We are continuing to work on the future of mobility and on the future of the sports car. Because we firmly believe that common sense can be fun and can also make sense. Especially in a Porsche.

Environment versus performance. Both win.

The concept.

Porsche e-mobility is providing the answers. Not some time in the future, but right now. Because global fuel consumption and CO_2 emissions must be reduced. We believe that, as a sports car manufacturer, we should start where we can actually change something: in the garage, in the everyday life of our drivers – with an intelligent concept.

Let's take an example: e-mobility increasingly replaces filling up at the petrol station with charging with electricity. Not just anywhere, but especially at home. This requires a reliable charging infrastructure where you can conveniently fill up with electricity. For us, it goes without saying that we should provide you with the charging equipment at the same time. With Porsche Design of course.

Another example: not all electricity is the same. It has the greatest environmental benefits when it is generated from renewable sources. So, in a few countries, we have negotiated special tariffs for you to use renewable power. More proof of this is that, according to our definition, e-mobility does not end at the vehicle charge port on your Porsche.

In our opinion, possibly the most important factor on the subject of e-mobility is the driver. This is why connectivity plays a crucial role. With our 'e-mobility services' as part of Porsche Car Connect you can control specific functions via your smartphone, such as displaying the current state of charge or, as an option, the current temperature inside the car.

The components.

The icons opposite symbolise the component parts of Porsche e-mobility. On the following pages of this brochure we explain in more detail what they stand for and what possibilities Porsche e-mobility can offer you. Together they embody a concept that will point to new directions in everyday driving and in sports car philosophy.

Porsche e-mobility

Car | Charging infrastructure | Electricity | Connectivity

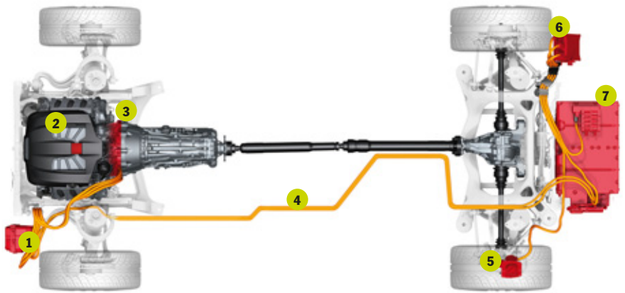
Car.

The heart of Porsche e-mobility is the car, or rather: the E-Hybrid. The foundation for this was laid by hybrid technology with two types of intelligent drive. Because a drive concept that combines high performance with utmost efficiency could only be achieved by the seamless interaction of the combustion engine and the electric motor.

A single letter – the E – is now having a great effect: it combines a future-oriented drive with the comprehensive concept of e-mobility. The new lithium-ion battery can be charged on an external mains through the vehicle charge port.

Thanks to its considerably greater energy content, the electric range is significantly longer. The powerful, high-torque electric drive ensures adequate electric performance. A new type of purely electric driving experience is possible, especially city driving, without any fuel consumption or local emissions.

The electric motor and combustion engine are still mechanically connected directly to the axles, so that the typical Porsche power can be called upon at any time: via the combustion engine or, for especially sporty driving, both drives together – the so-called boost.



1. Power electronics
2. Combustion engine
3. Electric motor
4. High-voltage cable
5. Vehicle charge port
6. On-board charger
7. High-voltage battery

Types of driving.

A Porsche E-Hybrid has five main types of driving. They are controlled automatically and according to requirements. The future-oriented drive concept can then make full use of the potential – and you can concentrate on what's important: enjoying the drive.

Electric
- The car is driven by the electric motor only
- **For emission-free driving without consuming any fuel**

Combustion engine driving
- The car is driven by the combustion engine
- Depending on its state of charge and load requirements, the battery can also be charged
- **For long journeys and high speeds**

Boost
- The car is driven by the electric motor and the combustion engine
- 'Kicking down' on the accelerator pedal calls up the car's maximum power (boost)
- **For greater performance, e.g. for overtaking manoeuvres and dynamic response**

Coasting
- The combustion engine is automatically switched off and disengaged when you take your foot off the accelerator pedal while driving
- Some energy is recovered to support the car's electrical system
- **For emission-free cruising and without consuming any fuel**

Recovery (of braking energy)
- When you brake, the electric motor works like a generator to produce electricity
- The combustion engine remains switched off
- **Recovering braking energy that would otherwise be lost – it can be used again later for electric driving**

Every relationship thrives on its tension.

