



BMW Group Innovation Days 2016.

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Further information on official fuel consumption figures, specific CO₂ emission values and the electric power consumption of new passenger cars is included in the following guideline: "Leitfaden über Kraftstoffverbrauch, die CO₂-Emissionen und den Stromverbrauch neuer Personenkraftwagen" (Guideline for fuel consumption, CO₂ emissions and electric power consumption of new passenger cars), which can be obtained from all dealerships, from the Deutsche Automobil Treuhand GmbH (DAT), Hellmuth-Hirth-Str. 1, 73760 Ostfildern-Scharnhausen and at http://www.dat.de/en/offers/publications/guideline-for-fuel-consumption.html. LeitfadenCO₂ (GuidelineCO₂) (PDF – 2.9 MB)





1. BMW Connected – the personalised digital mobility companion from BMW – celebrates its premiere. European launch in August 2016.

BMW has been connecting driver and vehicle for years now with ConnectedDrive. With the launch of BMW Connected in August in selected European markets, BMW is bringing out an all-encompassing digital concept that provides a seamless services experience covering all aspects of personal mobility. Using a flexible platform called the Open Mobility Cloud as a basis, BMW Connected seamlessly integrates the vehicle into the user's digital life via multiple touchpoints, such as an iPhone or Apple Watch. The first version of BMW Connected focuses first and foremost on journey management for the vehicle, featuring digital products and services designed to simplify the day-to-day planning of driving routes and appointments: BMW Connected gets the user to their destination on time and stress-free.

"Over the coming years, digitalisation is set to have a substantial impact on how we use our cars: digital services will emerge that connect us fully with our personal world, no matter whether we're out on the road or at home. The car will be transformed into a smart device – intelligently connected, seamlessly integrated and perfectly tuned to the individual needs of each and every user. This is precisely what the first version of BMW Connected aspires to achieve," explains Dieter May, Senior Vice President Digital Services and Business Models at the BMW Group.

The functions of BMW Connected.

With BMW Connected, mobility extends beyond the vehicle. BMW Connected is a digital companion offered in the form of an app and combines the various functions that assist with everyday mobility requirements. Once the user has set up a ConnectedDrive account and completed a short online registration process, they can create their BMW Connected customer profile quickly and easily. From this moment, BMW Connected – which is initially being made available for Apple iPhone users – scans for any mobility-related information, such as the addresses and arrival times contained in calendar entries, and notifies the driver of the ideal departure time for arriving at their destination punctually on the basis of real-time traffic information. BMW Connected is also handy for transferring places and points of interest from other apps, storing them as a destination together with the desired arrival time, and then effortlessly importing them to BMW in-car navigation systems with just a few clicks. In the case of hybrid and BMW i models, relevant data such as the remaining range or battery charge can be retrieved remotely and factored into journey planning.

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Putting an end to arriving late.

To ensure punctual arrival, the BMW Connected functions include "time to leave" notifications, which are sent to the user's smartphone or Apple Watch to let them know when they have to set off in order to arrive on time. To do this, the expected driving time is regularly compared with the prevailing traffic situation. Any significant changes in the situation are highlighted in colour in the app to make sure the driver still arrives at their destination on schedule.

The "Personal Learned Destinations" function recognises places the user drives to regularly and automatically stores them as favourite destinations, which can be accessed with a single click whenever required. This is supplemented by BMW Connected's ability to also recognise personal mobility patterns, such as the daily drive home from work. If abnormal traffic conditions would cause the user to arrive home late, for instance, BMW Connected takes action by alerting the user and suggesting the earlier departure time it has calculated for arriving home at the usual time. These functions together provide an easy and convenient way of planning the schedule for the day.

Destination entry in the navigation system with just one click.

The time-consuming manual input of destination addresses in the navigation system is set to become a thing of the past. Assuming that the destination address and desired arrival time have been set outside the vehicle using BMW Connected, the link between iPhone and car means this data is imported when the user climbs aboard. It is then promptly transferred to the BMW navigation system, allowing route guidance to be started directly. Once the journey has begun, a pre-worded SMS message containing the current arrival time can be sent straight from the vehicle to selected contacts, such as the people attending a meeting. A few clicks on the iDrive Controller is all it takes.

However, where users park their car is often not the journey's end point. Cue "Last Mile Navigation", which shows them the best way to get to their final destination on their mobile device. Besides all this, the familiar BMW Remote Services have likewise been incorporated into BMW Connected, allowing a variety of functions – such as the interior climate control, vehicle locking and unlocking, and operating the horn and headlight flasher – to be controlled remotely from a smartphone. The vehicle's current location completes the information available to the user.

The basis for BMW Connected.

At the root of the BMW Connected concept is a flexible service architecture – the Open Mobility Cloud. This platform builds on Microsoft Azure and processes data and information from all sorts of different sources. With machine learning and data

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analysis capabilities also in its arsenal, it provides the basis for personalisation and context orientation of the BMW Connected services.

What the future holds for BMW Connected.

BMW Connected and the functions it comprises are subject to ongoing development and are constantly being adapted to customer requirements. At the same time, the functions of existing BMW ConnectedDrive apps, such as MyBMW Remote and BMW Connected Classic, are being gradually transitioned to BMW Connected. The customer experience of every aspect of mobility is also being continuously expanded and improved, including smart home monitoring and control and integration into other relevant digital ecosystems. Starting in September, users in the USA will also be able to access BMW Connected via an Alexa skill for Amazon Echo, enabling them to get vehicle status like remaining range and execute remote commands like 'door lock', all through voice interaction. The skill integration into Amazon Echo and Alexa-enabled devices demonstrates BMW's leading role in the area of digitalization. BMW is one of the first automobile companies to release a customer product supporting voice services and access to vehicle information through Alexa.

The flexible architecture of BMW Connected furthermore facilitates the implementation of new functions and services. BMW will present the next update of BMW Connected in the autumn at the world premiere of the next-generation BMW 5 Series.

Launch in selected European markets.

BMW Connected has already been available on the US market since 31 March 2016. In August it will be extended to Germany, Austria, UK, Italy, France, Switzerland, Belgium, Spain, Netherlands, Denmark, Czech Republic, Norway, Poland, Portugal, Sweden, Finland, Republic of Ireland and Luxemburg. Feedback and requests received from American users have already been incorporated into the BMW Connected version for release in Europe. It therefore comes with functions that customers in the USA will also receive as an update. Customers, their experiences and desires are vital elements in adapting BMW Connected to meet people's needs even more effectively.

