

# The BMW i3. Contents.



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Note: The equipment described refers to specification for the German market.

# 1. The BMW i3. (At a glance)



- Market launch of the BMW i3 heralds the dawn of a new era in electric mobility; the new BMW i brand presents the BMW Group's first volume-produced model driven purely by electric power; visionary design; revolutionary vehicle architecture; familiar BMW driving pleasure; innovative connectivity; future-focused premium character strongly defined by sustainability; product substance unmatched by any rival is rooted in the well-founded research and development work carried out as part of project i and the superior technological expertise of the BMW Group.
- The BMW i3 is an uncompromising and attractive solution to personal mobility requirements of the present and the future in urban areas; first premium car worldwide purpose-designed to run purely on electric power – and therefore emission-free; specially developed LifeDrive architecture, BMW eDrive drive technology, customary BMW rear-wheel drive and revolutionary lightweight design underpin the perfect balance of driving pleasure, range and weight; the BMW i3's carbon footprint is around a third smaller than that of the BMW 118d – the World Green Car of the Year 2008 – or around 50 per cent smaller if the car is running on power generated from renewable sources.
- Passenger cell (Life module) made from carbon-fibre-reinforced plastic (CFRP); drivetrain technology, high-voltage battery, chassis, crash and structural functions integrated into the aluminium Drive module; DIN kerb weight: 1,195 kilograms; low centre of gravity; even weight distribution; spacious interior with four seats; slightly raised seating position; opposing “coach” doors; torsional stiffness of CFRP passenger cell structure allows the omission of B-pillars; centre tunnel has also been omitted, thanks to the positioning of the electric motor directly on the driven rear axle; boot capacity: 260 – 1,100 litres.
- Groundbreaking design based around signature BMW i design language; faithful visualisation of sporting capability and efficiency; distinctive proportions; hallmark BMW i colour scheme, including exterior “black belt”; distinctive side view exuding lightness – with stream flow lines and large window surfaces; short overhangs; enclosed BMW kidney grille; bespoke design for the headlights and rear light clusters with U-shaped LED arrangement; rear lights integrated into the fully glazed tailgate.

- Innovatively designed interior with a clear emphasis on spaciousness, cutting-edge functionality and a future-focused premium character; clear structuring provided by a surface design based on the layering principle; lightweight seats; exceptionally high proportion of naturally treated materials, recycled materials and renewable raw materials; start/stop button and bespoke gear selector lever on the steering column; instrument cluster and Control Display in freestanding monitor form; iDrive operating system and Driving Experience Control switch fitted as standard; four equipment lines available: Atelier, Loft, Lodge and Suite.
- BMW eDrive technology including electric motor and high-performance lithium-ion battery developed and manufactured independently by the BMW Group; hybrid synchronous electric motor developed specifically for the i3, maximum output: 125 kW/170 hp, peak torque: 250 Nm (184 lb-ft); power sent to the rear wheels via an integrated differential gear; lithium-ion high-voltage battery with usable energy capacity of 18.8 kWh; intelligent drivetrain and charge management using power electronics developed by the BMW Group; battery can be recharged from a domestic power socket, BMW i Wallbox or public charging station.
- Sporting driving characteristics and excellent agility; acceleration from 0 to 100 km/h (62 mph) in 7.2 seconds, 0 to 60 km/h (37 mph) in 3.7 seconds and from 80 to 120 km/h (50 to 75 mph) in 4.9 seconds; top speed, electronically limited: 150 km/h (93 mph); turning circle: 9.86 metres.
- Energy consumption: 12.9 kilowatt hours per 100 kilometres (62 miles) in the EU test cycle; more efficient than any competitor, efficiency further optimised through specific BMW EfficientDynamics technology, such as Brake Energy Regeneration, ECO PRO and ECO PRO+ mode including coasting function; range under everyday conditions: 130 – 160 kilometres (approx. 80 – 100 miles) when COMFORT mode is engaged using the Driving Experience Control switch; range can be increased by 20 kilometres (12 miles) when ECO PRO or ECO PRO+ mode are activated; additional option: two-cylinder range extender petrol engine developing 25 kW/34 hp maintains a minimum charge level and boosts range to around 300 kilometres (185 miles).
- Sophisticated chassis technology enables a well-balanced combination of agile handling and impressive ride comfort; MacPherson single-joint spring strut front suspension; five-link rear axle mounted directly to the Drive module; Electric Power Steering; DSC (Dynamic Stability Control) including DTC (Dynamic Traction Control); 19-inch forged light-alloy wheels as standard.