The Panamera S E-Hybrid.

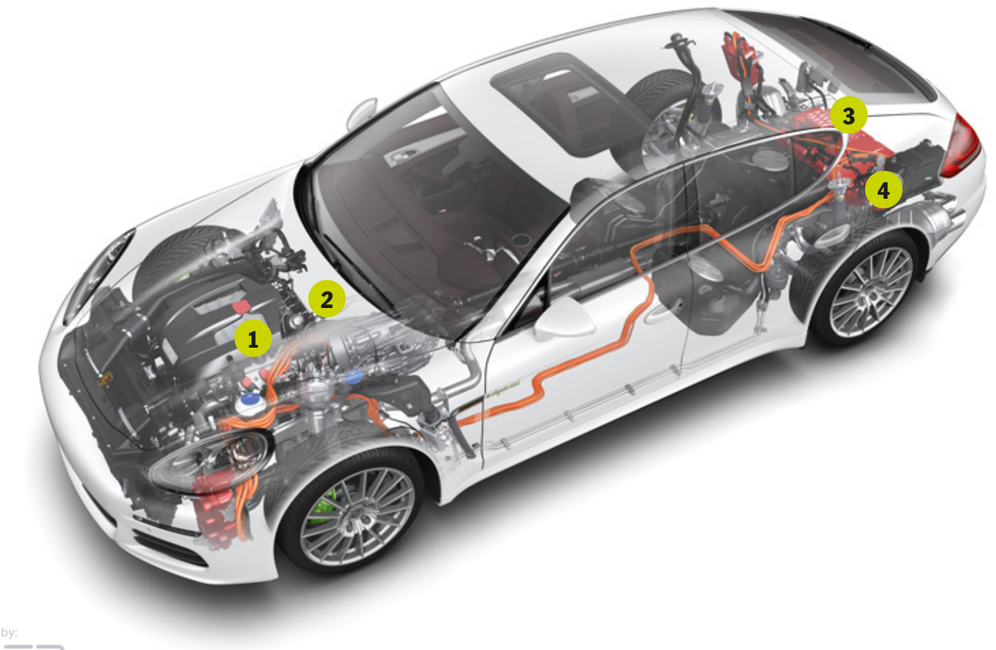
As a plug-in hybrid, the Panamera S E-Hybrid has reached the next level of technological development: at 36 km (measured in the NEDC), the range on electricity alone is much better than with a conventional hybrid vehicle, as is the top speed it can reach on electricity – up to 135 km/h.

The main thing that makes this possible is the latest lithium-ion-based battery technology, including 9.4 kWh of energy, and a vehicle charge port for external charging. The second requirement is that the components of the hybrid system must fit together perfectly and ensure optimum interaction. In the new Panamera S E-Hybrid, they are synchronized by the electronic engine management system. Both drives are connected directly to the axles. So, between 1,250 and 4,000 rpm, a total of 306 kW (416 hp) and a torque of 590 Nm are delivered fully and effectively to the tarmac. The super-charged 3.0-litre V6 engine generates 245 kW (333 hp) at 5,500 rpm and at this speed the electric drive adds 61 kW (83 hp) to the overall system performance – creating a total of 306 kW (416 hp). At lower speeds, the electric motor can develop up to 70 kW (95 hp). It is powered by the lithium-ion battery, which is housed beneath the luggage compartment floor in order to save space. In total, this provides a top speed of 270 km/h and an acceleration from 0 to 100 km/h in just 5.5 seconds. With an average of 3.1 l/100 km, consumption is extraordinarily low and is setting new standards at Porsche – as are the CO_2 emissions of 71 g/km.

New standards are also being set by the convenient charging equipment. For use on the road and at home: the Porsche Universal Charger (AC) can be taken in the car or placed in the practical Porsche Design Charging Dock (see page 21).

And with e-mobility services you also have remote control of your Panamera S E-Hybrid. For example, you can control the charging process conveniently via smartphone or activate the car's optional parking pre-climatisation.