Once launched, BMW Connected will be available as a free download from the Apple App Store, and can be used in BMW vehicles with the optional extra "ConnectedDrive Services" activated.





2. A commitment to development delivers ongoing reductions in emissions: The new-generation Efficient Dynamics engine family.

The introduction of the latest Efficient Dynamics engine family has seen the BMW Group strike a remarkably impressive balance across all model segments between performance on the one hand and fuel consumption and emissions figures on the other. The BMW Group is now unveiling new versions of the three and fourcylinder petrol and diesel engines, which benefit from rigorous further development and are therefore set to raise the bar all over again.

Like their predecessors, the new power units are based on the modular system that enables the application of consistent design principles, a shared architecture and matching components. The key elements of the standardised concept include the in-line engine's basic design principle, an aluminium crankcase with uniform positioning of the intake and exhaust sides, a cylinder displacement of around 500 cubic centimetres per combustion chamber, as well as the arrangement of timing chains and ancillary units. In addition to this, the full line-up of petrol and diesel engines feature BMW TwinPower Turbo technology. This generates significant synergies in engine development and manufacture that have a positive impact on both environmental and economical sustainability. The high level of commonality within the engine family ensures that every drive unit – regardless of the number of cylinders, output or combustion method – meets the exacting standards set by the BMW Group for engine efficiency, power delivery and refinement.

The evolution of the Efficient Dynamics engine family has centred around further reducing fuel consumption and emissions at the same time as optimising performance characteristics. A raft of individual measures have been implemented to make the drive units even more efficient, and the resulting drop in consumption is evident on both the EU test cycle and in real-world driving. The improvements that have been incorporated to minimise emissions are furthermore designed to lower levels not just of CO_2 emissions but also other exhaust gas components.

The advances made in the new-generation Efficient Dynamics engine family also herald further improvements to the engines' smoothness and acoustic comfort while reducing weight. The new petrol and diesel units are suitable for both longitudinal and transverse installation, meaning that they can be fitted in a wide variety of BMW and MINI models.

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New generation of petrol engines: greater output, torque and efficiency.

For the petrol engines, the BMW TwinPower Turbo technology comprises a turbocharging system, direct petrol injection, variable control of intake valve lift (VALVETRONIC) and continuously variable opening times for the intake and exhaust valves (Double-VANOS). This combination is the ideal set-up for instantaneous power delivery, free-revving performance, efficient fuel metering and clean combustion. These trademark qualities stand out even more clearly in the new generation of engines, thanks to a further cut in fuel consumption and emissions of up to 5 per cent, and an increase in the power units' output and maximum torque of 5 kW/7 hp and 20 Newton metres (15 lb-ft) respectively.

The turbocharging system, consisting of a turbocharger integrated into the exhaust manifold that enables the flow dynamics of the recirculated exhaust gases to be utilised to particularly positive effect, has undergone further development as part of the engine family's overhaul. The exhaust manifold and turbocharger are now housed together in the cylinder head. The turbocharger casing for the threecylinder engines is made from either aluminium or steel depending on the output variant, while the four-cylinder units all feature steel casings.

A reworked version of the direct injection system provides for added efficiency in the new petrol engines. The injectors positioned centrally between the valves are fed from a new fuel pump via a modified system of fuel lines, and will in future operate at an increased maximum pressure of 350 bar. The higher injection pressure enables even more precise metering of the fuel and has the additional effect of helping to improve emissions quality over wide load ranges.

The more advanced cooling system fitted in the new generation of engines likewise serves to optimise the combustion process with the aim of reducing both CO_2 output and other pollutant emissions. The new coolant pump now has separate outlets for the flow of coolant to the cylinder head and engine block, which results in far more effective thermal management.

Balancer shafts ensure both the three and four-cylinder petrol engines display the wonderfully smooth operation for which BMW and MINI power units are renowned. These shafts iron out the vibrations that occur when power is transmitted to the crankshaft. Three-cylinder engines will in future benefit from a new balancer shaft complete with a modified drive mechanism that results in a weight saving, improved excitation and further enhanced acoustic properties.

Other modifications that have a positive impact on engine efficiency include the use of a single-piece timing chain drive, which has the additional effect of optimising

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acoustics. Plus, the revised engines are fitted with a new belt drive that is now the same on all variants. An L-shaped belt arrangement is used for driving the alternator, water pump, torsional vibration damper and air conditioning compressor.

Next-generation diesel engines: fuel consumption and CO_2 emissions lowered by up to 5 per cent.

When it comes to the diesel power units, the BMW Group has again already set the standard for economy, power delivery and refined performance with the current Efficient Dynamics engine family. The BMW TwinPower Turbo technology for diesel engines consists of a turbocharging system with one or more turbochargers and common-rail direct injection. These two key elements have undergone substantial development for the modified engines, while enhancements to the basic engine's construction have also been implemented along with numerous other detail refinements. Again, these serve to both boost engine efficiency and minimise emissions. The newly enhanced versions of the diesel units in the Efficient Dynamics engine family burn up to 5 per cent less fuel on average, which in turn means they also emit up to 5 per cent less CO₂. Internal engine modifications and improved exhaust gas aftertreatment result in a considerable reduction in other emissions too.

To ensure even sharper throttle response while also increasing engine efficiency, all four-cylinder diesel units will in future benefit from the multi-stage turbocharging system that was previously only found on the most powerful four-cylinder engines of this type. This principle involves using two turbochargers of different sizes whose precision interaction is designed to put pulling power on tap early and keep it constant over a broad rev range. The multi-stage turbocharging on the new four-cylinder units features a low-pressure stage with variable inlet geometry and a high-pressure stage. To further enhance responsiveness and acoustics, both turbochargers are equipped with the latest slide bearing technology. The new turbocharging system's high-pressure stage is fully integrated into the exhaust manifold.

The system is controlled by means of the low-pressure stage's electrically adjustable charger vanes as well as the wastegate valve for the high-pressure stage and a compressor bypass, both of which are actuated pneumatically. This allows the supply of compacted air to the combustion chambers to be precisely adjusted at all times to suit the load requirements and the driving situation. In future, switchable cooling for the low-pressure stage housing will further improve the most powerful four-cylinder diesel engine's efficiency.