- Intelligent lightweight design, e.g. a CFRP passenger cell, aluminium chassis, instrument panel with magnesium supporting structure and weight optimisation of all components specially developed for the i3; comprehensive safety concept with precisely defined crash zones in the Drive module, extremely torsionally stiff passenger cell and electronically controlled restraint systems.
- Varied range of BMW ConnectedDrive features, including standard BMW i functions; connectivity via a SIM card fitted in the vehicle; BMW TeleServices and Intelligent Emergency Call as standard; optional Driving Assistant Plus with camera-based Cruise Control including Stop & Go function, Traffic Jam Assistant, Speed Limit Info and No Passing Info display, pedestrian recognition and Collision Warning with light city braking function, Proactive Driving Assistant; optional parking assistance package with PDC at the front, rear view camera and fully automatic Parking Assistant; optional Comfort Package with features including a rain sensor, Cruise Control with braking function, automatically dimming rear-view and exterior mirrors; also available are BMW Online Entertainment, Concierge Services, Real Time Traffic Information, use of the flinc car sharing network (only in Germany for the time being) and other mobility services specific to BMW i.
- Services specific to BMW i available as part of 360° ELECTRIC: BMW i Wallbox enabling convenient battery charging at home, ChargeNow card allowing customers to use public charging stations without the need for cash, innovative mobility services, intermodal route guidance via smartphone app, MyCityWay and ParkatmyHouse.
- Extensive standard equipment, including Navigation system Professional with dynamic range display, USB and AUX-in sockets, hands-free facility for telephone, air conditioning, leather steering wheel, LED daytime driving lights, Park Distance Control (PDC) with rear-mounted sensors, charging cable for use with a domestic power socket.
- All-embracing sustainability concept across the entire value chain; carbon fibre production at Moses Lake, USA, and vehicle assembly at BMW Plant Leipzig using 100 per cent renewable energy; BMW i packages for using eco power to charge the high-voltage battery; innovative sales concepts for flexible access to personal mobility.

## 2. A new era in electric mobility: The concept.



BMW i is committed to creating innovative vehicles and mobility services with a premium character that is strongly defined in terms of sustainability. As a world-leading supplier of premium cars, the BMW Group is playing an active and definitive role in shaping the face of personal mobility now and into the future. The BMW Group's commitment to sustainability is an established element of its corporate strategy and one of the fundamental principles enforced throughout the company's value chain – as independent studies have regularly confirmed. Indeed, the BMW Group has been named the “world's most sustainable automobile manufacturer” in the Dow Jones Sustainability Index for eight consecutive years.

The BMW Group's Efficient Dynamics strategy covers on the one hand the ongoing evolution of technology aimed at steadily reducing fuel consumption and emissions, and on the other revolutionary vehicle and drivetrain concepts. The electric motor, power electronics and lithium-ion battery developed by the BMW Group for the BMW i3 are all examples of BMW eDrive technology. The BMW eDrive banner encompasses any BMW concept that delivers pure electric driving and zero local emissions, making it another pillar of Efficient Dynamics.

### **All-encompassing approach: from project i to the BMW i brand.**

The research and development work carried out since 2007 as part of project i has laid the foundations for consistently sustainability-focused vehicle concepts and mobility solutions. Alongside its conceptual and technological development work, the company has also conducted field studies looking at the use of pure-electric vehicles in everyday conditions. More than 1,000 people have taken part in the studies, racking up around 32 million kilometres (20 million miles) at the wheel. The knowledge gained as a result has been channelled into the creation of innovative vehicle concepts and mobility solutions.

The BMW Group is pursuing an integrated approach, as embodied by the new BMW i brand, in its drive to achieve the necessary balance between individual needs and the global mobility requirements of the future. The BMW i3 is the new brand's first model – and, at the same time, the BMW Group's first volume-produced car to run purely on electric power. Its unique product substance is the result of an innovative vehicle concept created for BMW i

and the outstanding development expertise of the world's most successful premium carmaker in the fields of drivetrain technology, lightweight construction, design and intelligent connectivity, as well as the company's track record of opening up totally new vehicle segments. All of which makes the i3 both an original BMW Group product and the figurehead for a new expression of personal mobility.

The design of the BMW i3 showcases both BMW's customary sporting capability and the efficiency of a four-seater with authentic clarity. Its vehicle concept, including a passenger compartment made from carbon-fibre-reinforced plastic (CFRP), combines lightness, stability and safety with impressive spaciousness. Meanwhile, the driver assistance systems and mobility services from BMW ConnectedDrive and the 360° ELECTRIC package of services – all developed specially for BMW i – turn zero-emission urban mobility into a compelling everyday driving experience.

### **The BMW i3 – conceived from day one to run on electric power alone.**

The market launch of the BMW i3 ushers in a new era in electric mobility. It is the world's first premium car conceived from the outset to incorporate an all-electric drive system. This concept gives the i3 numerous advantages over "conversion" vehicles, in which the original combustion engine is later swapped for an electric motor. Firstly, the engineers have free rein in terms of the construction, dimensions and configuration of all the electric drive system's components. The trajectory of the car's development is also dictated by the characteristics designed into the car by the development team and not by the constraints imposed by a pre-existing vehicle design. For example, the space in a conversion vehicle set aside for the fuel tank or exhaust system cannot be put to particularly constructive use. In the BMW i3 there has been no need for this kind of compromise. Instead, the engineers were able to focus entirely on shaping the character of the BMW i3 as a sporty and agile, yet also comfortable premium car for an urban environment.