A visible identification feature of the innovative drive is the use of Acid Green. At Porsche, this colour is showing the way into a new technological era. So, on the Panamera S E-Hybrid, the model logo on the rear and the 'e-hybrid' logos on the front doors are outlined in Acid Green. The brake calipers are also finished in Acid Green.



1. 3.0-litre V6 engine
2. Hybrid module with electric motor
3. Lithium-ion battery
4. Vehicle charge port
5. Charging Dock with Porsche Universal Charger (AC), mounted

Fuel consumption (in l/100 km) combined 3.1; CO_2 emissions 71 g/km; electricity consumption 16.2 kWh/km; efficiency class DE/CH A+/A

1. E-Power button
2. E-Charge button
3. Sport button

Driving modes.

With the Panamera S E-Hybrid you can remain in control – the three different driving modes allow you to control certain hybrid-specific types of driving (see page 11). You can then deliberately play out their corresponding strengths allowing you to experience their individual benefits. Although, ultimately, you are still always driving a Porsche.

1. E-Power

- E-Power mode (electric driving) is activated as standard. Every journey starts with electricity alone
- Fully electric drive with high torque electric motor for an intensive driving experience without using any fuel, e.g. for driving through town or on the way to work
- With kick-down, the power available from the whole system can be called upon at any time

2. E-Charge

- E-Charge mode can be activated by pressing a button
- The high-voltage battery is charged while driving by the combustion engine which generates more power (principle of changing load point)
- Useful for charging while driving, e.g. on motorways, for instance when there is a city route coming up where you will want to drive on electricity

3. Sport

- In Sport mode, the boost is activated when the gas pedal position reaches 80% – combustion engine and electric motor develop the full performance potential together
- For dynamic driving with a suitable gas pedal characteristic, maximum power and maximum torque

Displays.

The main information on your Panamera S E-Hybrid is always in view – clearly and compactly. This is ensured by the intelligent linking of different information systems: in the instrument cluster, on the screen of the Porsche Communication Management (PCM), which is available as an option, on the vehicle charge port or on your smartphone.

1

1. Power meter in the instrument cluster

- The ready display provides information on the operating condition
- Displays the current system power
- Boost and recovery range can be seen

2. Colour display in the instrument cluster

- Represents the energy flow
- Can be used to program three charge timers
- Displays useful information, such as the electric range

3. Porsche Communication Management (PCM)

- Shows a detailed graphic of the car, indicating energy flows
- Shows detailed static values such as the proportion of driving without the combustion engine (zero emissions) and average consumption

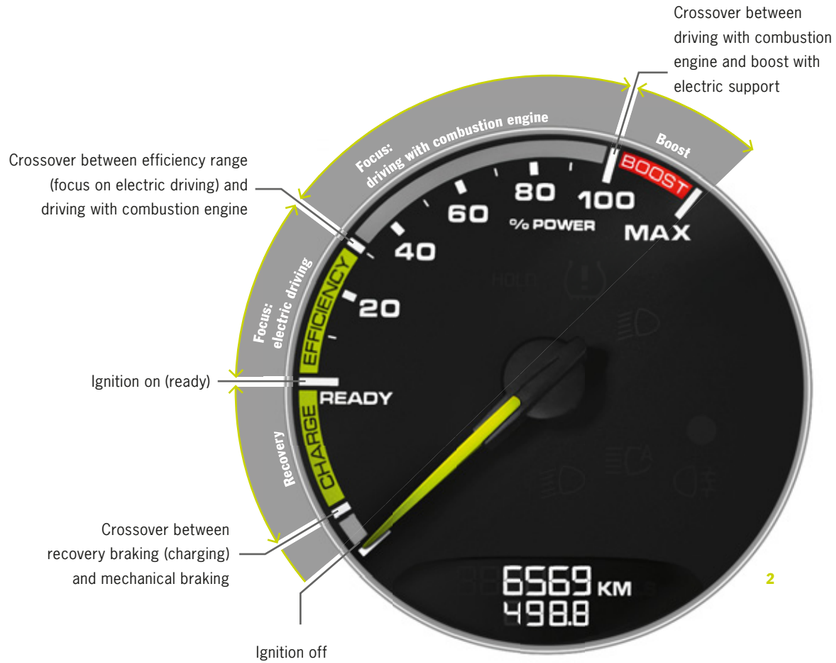
4. State of charge display on the charging socket

- Provides information on the car's state of charge and shows whether it is connected to the mains
- The state of charge LED pulses when charging – the slower the pulsing, the fuller the battery
- The charge timer button indicates whether time-controlled charging is activated

5. E-mobility services (smartphone app)

- Provides information on the current status of the car
- Can be used to check the charging processes and optional pre-climatisation (heating and cooling) inside the car
- More on e-mobility services on page 28

1. Instrument cluster
2. Power meter in the instrument cluster



2

Time machine.
Direction: Future.