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> A redesigned system of exhaust gas recirculation (EGR) also helps to both reduce fuel consumption and minimise emissions. A single-stage version of this system is fitted on the new four-cylinder diesel engines and a two-stage version on the threecylinder units, ensuring particularly effective reduction of nitrogen oxide emissions (NO_x). The EGR high-pressure module employed in all next-generation engines diverts the exhaust gases straight out of the manifold via an infinitely adjustable valve before directing them to the intake system, either in a cooled or a non-cooled state, as required. The new three-cylinder diesel units are additionally equipped with a low-pressure EGR module that likewise includes a cooling facility. This captures exhaust gas that has already flowed through the diesel particulate filter (where it is stripped of its soot particles) and reroutes it to the clean air line. The low-pressure exhaust gas recirculation can also be used in engine running conditions where the pressure difference in the turbocharging system is insufficient to activate the high-pressure EGR.

> The common-rail direct injection system for the new three and four-cylinder diesel engines has also undergone further improvement and now operates at a higher pressure and with greater precision. Its revised injectors feature an upgraded system of sensors that enables extremely exact metering of the injected fuel. In multiple injections within a stroke sequence, the intervals between the individual injections can also be shortened as a result. The finer atomisation of the fuel brought about by the further increase in maximum injection pressure leads to exceptionally clean combustion with reduced residue in the exhaust gas. The injection systems on the three-cylinder engines will in future work with up to 2,200 bar of pressure, while the maximum pressure for the four-cylinder diesel units will increase to 2,500 bar or 2,700 bar in the most powerful variant.

Manufacture of both the three and four-cylinder diesel engines will in future rely on a process known as "form honing" for machining the cylinder bores in the aluminium crankcase, with their twin-wire arc-sprayed coating. The standard procedure used to date involves giving the cylinder bores a perfectly cylindrical shape, meaning they have an identical diameter from top to bottom. The influence of thermal and dynamic forces causes expansion in the top section of the cylinder bores, which starts during assembly of the cylinder head but is particularly noticeable during engine operation. Depending on the piston design, this either causes play at the top of the cylinder bores that has a negative effect on the engine acoustics or increased friction low down that is detrimental to efficiency. The new manufacturing technique being used for the first time for production engines makes allowance for these subsequent alterations. In order to compensate for them, the cylinder bores are now flared slightly towards the bottom. The desired geometry is obtained by means of an axial lifting motion with overlapping rotation. When the

> engine is operating, the expansion in the top section therefore creates a largely uniform diameter throughout the cylinder bores, allowing the pistons' friction losses to be reduced without any negative impact on the engine's acoustics.

> A newly improved oil circuit with switchable piston cooling for on-demand operation and a modified belt drive for the ancillary units are two more innovations that help to increase efficiency, while a new tensioning technique for the balancer shafts serves to further enhance the acoustic properties of the four-cylinder diesel engines.

> The internal engine measures will be complemented by a remarkably effective system of exhaust gas aftertreatment in the future three- and four-cylinder diesel units. Besides the close-coupled diesel particulate filter and NO_X trap, all next-generation diesel engines can also be equipped with a Selective Catalytic Reduction (SCR) system. With this form of emission control, a water-based urea solution known as AdBlue is added to the exhaust flow. A water-cooled dispensing module injects precise quantities of the solution, which transforms into ammonia in the exhaust pipe before reacting with the nitrogen oxides inside the SCR catalytic converter to produce nitrogen and water. The effectiveness of this exhaust gas aftertreatment is permanently monitored by another sensor positioned downstream from the SCR unit.

The AdBlue solution – carried in a separate reservoir – is injected into the exhaust pipe in precisely calculated doses without the driver noticing. Together with the optimised combustion process and all the other emission control measures, this ensures that all drive unit variants worldwide from the upcoming generation of the Efficient Dynamics engine family will again comply with both current and future legislation governing emissions reduction.





3. Battery technology – a core capability of the BMW Group.

The future appeal and market popularity of electric vehicles will to a large extent hinge on advances in battery technology. The performance of the high-voltage battery is key to meeting customer criteria such as:

- electric range
- charging time
- power output
- reliability/durability
- safety
- costs.

High-voltage batteries, along with electric motors and intelligent energy management systems, are cornerstones of the BMW eDrive technology for BMW i and BMW iPerformance models. The BMW Group decided at an early stage to take the same approach for its eDrive components as for its internal combustion engines, namely to develop them in-house, in each case tailoring them to the requirements of the specific model. This is the only way to fully exploit the potential of powertrain electrification for across-the-board reductions in fuel consumption and emissions, while at the same time delivering the hallmark BMW driving experience based on sporty and refined performance characteristics.

The high-voltage battery packs built by the BMW Group meet the high standards that a premium-quality vehicle must always conform to. For example their performance remains exceptionally stable on short or longer trips. Even when the remaining range is getting low, driving enjoyment is not affected. Therein lies a key difference between BMW Group batteries and those used in vehicles from other manufacturers. At the same time, these batteries are also much less temperature-sensitive than those of competitor models. Only extremely low outside temperatures are capable of reducing their performance. And even under these circumstances, usable battery power still remains constant over a wide state-of-charge window. The high-voltage batteries used by the BMW Group are also designed for a very long service life. That's why the warranty on BMW electric vehicle batteries is eight years.

To achieve an optimal combination of crash safety, durability (reliability) and performance, a high-quality, robust production process is essential. The Dingolfing plant is the BMW Group's centre of competence for the manufacture of electric drive systems, supplying high-voltage batteries and other chassis and powertrain components for BMW i models and the BMW Group's future plug-in hybrid models.

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> Battery cells used in BMW i cars and the plug-in hybrid versions of core-brand models are always sourced from the leading manufacturer of lithium-ion battery cells. Whenever a new generation of cells comes onto the market, a new procurement round is launched. This ensures that BMW is always able to use the best possible cell technology, on commercially reasonable terms. BMW believes it can only be successful if it has an in-depth understanding of cell chemistry and cell manufacturing, that is to say if its competency standards here are similar to those in the field of internal combustion engines. With its internal battery cell research activities, the BMW Group makes sure that it maintains the necessary in-house evaluation and appraisal capacity at all times.

> The BMW Group's international research network conducts extensive studies in all areas of battery technology across the entire value chain, including materials development. Making advances in battery cell materials is the most effective lever for progress in key customer criteria such as energy density, charge capability, power and costs, while enabling the same high standards of reliability, long service life and safety to be maintained.

This form of research and development cooperation between the BMW Group, materials manufacturers and cell manufacturers allows BMW to adopt a very focused approach to innovation, ensuring that now and in the future, BMW i and BMW i Performance vehicles are always equipped with the best possible battery technology, in line with the premium quality ethos of the BMW Group.





4. Competence centre for eDrive technology: The BMW Group's Dingolfing plant is the main production centre for electric motors and high-voltage batteries.

With its long experience in the field of electric mobility, its ultra-modern production facilities and its specially trained employees, the Dingolfing plant has established itself as the main competence centre for eDrive technology within the global production network of the BMW Group. Ever since the launch of the first BMW i production models, the Dingolfing plant has produced high-voltage batteries and other powertrain and chassis components for these vehicles. Prior to that, the plant already supplied high-voltage batteries for the BMW Active E, BMW 3 Series ActiveHybrid, BMW 5 Series ActiveHybrid and BMW 7 Series ActiveHybrid.

Now, with the market launch of the first plug-in hybrid versions of the BMW corebrand models – for which the plant supplies the rear-mounted electric motors and all high-voltage battery packs – production of BMW eDrive components in Dingolfing is scaling up once again. Over the past years, the BMW Group has invested more than €100 million in electric drive technology in Dingolfing, strengthening the plant's competitiveness and securing jobs. Although the production processes for electric motors and high-voltage batteries are highly automated, the plant is taking on increasing numbers of highly qualified employees. The number of people employed in production of components for plug-in hybrid vehicles will increase from around 100 at the present time to more than 200 in the medium term.

Technology transfer from BMW i also generates innovations in production and equips it for the future.

The transfer of technology and know-how from the development of BMW i models also extends to the production side, as is clear from a glance at the manufacturing capacities for electric drive technology. The experience acquired by BMW i not only flows into improving key features of the BMW eDrive components themselves, it also makes for more flexible and quality-oriented production processes at the Dingolfing plant.

This internal cross-brand knowledge transfer mirrors the BMW Group's allencompassing approach to electric mobility in general. Electric drive components that play a key role in the driving experience are developed in-house. In addition to electric motors and the high-voltage batteries, this also includes the power electronics and the vehicle electrical system – which provide the basis for intelligent energy management. The decision to develop and produce eDrive technology

> within the company means the BMW Group has acquired a level of systems expertise that is unique among its competitors. Extensive know-how about all the individual system components is paired with an in-depth understanding of electric drive technology as an overall system. Innovations and improvements can be quickly and directly incorporated as exclusive USPs into the product substance of eDrive components. All this helps to strengthen the BMW Group in its quest to be the industry leader in the EV segment.

> The BMW Group's decision to develop and produce eDrive technology in-house means that the entire portfolio of drive technology for all electric and plug-in hybrid vehicles always conforms to the high standards of the BMW Group on quality, reliability and safety. At the same time, the performance characteristics of this drive technology can be counted on to provide all the models in which these components are fitted with their signature brand attributes. The in-house principle also makes it possible to develop and improve the products and the production processes in parallel.

Modular design system offers the twin advantages of standardisation and flexibility.

The parallel relationship between the product portfolio and the production process can already be seen in the configuration of the new manufacturing facilities at the BMW Group's plant in Dingolfing. A total area of approximately 6,000 square metres in the new production hall acts as the global production network's main manufacturing site for eDrive components. Approximately 1,500 square metres of space is devoted to the production of electric motors and battery modules, while a 1,000-square-metre area is used for the assembly of the high-voltage batteries. In all these areas, the manufacturing facilities are configured to allow rapid expansion of production capacities, which can even be doubled in size with no negative impact on the efficiency of the production process. Also, a number of existing vacant spaces on the site could potentially be used to extend the overall production capacity for electric drive systems even further.

Similar flexibility can be seen in the eDrive product portfolio itself. The BMW Group has developed a modular design system whereby electric motors and high-voltage batteries of varying size, performance and type can be developed on the basis of shared, standardised design principles and common basic characteristics. With this combination of standardisation and flexibility, the Group is equipped to cover the requirements of all of its current and future all-electric and plug-in hybrid models. What's more, the scalable architecture is also the key to offering these models at attractive prices, comparable with those of conventionally powered vehicles of similar power and performance. The modular strategy also allows eDrive

> components for a wide range of BMW i and BMW iPerformance models to be produced simultaneously on a standardised production line. In this way the BMW Group is able to respond flexibly to changes in market demands, and is able to smoothly integrate the production of new model versions into the existing production process.

Electric motors from Dingolfing: bespoke technology and innovative manufacturing deliver the expected driving experience in electric models as well.

With its strategy of in-house development and production of eDrive technology, the BMW Group aims to ensure that its customers are also offered the driving experience expected of the BMW Group brand in question when driving an electric model. As a result, the Group is able to differentiate itself clearly from competitor brands in the electric market too, through such characteristics as dynamic performance, efficiency and comfort. The electric motors play a key part in this. The motors used in the BMW i and BMW iPerformance models feature a high power-tosize and power-to-weight ratio and offer linear power delivery extending right up into the high rpm range, along with exceptional efficiency. These characteristics are the product of a special design principle, the incorporation of BMW i know-how into a wide range of detailed features, and innovative production processes.

The stator and rotor, both produced at the BMW Group's Dingolfing plant, are then attached to the casing of the motor. The assembly line is highly flexible, and individual employees are trained to be able to perform a range of different operations. The U-shaped arrangement of the workstations ensures that this flexibility is combined with high efficiency. At all stations the components are delivered to the operator in an ergonomic manner. At the same time the work stations are adjustable for height and tilt to suit individual ergonomic needs. Most operations can be performed either from a sitting or a standing position. This special way of working contributes to the high production quality of the eDrive components that leave the Dingolfing plant.

The high specific output and sporty characteristics of eDrive motors are a result of the extensive optimisation of the permanently excited synchronous electric motor technology on which these motors are based. For example the stator consists of up to two kilometres (1 ¹/₄ miles) of copper wiring, which is specially wound for extracompact dimensions. The stator production process comprises the packaging and insulating of the individual sheet metal sections, and drawing in and forming the coils. The sheet metal sections are joined by laser welding. Rotor assembly also follows a special process. After the magnets have been inserted and caulked in the rotor structure, which is made up of numerous sheet metal sections, the cooled

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rotor shaft is shrink-fitted into the heated component. Only then is the rotor magnetised, which considerably simplifies the overall assembly process. During final assembly of the motor, the stator is first of all shrink-fitted into the motor casing, which has previously been induction-heated to a temperature of around 150 degrees Celsius. Then the rotor is inserted. After all other parts have been fitted, and a function test has been carried out, the fully assembled electric motor can be flange-mounted to the transmission.

Customized battery packs: standardised design, individual configuration, maximum efficiency.