The 918 Spyder concept car.

You know to expect something special when Porsche conducts a concept study. However, many would not have expected three engines and plug-in hybrid technology in a super sports car. And for it to bear a name that combines the past with the future: the 918 Spyder.

This concept car demonstrates the future of e-mobility. Here too ‘hybrid’ is not always the same thing. First the arrangement and operation of the motors make the 918 Spyder a high-performance E-Hybrid. And the driver is also an integral part of the vehicle architecture. With an interior designed for the next generation of drivers.

A high-performance, trend-setting control concept. The 918 Spyder is set to change the very essence of driving a sports car. And quite soon in fact – the 918 Spyder will go into series production in 2013. A first prototype drove the Nordschleife in just 7.14 minutes – and has therefore already overtaken the future. To us, the E-Hybrid isn’t just lip service, it is a clear statement – for sports cars.

Charging infrastructure.

In our opinion, an innovative car concept is of no value if it ends with the car. E-mobility therefore includes the infrastructure: an optimally integrated vehicle charge port, practical charging equipment and intelligent charging options, to use at home and on the road.

Vehicle charge port.

The vehicle charge port connects the car to the electricity infrastructure.

Once plugged in, the vehicle plug is automatically identified by the car and locked. The car is now secured, even against being driven off. The charging process starts immediately. If you use the charge timer to enter a time by when the battery should be charged, the charging process will start later. So that you can take advantage of cheaper night-time tariffs, for example.

Two LEDs show the mains connection status and the battery's state of charge. When you open the car with the key, the charging process is stopped and the vehicle plug is released.

1

2

Charging equipment.

When you buy an E-Hybrid you automatically receive the charging equipment that has been developed by Porsche itself. You can then charge your car at home and on the road quite safely, quickly and conveniently.

The Porsche Universal Charger (AC) establishes a safe connection between different electrical sockets and your car. Charging normally starts automatically when it is plugged in. However, if there is a problem – due to a defective electrical socket for example – clear instructions will appear on the display.

1. Vehicle charge port
2. Charging Dock with Porsche Universal Charger (AC), mounted
3. Porsche Universal Charger (AC) with vehicle plug and industrial plug

The Charging Dock has been specially created by Porsche Design. The practical Wall Mount for the Porsche Universal Charger (AC) is like a private filling station – for your Porsche. The Porsche Universal Charger (AC) can be easily stowed in the transport case for use on the road. If you want to charge your car abroad, you can opt for an appropriate adapter cable – for all common electrical sockets throughout the world.

3

Charging at home.

- To charge your car quickly and conveniently at home we recommend you install an industrial electrical outlet and the Charging Dock. You can connect the Porsche Universal Charger (AC) to the heavy current socket and place it in the Charging Dock
- Contact your Porsche Centre regarding installation
- If required they will arrange a suitable time for a qualified electrician to visit you. Of course, the installation can also be performed by any proficient electrician that you trust
- The electrician commissioned comes to you and checks where the Charging Dock can be installed, e.g. on a wall close to where the vehicle is parked
- The Charging Dock is installed – you can now fill up with electricity even more conveniently and quickly at home. Your car will be fully charged in approximately 2.3 hours

Charging on the road.

- Close to shopping centres, in car parks or at the roadside: a lot of cities now already have public charging stations that you can use
- With the increasing number of plug-in hybrid and electric vehicles, the number of charging stations is also continuing to increase
- Alternatively, you can fill up with electricity using the Porsche Universal Charger (AC) at any normal electrical socket, e.g. while at work or visiting friends. There are special, easy-to-change plug adapters for this
- The charging equipment can be stowed in the transport case in the luggage compartment to save space

Electricity.