Production of the high-voltage battery packs for BMW i and BMW iPerformance models at the Dingolfing plant happens in two stages. The first, highly automated stage involves packaging the externally supplied lithium-ion cells into modules. These modules, each comprising 16 cells, are then mounted, together with the connectors, controllers and cooling systems, in an aluminium housing. The battery packs are in each case configured to meet the requirements of the model in which they are installed, and may comprise either five or six modules. The modular design principle allows high-voltage battery packs with common basic characteristics and quality standards to be custom-configured to the size and geometric requirements of the specific model. Every model can therefore be fitted with a battery that is optimally adapted to the available installation space and the intended positioning of the battery in the vehicle.

The design and manufacture of the high-voltage battery packs provide further examples of knowledge transfer from BMW i. Numerous production techniques that contribute to their high quality and reliability were first used in the production of battery packs for the BMW i3 and BMW i8, since which time they have been continuously refined and improved. Following an initial inspection on arrival at the Dingolfing plant, the externally supplied battery cells, which are built to the BMW Group's precise specifications, are readied for the largely automated module assembly process. Robots then apply a layer of bonding agent, package the cells into groups, pressure-weld the module frame to the grouped cells, fit the thermal interfaces and laser-weld the cell contacts.

The finished modules can then be assembled into a complete battery pack tailored to the requirements of the specific model. The BMW Group's Dingolfing plant currently produces three different types of high-voltage battery pack, using what is known as a cellular manufacturing process. Cellular manufacturing offers exceptionally high levels of flexibility, while also ensuring efficiency and quality. This means that for batteries too, manufacturing capacity can be adjusted at any time to

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meet changing requirements, while new versions can always be easily integrated into the production process.

Depending on the version, the battery pack comprises five or six modules, which are installed in an aluminium casing equipped with pre-installed cooling systems and connectors. The modules are automatically bolted in place and linked up using electrical connectors. This installation technique means that in the event of a fault it is possible to simply swap individual modules rather than having to replace the entire battery. The servicing workload is further reduced by the internal layout of the battery, which allows the insulated modules to be taken out without risk after opening the casing. Last but not least, the swapping of battery modules only requires minimal dismantling of the cooling system.

The coolant circuit of the vehicle's air conditioning system is also used to cool the battery. Its gaseous coolant provides direct cooling of the cells. This approach ensures highly efficient temperature control, since the heat transfer from the evaporation process is direct and therefore much more efficient than if an additional medium were used. This allows a particularly compact cooling system to be used. At the same time, there is no risk of liquid being released in the event of a collision.





5. Paving the way for the mobility of the future: The list of achievements keeps on growing. The BMW i3 (94 Ah).

The BMW Group is shaping the mobility of the future. With a host of innovations, its vehicles, mobility services and production processes are taking the driving enjoyment for which the brand is renowned into the 21st century and making sustainability the defining feature in a new understanding of premium. This integrated approach addresses the global challenges of growing environmental and economic pressures, new political and regulatory requirements and social change. The BMW i brand offers a prime example of development processes and products – whether vehicles or services – which are capable of responding to dwindling resource availability, increasing urbanisation worldwide and growing public awareness of sustainability issues. By combining zero local emissions with a high-end, emotionally appealing driving experience, BMW i points the way to a new era in personal mobility.

The BMW i brand is spearheading this paradigm change within the BMW Group. The BMW i3, which is designed to provide all-electric urban mobility, and the BMW i8 plug-in hybrid sports car set global benchmarks in sustainable, premiumclass driving enjoyment. Both models derive their powerful appeal from progressive styling, advanced powertrain technology, intelligent lightweight engineering, innovative connectivity and resource-efficient materials and production processes. Thanks to its all-encompassing product concept and uncompromising focus on sustainability, the BMW i brand received more awards during its launch phase than any other brand in automotive history.

Sustainable driving pleasure enjoys global market success.

The powerful appeal of sustainable mobility in a premium package is underscored by the market success the BMW i models have already achieved. Since its launch in 2013, the BMW i3 has gone on to become the world's best-selling electric vehicle in the premium compact segment. Just two-and-a-half years after it went on sale, the i3's share of the electric vehicle markets where BMW i is represented has already outstripped the core BMW brand's figure in the conventional vehicle market (all data as per POLK/IHS, 6/2016). BMW i has been particularly successful in countries that are promoting the adoption of electric vehicles with measures such as tax concessions or preferential parking and city centre access. For example, sales of the BMW i3 in Norway for the period from January to May 2016 were around double those for all versions of the BMW 3 Series, traditionally BMW's bestselling model range. In China meanwhile, the BMW i3 is making inroads into a new

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> market with big potential. Here it is the first imported electric vehicle that can be purchased tax-free, and is exempt from the otherwise usual licence plate lottery.

Sales of the BMW i8 since its launch have exceeded the combined sales of all other plug-in hybrid sports cars. And both BMW i models have a high rate of customer acquisition from other brands. Worldwide, around 80 per cent of all BMW i3 buyers are first-time customers of the BMW Group.

Technology transfer to the BMW brand helping to drive progress.

Innovations instigated by BMW i are helping to drive developments in the electric mobility market as a whole. The specially designed vehicle architecture of BMW i models, with a passenger cell made entirely of carbon fibre-reinforced plastic (CFRP) and an aluminium chassis, marks a new dimension in intelligent lightweight design. Use of recycled and natural materials in the vehicles themselves and renewable energy during the production process, 70 per cent lower water consumption and a 50 per cent reduction in energy consumption all highlight the brand's integrated approach to sustainability and contribute to the exceptionally small environmental impact of these vehicles across their entire lifecycle. With BMW ConnectedDrive services tailored specially to electric mobility and advanced mobility services such as ParkNow and ChargeNow, BMW i is demonstrating how intelligent connectivity can pave the way for improving both the comfort and everyday practicality of sustainability-led personal mobility.

The role of BMW i as a pioneer is also reflected in the sharing of knowledge and technology between BMW i and the other BMW Group brands. For example, BMW eDrive technology also offers access to all-electric and therefore zero-localemission driving in the plug-in hybrid BMW iPerformance models, which will be available in four different vehicle segments from summer 2016. In the new BMW 7 Series luxury models, the Carbon Core body structure, along with the optional BMW Laserlight (first introduced in the BMW i8) are further examples of the transfer of ground-breaking expertise from BMW i. With its BMW eDrive technology – which includes electric motors, high-voltage battery packs and intelligent energy management – and its expertise in the use of CFRP, the BMW Group possesses a globally unrivalled level of development and production know-how. This provides the ideal platform for the swift and efficient passing on of innovations from BMW i to other BMW Group models and brands. So although BMW i at present only accounts for just over 1 per cent of the total unit sales of the BMW Group, it is 100 per cent symbolic of the Group's strong future potential.

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Zero-emission driving for longer: the BMW i3 (94 Ah).

The BMW Group's in-house development expertise has also brought further advances in the field of electric mobility to the BMW i model line-up. From summer 2016, a new version of the BMW i3 will be offered with substantially increased battery capacity. Lithium-ion cells with a higher energy density give the high-voltage battery pack of the BMW i3 (94 Ah) a capacity of 33 kilowatt hours. Although the battery's dimensions remain unchanged, the operating range measured under the official NEDC test cycle is up by more than 50 per cent, from 190 kilometres (118 miles) to more than 300 kilometres (186 miles), while real-world driving range is increased to a maximum 200 kilometres (124 miles) on a single battery charge, even in adverse weather conditions with corresponding air conditioning or heating requirements.

The performance of the BMW i3 (94 Ah), with its 125 kW/170 hp hybrid synchronous electric motor, is largely unchanged. The new i3 accelerates from 0 to 100 km/h (62 mph) in 7.3 seconds and is the sportiest electric vehicle in its segment. With electricity consumption of 12.6 kWh/100 km (NEDC), it is also the most efficient. The existing BMW i3 with 60 Ah battery will remain in the line-up. A version with range-extender engine will also be offered for both models (BMW i3 94 Ah/BMW i3 60 Ah: petrol consumption combined: 0.6/0.6 l/100 km [470.8/470.8 mpg imp]; electricity consumption combined: 11.3/13.5 kWh/100 km; CO₂ emissions combined: 12/13 g/km; figures as calculated in the EU test cycle, may vary depending on the tyre format specified). By maintaining the battery charge during a journey, the two-cylinder engine can increase the car's range by 150 kilometres (93 miles).

The best-selling premium electric car in its segment is therefore now available in four different versions. To mark the launch of the BMW i3 (94 Ah), BMW i will also offer additional equipment options and new, more powerful charging stations for home garages. Under a retrofitting program it will also be possible, thanks to the flexible modular design of the high-voltage battery, for drivers of a BMW i3 equipped with the first-generation battery to have this exchanged for the latest battery version.

BMW i is continuing to press ahead with its development work on both intelligent hybrid construction concepts featuring CFRP and the expanded use of renewable and recycled materials in automotive applications. It is also a pioneer in the development of new mobility services in the areas of charging, parking and autonomous driving.







6. The best of two worlds: The BMW iPerformance models. The BMW 740e iPerformance, BMW 740Le iPerformance and BMW 740Le xDrive iPerformance.

New, sustainability-focused priorities have played an unprecedented, defining role in automotive development since the beginning of the 21st century. The BMW Group has been quick to identify the challenges involved and, in 2000, initiated its Efficient Dynamics development strategy centred around the ongoing reduction of vehicle fuel consumption and emissions. Efficient Dynamics has since extended its influence into almost every area of vehicle development at the BMW Group, and the innovations it has spawned are gaining steadily in reach and richness. Combustion engines with enhanced efficiency, BMW eDrive technology for powertrain electrification, BMW EfficientLightweight, optimised aerodynamics and intelligent energy management all help to bring CO₂ emissions down to new levels and raise driving pleasure to previously uncharted heights.

The central tenet of Efficient Dynamics has been expressed most rigorously in the products and services offered by the BMW i brand. A bespoke vehicle architecture, BMW eDrive technology and a new dimension in intelligent lightweight design achieved through the widespread use of CFRP are the fruits of a revolutionary approach embodied by the progressive design of the BMW i3 and BMW i8, the resource-efficient selection of materials and the extensive application of regenerative energy recovery in production processes. As well as ensuring the environmental impact of BMW i cars over their lifecycle is exceptionally small, this all-encompassing strategy also extends well beyond the car itself. Services from BMW ConnectedDrive designed specifically for electric mobility, 360° ELECTRIC products and services enabling convenient charging, and a pioneering range of mobility services allow BMW i to take the lead in sustainable personal transportation.

Transfer of technology from BMW i paves the way for sustainable driving pleasure.

The use in models from other BMW Group brands of technological knowledge and innovations developed by BMW i underlines its trailblazing role. One example is the body structure with Carbon Core presented in the new BMW 7 Series. The BMW Group has built further on its industry-leading expertise in the area of CFRP usage under the BMW i banner and is employing industrially produced CFRP in conjunction with steel and aluminium for the first time in the BMW 7 Series. The

luxury sedan can also be specified as an option with BMW Laserlight, which made its debut in a series-produced car on board the BMW i8.

The transfer of technology from BMW i is highlighted particularly vividly by the introduction of the BMW brand's first plug-in hybrid models. From summer 2016 customers will be able to choose BMW iPerformance models in four segments, with BMW eDrive technology delivering not only significantly improved efficiency but also all-electric, locally emission-free mobility and an intense hybrid driving experience characterised by instantaneous power delivery. The variety of plug-in hybrid cars on offer is unmatched in the premium segment and comprises the BMW X5 xDrive40e iPerformance, BMW 330e iPerformance Sedan, BMW 225xe iPerformance Active Tourer, BMW 740e iPerformance, BMW 740Le iPerformance and BMW 740Le xDrive iPerformance.

The BMW iPerformance models: distinctive characters at the meeting point between BMW and BMW i.

Like BMW M Performance Automobiles, which can credit powertrain and chassis technology developed using the motor racing expertise of BMW M GmbH for their undeniably sporting characteristics, the BMW iPerformance models also form a special category of their own. Positioned where the BMW and BMW i brands meet, they combine the best of both worlds. Their plug-in hybrid drive system consists of combustion engines with BMW TwinPower Turbo technology, an eight-speed Steptronic transmission and the BMW eDrive technology developed at BMW i.

The BMW eDrive technology – in the form of an electric motor, a high-voltage battery and intelligent energy management – is rooted in a modular construction system whose components have been developed and manufactured in-house by the BMW Group. They are individually configured to meet the needs of each specific model, link up with four- and three-cylinder petrol engines and work with classical rear-wheel drive, BMW xDrive and electrified all-wheel-drive. This flexibility enables the line-up of BMW iPerformance models to be expanded quickly into other model ranges.

The progressive character of the BMW iPerformance models is underlined by specific exterior design details. In addition to the "eDrive" badge on the C-pillars, they feature a BMW i logo on the front side panels (left and right), blue wheel hub covers and BMW kidney grille bars in the shade of blue now readily associated with BMW i.

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Intelligent energy management, all-electric driving at the touch of a button.