Electricity is the energy of the mobile future. It can be generated very efficiently, and without producing any CO_2 from renewable sources such as water, wind and sun. Thanks to efficient networks, electricity can also be transported over long distances with little loss and is available today even in the world's less developed areas. In other words: if you want to drive and be CO_2 neutral, you must use renewable electricity.

Lithium-ion batteries can store increasing amounts of electricity in the car. High-performance electric motors convert it into driving torque – approximately four times more efficiently than a combustion engine. So electricity means more sustainable driving enjoyment.

Connectivity.

We have put together the package of e-mobility services especially for our E-Hybrid cars under the term ‘Porsche Car Connect’. They include many options for controlling your Porsche, not just via the steering wheel, but also via smartphone. You can call up a variety of information and control individual functions.

This service is included for five years when you purchase a Porsche E-Hybrid and can then be extended at a charge.

1. **State of charge**
   Monitor the state of charge of your E-Hybrid.

2. **Electric range management**
   Call up information on remaining electric range and total range.

3. **Charge timer with user-defined charging times**
   Control the charging process remotely with your smartphone.

4. **Parking pre-climatisation remote control**
   This function is available as an option. You can use it to activate pre-climatisation inside your car from the outside – straight away or time-controlled. Whether it’s hot or cold outside, bring the temperature inside the car to within a range that feels comfortable.

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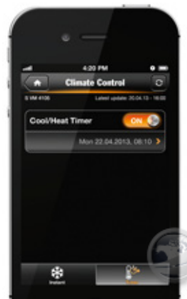

FAQ.

Questions about the car.

1. **What does ‘E-Hybrid’ stand for?**
   ‘E-Hybrid’ stands for the innovative plug-in hybrid drive from Porsche. A drive that combines combustion engine and electric motor, supported by a lithium-ion battery, which stores more energy and can be charged externally from the mains. This enables a relatively high proportion of electric driving with low emissions, yet the high performance that is typical of Porsche.

2. **Can I drive a car with plug-in hybrid drive like a conventional car?**
   Yes, the car's internal management system controls the interaction between the two drives almost automatically. To get the maximum benefit from electric driving (lower consumption and lower CO_2 emissions and more electric performance), the high-voltage battery should be charged externally from the mains.

3. **Who will find a plug-in hybrid drive useful?**
   Customers who do a high proportion of city driving will particularly benefit from low consumption and low CO_2 emissions because a lot of urban routes can be driven on electricity only. But the benefits of the hybrid drive, such as coasting and recovery (of brake energy), can be enjoyed on cross-country journeys as well. Powerful acceleration, on the motorway for example, is possible with a combination of both drives (boost).

4. **What is the car’s fuel consumption in everyday driving?**
   Fuel consumption varies according to the style of driving and type of road. The higher the proportion of purely electric driving, the lower the fuel consumption and therefore CO_2 emissions.

5. **What is the guarantee on the high-voltage battery and does it require maintenance?**
   Porsche provides a six-year guarantee on the high-voltage battery or observes the legal requirements. It is a fixed part of the car and is maintenance-free.

6. **How safe is the car in an accident?**
   Essentially the same high Porsche safety standards have been used as in models with conventional drive. There is a special crash housing to protect the high-voltage battery and, depending on the seriousness of the accident, the high-voltage system is disconnected in a fraction of a second.

Questions about charging.

1. **How do I charge my car at home?**
   The quickest and most convenient way to charge your car at home is with the Porsche Universal Charger (AC), which is provided as standard, and its practical Charging Dock. Your Porsche dealer will recommend a qualified electrician, if required, to install the necessary industrial electrical outlet.

2. **How do I charge my car when on the road?**
   The quickest way of charging the car is at the public charging stations offered by various providers. A Charging Cable, which is available as an option, is required at some charging stations. With slower charging speeds, it is also possible to charge the car from a normal domestic electrical socket. Porsche recommend that you use the Porsche Universal Charger (AC), that is provided as standard, for this purpose.

3. **How long will my car take to charge?**
   The charging time depends on the size of the battery, the starting state of charge and the efficiency of the infrastructure. A Panamera S E-Hybrid can be fully charged at home typically in about 2.3 hours.

4. **How often do I have to charge?**
   To be able to enjoy the full benefits of the car, it is recommended that the car is charged, if possible, after every long journey – for example overnight. If there is no opportunity to charge the car, you can still remain fully mobile thanks to the combustion engine.