In all the BMW iPerformance models, intelligent energy management ensures the combustion engine and electric motor work together to the best possible effect. The dynamic stimulus provided by the electric boost function, enhanced efficiency courtesy of the electric assist function and the option of driving through town and cross-country on electric power only create a unique symbiosis of driving pleasure and sustainability.

The driver can use the eDRIVE button to select two other modes as an alternative to the default AUTO eDRIVE setting and, in so doing, adjust how the hybrid function intervenes. Like the BMW i8, the BMW iPerformance models can, at the touch of a button, also drive on electric power alone – in MAX eDRIVE mode – up to a top speed of between 120 and 140 km/h (75 – 87 mph), depending on the model. The combustion engine can be brought into play in MAX eDRIVE mode, but only via kickdown. The all-electric range is up to 48 kilometres (30 miles), depending on the model. In BATTERY CONTROL or SAVE BATTERY mode the charge of the high-voltage battery is kept constant or increased to a level chosen by the driver by means of the electric motor's generator function. For example, electric power can be held back or even increased while on the motorway so the energy can be used subsequently for locally emission-free driving in town.

BMW i services provide a premium-level hybrid driving experience.

BMW ConnectedDrive services aimed at making electric mobility more enjoyable also contribute to the appeal of the BMW iPerformance models. As in the BMW i3 and BMW i8, the navigation system can display public charging stations. Intelligent energy management uses navigation data to calculate a proactive operating strategy which determines the optimum time and sections of the journey for using the electric motor and charging the battery by means of energy recuperation.

Added to which, customers plumping for a BMW iPerformance model will be greeted by an extensive network of mobility services from BMW i. BMW 360° ELECTRIC offers tailor-made solutions enabling safe, straightforward and rapid charging of the high-voltage battery at home. As well as the BMW i Wallbox (available in two variants), an all-encompassing service concept – covering everything from the supply and installation of the charging station to maintenance, advice and other services – is also available. And BMW i also aims to optimise charging options during a journey with the ChargeNow mobility service. ChargeNow is designed to make using the world's largest network of public charging stations pleasingly convenient.

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Luxury, driving pleasure and sustainability at the highest level: the BMW iPerformance variants of the BMW 7 Series.

The BMW brand is displaying its commitment to sustainable mobility by adding an extra splash of allure and exclusivity to the upper reaches of its vehicle line-up in the form of three BMW iPerformance Automobiles for the new BMW 7 Series model range. Both the Carbon Core body structure and BMW eDrive technology of the luxury sedans with plug-in hybrid drive system are rooted in know-how developed at BMW i. The BMW 740e iPerformance (fuel consumption combined: 2.2 - 2.0 |/100 km [128.4 - 141.2 mpg imp]; CO₂ emissions combined: 50 - 45 g/km), BMW 740Le iPerformance (fuel consumption combined: 2.2 - 2.0 |/100 km [128.4 - 141.2 mpg imp]; CO₂ emissions combined: 51 - 45 g/km) and BMW 740Le xDrive iPerformance (fuel consumption combined: 2.5 - 2.1 |/100 km [113 - 134.5 mpg imp]; CO₂ emissions combined: 56 - 49 g/km) allow top-level driving pleasure and long-distance comfort to be experienced in combination with all-electric, locally emission-free mobility as well.

The new BMW 7 Series model range therefore champions the brand's hallmark driving pleasure in a wide variety of ways – embodying everything from the standout sporting character of the BMW M760Li xDrive M Performance Automobile (fuel consumption combined: 12.6 l/100 km [22.42 mpg imp]; CO₂ emissions combined: 294 g/km) with its 448 kW/610 hp 12-cylinder engine to the cutting-edge efficiency of the BMW iPerformance models. Here, a latest-generation four-cylinder petrol engine with BMW TwinPower Turbo technology teams up with an electric motor to generate system output of 240 kW/326 hp and combined maximum torque of 500 Newton metres (369 lb-ft).

Intelligent energy management also optimises the interplay of the combustion engine and electric motor in the plug-in hybrid luxury sedans. The instantaneous responses generated by the electric boost function, the enhanced efficiency courtesy of the electric assist function at higher speeds and the option of driving on electric power alone at up to 140 km/h (87 mph) pave the way for a new form of authoritative driving pleasure. The characteristic power delivery of the hybrid systems enables acceleration of 0 to 100 km/h (62 mph) in 5.4 seconds in the BMW 740e iPerformance and 5.5 seconds in the BMW 740Le iPerformance. The BMW 740Le xDrive iPerformance completes the same sprint in 5.3 seconds. The maximum electric range, as per the EU test cycle for plug-in hybrid vehicles, is 44 - 48 kilometres / 27 - 30 miles for the BMW 740e iPerformance and BMW 740Le iPerformance or 41 - 45 kilometres / 25 - 28 miles for the BMW 740Le xDrive iPerformance (figures may vary depending on the tyre format specified).

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> In the BMW 740e iPerformance and BMW 740Le iPerformance the drive delivered by the hybrid system via the eight-speed Steptronic transmission takes the classical route to the road through the rear wheels. The BMW 740Le xDrive iPerformance, meanwhile, follows in the tyre tracks of the BMW X5 xDrive40e iPerformance Sports Activity Vehicle as the brand's second model to distribute its power permanently to all four wheels (via the xDrive intelligent all-wheel-drive system) in pure-electric mode, when the combustion engine cuts in and when both drive systems are in use at the same time.

> The high-voltage battery was developed specifically for the plug-in hybrid luxury sedans and is accommodated underneath the rear seat bench in a space-saving position that also ensures optimum crash safety. As in its BMW 7 Series siblings, the boot area of the BMW iPerformance variants therefore also benefits from a level surface. It provides 420 litres of space, and extra capacity can be gained by using the storage compartment underneath the load compartment floor, lowering the cover in the rear section of the boot or opening the side storage compartments.

The high level of standard specification for the BMW 740e iPerformance, BMW 740Le iPerformance and BMW 740Le xDrive iPerformance includes LED headlights, the BMW Display Key, the ConnectedDrive navigation package, smartphone integration with an inductive charging facility for the phone battery, and an iDrive operating system expanded to include a touchscreen function for the Control Display and the globally unique BMW gesture control feature. Customers can also look forward to auxiliary heating and air conditioning, which allow them to prepare the car's interior temperature in advance. Another item on the list of standard equipment is the Ambient light function, which includes the Welcome Light Carpet and – in the BMW 740Le iPerformance and BMW 740Le xDrive iPerformance – the Ambient highlight in the rear compartment (the equipment described refers to specification for the German market).

The selection of optional driver assistance systems includes the new-generation BMW Head-Up Display as well as the Parking Assistant, Driving Assistant, Driving Assistant Plus and Surround View systems. The sense of wellbeing can be further heightened by the addition of comfort seats, active seat ventilation, the massage function with Vitality Programme and the Heat Comfort package, while the BMW 740Le iPerformance and BMW 740Le xDrive iPerformance are also available with the Executive Lounge and Sky Lounge Panorama glass roof options. Furthermore, the BMW iPerformance variants of the new BMW 7 Series can also be specified as an option with the M Sport package, Pure Excellence exterior design and interior design packages and BMW Individual Design Composition.





7. The new BMW 3 Series Gran Turismo.

The BMW 3 Series Gran Turismo, which combines the elegance of a coupe with the spaciousness of an executive sedan and load capacity of a station wagon, has developed into a firm fixture of the mid-size class over the last three years. Its biggest sales markets are China, Germany and the USA, and the majority of BMW 3 Series Gran Turismo customers are new to the BMW brand. The new version of the Gran Turismo cuts a visibly sportier figure, and the three petrol and five diesel engines in the range offer noticeably higher output. All the engines are turbocharged and burn up to 14 per cent less fuel. The interior, meanwhile, impresses with its high-quality materials, the new user interface for the Navigation system Professional (taken from BMW's luxury-class cars) and even better smartphone connectivity.

More dynamic looks and an even greater feeling of luxury inside.

At 4,824 millimetres in length, the BMW 3 Series Gran Turismo is around 200 millimetres longer than the other members of the BMW 3 Series family. And that takes it close to luxury-class territory. The design of the new BMW 3 Series Gran Turismo, which has been sculpted to visibly greater dynamic effect at both the front and rear, heightens the impression of class. The new, standard-fitted LED headlights for dipped and high beam and the LED front foglamps lend the BMW 3 Series Gran Turismo a more sporting appearance. The car has a visually broader stance on the road. And the combination of updated LED rear lights and more zestful lines brings extra brawn to the rear styling.

The interior of the BMW 3 Series Gran Turismo has an even more sophisticated feel, thanks to upgraded materials and accents. Extra chrome around the interior controls, and new decorative wood elements, colours and leather trim variants take perceived quality to another new level, while the interior's haptic and ergonomic attributes have also been further enhanced. Sportiness coupled with the elegance of a coupe, the comfort and convenience of four doors, a seating position raised by 59 millimetres with excellent all-round visibility, and a generous feeling of space have always been key reasons to purchase a BMW 3 Series Gran Turismo. The space argument is particularly persuasive in the rear compartment, where three full-size seats and legroom more familiar from a luxury sedan – courtesy of a wheelbase lengthened by 110 millimetres (now 2,920 millimetres) – await. The large tailgate, meanwhile, opens to reveal a boot offering 520 to 1,600 litres of load space and allowing extremely varied use.

The latest version of the BMW Navigation system Professional will now also be offered in the BMW 3 Series Gran Turismo – the first time a mid-size model has been available with the upgraded system. The most important menu items are now

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> displayed in a clear, tile-based style, which makes operating the system even more intuitive. Linking up mobile phones has become more convenient, as smartphones can now also be charged and connected to the car's external aerial wirelessly via an inductive tray.

New engine family: higher outputs, lower fuel consumption.

The new generation of engines available for the BMW 3 Series Gran Turismo offer compelling levels of sports performance, agility and economy. The range consists of three all-new petrol units developing 135 kW/184 hp to 240 kW/326 hp and five diesel variants producing 110 kW/150 hp to 230 kW/313 hp – with classical rearwheel drive or BMW xDrive all-wheel drive, with manual or Steptronic automatic transmission (fuel consumption combined: 7.7–4.3 l/100 km [36.7–65.7 mpg imp]; CO_2 emissions combined: 175–112 g/km)*. All the four- and six-cylinder petrol engines and four-cylinder diesels are taken from the newly developed, modular BMW EfficientDynamics engine family and enjoy the benefits of cutting-edge BMW TwinPower Turbo technology. The arrival of the updated BMW 3 Series Gran Turismo sees the new petrol engines slotting into this model's line-up as well. An all-new addition to the diesel ranks, meanwhile, is the BMW 325d Gran Turismo. The other four-cylinder diesels have been available to customers since the launch of the new engine generation in summer 2015.

Considerable efficiency gains have been made with the new engines, despite their increased output. The reductions in fuel consumption and CO₂ emissions range from 4.5 per cent in the BMW 318d Gran Turismo to 13.8 per cent for the BMW 320d Gran Turismo. And further improved manual and automatic transmissions, the Auto Start Stop function, Brake Energy Regeneration, on-demand operation of ancillary units and the ECO PRO mode also help the new BMW 3 Series Gran Turismo to set the benchmark for fuel economy and emissions.

The BMW 320i Gran Turismo, 318d Gran Turismo and 320d Gran Turismo come as standard with the six-speed manual gearbox, but can also be ordered with the eight-speed Steptronic automatic transmission as an option. All other engine variants feature the automatic as standard. And that means three more variants of the car (the BMW 330i Gran Turismo, BMW 340i Gran Turismo and BMW 325d Gran Turismo) are offered exclusively with the efficient Steptronic unit than was the case with the outgoing model. Improvements in efficiency, an increase in ratio spread and a reduction in converter slip during the gear-change process bring about a three per cent drop in fuel consumption and CO_2 emissions. At the same time, customers can expect both driving comfort and shift comfort to be heading in the opposite direction.

All petrol-engined BMW 3 Series Gran Turismo variants and the diesel-powered BMW 320d Gran Turismo and BMW 330d Gran Turismo can be specified as an option with BMW xDrive. The BMW 335d xDrive Gran Turismo has this all-wheel-drive technology as standard.

A total of 18 engine, transmission and drive configurations are therefore available for the BMW 3 Series Gran Turismo.

Three equipment lines to choose from.

BMW 3 Series Gran Turismo customers can choose between Sport Line, Luxury Line and M Sport variants. The Estoril Blue colour shade is available exclusively for M Sport models. The BMW 3 Series Gran Turismo is fitted with an extensive selection of equipment items as standard, including automatic climate control, keyless engine ignition, Servotronic, six airbags, LED headlights for dipped and high beam, LED front foglamps, a high-resolution colour screen with iDrive Controller, a hands-free facility for phone calls – including a USB port and Bluetooth audio streaming – and a leather multifunction steering wheel. Greater freedom with interior and exterior equipment combinations opens up a wider range of possibilities to customers. Two new metallic paint finishes are available, as are three new wheel rim designs and additional upholstery variants and interior trim strips.