5. **How safe is charging?**
   Cars and charging equipment have been fitted with a lot of additional safety functions to make charging even safer than, for example, using electric domestic devices. Special attention has been paid to ensuring that cars can also be charged safely in wet weather. Nevertheless you should exercise the same caution when charging as you normally would when using electrical equipment.

6. **Can I also charge Porsche cars with charging equipment from other manufacturers?**
   Porsche follows the relevant country-specific charging standards for cars and charging equipment. Our products are essentially compatible with those of other manufacturers, provided they are based on the same standards. For optimum safety and comfort, however, we recommend using the charging equipment that has been optimised by Porsche for your car.

Questions about electricity.

1. **Does the extra electricity required for electromobility cause bottlenecks in the electricity supply?**
   No, even with an increasing number of chargeable cars, the electricity demand for electromobility compared to the electricity demand from industry and domestic purposes is still relatively low. Specifically charging when there is a low demand from other users (e. g. at night), makes better use of existing electricity generating plants.

2. **How environmentally friendly is driving with electricity?**
   To make full use of the environmental benefits of e-mobility, cars should preferably be charged with renewable electricity. The CO_2 emissions can then be reduced to almost zero in electric operation. At the same time energy consumption drops by more than half compared with that of a combustion engine.

3. **How can I specifically use renewable electricity?**
   In a lot of countries you can select a tariff for renewable electricity. This usually requires changing electricity provider. A good provider of renewable electricity can be identified by the fact that it promotes the installation of new renewable electricity generating plants.

4. **Does Porsche offer renewable electricity itself?**
   In some selected countries, Porsche is already negotiating with providers of renewable electricity and routinely checks the spread to other countries. More detailed information is available from your Porsche Centre.

5. **How can I specifically use cheaper night-time electricity with my car?**
   The car gives you the option of setting the charging time yourself with a timer and therefore charging specifically when electricity is cheaper.

6. **Is it cheaper to drive with electricity than with fuel?**
   In most countries it is cheaper to drive with electricity than it is with fuel. However, the amount of the saving varies due to the rates of taxation on electricity and fuel that differ considerably from region to region.

Questions on connectivity.

1. **What is Porsche Car Connect?**
   Porsche Car Connect includes services that connect the car with the customer via a smartphone. The product includes Remote Services, Porsche Vehicle Tracking Services and special e-mobility services.

2. **Which e-mobility services are included in Porsche Car Connect?**
   The service includes functions for checking the state of charge, range management, and pre-climatisation remote control.

3. **How does Porsche Car Connect work?**
   Via a SIM card installed in the car, a secure data connection is established with a server which enables data to be exchanged with the smartphone.

4. **Which smartphone operating systems are supported?**
   Smartphones based on the Android and iOS operating systems are supported.

5. **How much does it cost?**
   The services can be used free of charge for five years. No further fees apply in respect of the car even when roaming. The services can be extended after that time. For further information on costs involved, please contact your Porsche Centre.

6. **On which markets is Porsche Car Connect available?**
   Porsche Car Connect is available in Europe, USA, South Africa and Russia. The product is constantly being extended. Detailed information on availability in your country can be obtained from your Porsche Centre.

Electric motor or combustion engine.
Coasting or dynamic driving.
Heart or mind.

The answer is still Porsche.

When we build a hybrid we build it in the Porsche way. Because it's not just about horsepower or revs per minute. It is about using existing resources as efficiently as possible. For the overtaking lane – and for city traffic. We are constantly encountering contradictions. In truth: we look for them. In order to combine them. That is how we find new – and sometimes surprising – solutions for the future and for the driver. With e-mobility they have been given a name. A tangible concept that you can take onto the road yourself – and drive forward every day. Direction: Future. As the E-Hybrid.

The vehicle models shown represent the equipment for the Federal Republic of Germany. They might include individual pieces of equipment that are not included as standard and are only available for an extra cost. In different countries, not all models and equipment will be available because of country-specific conditions and requirements. Please find out about the exact range of equipment from your Porsche Centre. Details on design, the equipment included, appearance, performance, dimensions, weight, fuel consumption and operating costs represent current knowledge at the time of going to print (04/13). Changes to design, equipment and what is included, and differences in shade and errors excepted.

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