When it comes to the driving attributes of the i3, the engineers have achieved a perfect balance of vehicle weight, performance and range. This is particularly important since these three factors are so inextricably linked. The operating range of electric vehicles can be extended by increasing battery size, but that adds weight and therefore has a negative impact on performance. Similarly, a more powerful motor requires more energy, which again means heavier batteries or restricted range. A lightweight body, on the other hand, enhances performance and the weight saving can be "invested" in larger batteries which, in turn, boost the car's range.

In its mission to deliver driving pleasure in urban areas, the BMW i3 has come up with the perfect package. With a DIN kerb weight of 1,195 kilograms the car is lighter than most compact vehicles, yet offers significantly more space for up to four occupants. It also has the edge over conventionally powered models of a comparable size and output in the sprints from 0 to 100 km/h / 62 mph, which it completes in 7.2 seconds, and 0 to 60 km/h / 37 mph (3.7 seconds). Furthermore, extensive road tests conducted as part of project i proved that the car's range of 130 to 160 kilometres (approx. 80 – 100 miles) in everyday conditions is adequate to comfortably meet the day-to-day mobility needs of the target customer group.

### **Sustainability throughout the value chain.**

The revolutionary character of the BMW i3 is based on an overall concept which has been designed from the ground up to provide sustainable mobility, and incorporates a large number of technical features geared towards maximum efficiency. The “next premium” approach embodied by BMW i is, however, not just focused on the vehicle itself. When it comes to the choice of materials, production process, supply chain and recycling, the BMW i3 likewise sets unrivalled standards in the automotive industry. The lightweight design strategy specially developed for BMW i models makes extensive use of lightweight, corrosion-proof, crash-resistant and high-tech CFRP. In this field, too, the BMW Group is breaking new ground – both in the use of this innovative material and in its manufacture and processing.

The production of the BMW i3 sets new standards in environmental protection and consumes around 50 per cent less energy and around 70 per cent less water in comparison with the current average figures for production in the BMW Group, which are already extremely efficient. All the electricity used to produce the BMW i models at the Leipzig plant is wind-generated and therefore 100 per cent renewable. This is the first time an automobile manufacturing plant in Germany has installed wind turbines on site to directly power production. Likewise, all of the energy used in carbon fibre production at Moses Lake is entirely derived from renewable, locally generated hydroelectric power and is therefore completely carbon-free. BMW i is thus achieving the goal it envisaged at the outset: compared to the World Green Car of the Year 2008 – the BMW 118d – the BMW i3's carbon footprint is around a third smaller, and if the customer runs the BMW i3 on power generated from renewable sources it is roughly half the size.

### 3. A window into the future: Innovative design and sustainable materials.



The BMW i3 is the first premium-segment model conceived to run purely on electric power. And the car's innovative vehicle concept also shines through in its design. The exterior and interior design of the i3 are heavily influenced by its LifeDrive architecture and pioneering drive system. Indeed, not content with conjuring up an unmistakable feeling of space and extraordinary driving experience, these two elements also have a significant stylistic impact. The origins, identity and individuality of the BMW i3 share equal prominence in its design. The fresh interpretation of established design features offers a nod to the car's BMW family ties. Its standalone design language, which will also mark out future BMW i models, embodies lightness, safety, efficiency and driving pleasure, underlining the particular skill-set of the BMW i3. The appearance of the BMW Group's first all-electric model reflects the extra focus on sustainability within its premium character, the role of the LifeDrive architecture in optimising the car's functionality, and the i3's innovative expression of emission-free driving pleasure in urban areas.

#### **LifeDrive architecture forms the basis for innovative design.**

The structure of the LifeDrive architecture represents the basic construction of the BMW i3. The central element of the Life module is the carbon-fibre-reinforced plastic (CFRP) passenger compartment. A robust plastic outer skin is attached onto this compartment, allowing extensive freedom in design. The Life module is fixed to the aluminium Drive module, which houses all the drive and chassis technology. This distinctive two-way split is reflected in the design of the BMW i3. Indeed, both the exterior and interior make a feature of this structural characteristic through the visible layering and intertwining of different surfaces.

The use of lightweight, yet extremely rigid, CFRP for the passenger compartment allows the car to dispense with B-pillars, making access to the two rows of seats even more comfortable. The carbon frame, part of which is visible when the doors are opened, serves as a connecting element between the exterior and interior. The exposed structure of the two-dimensional carbon matting gives this section of the CFRP construction an extremely functional look.

### **Proportions point to agility and spaciousness.**

A body measuring 3,999 millimetres in length, 1,775 mm in width and 1,578 mm in height gives the BMW i3 distinctive proportions whose dynamic character and compactness emphasise the car's agility in urban use. The extremely short front and rear overhangs of the BMW i3 are also a clear pointer to its nimble driving characteristics. Large glass surfaces imbue the i3 with a compelling lightness and, together with its exposed carbon structures, lend visual expression to the car's low weight. From the side, the flowing silhouette and long wheelbase of the BMW i3 catch the eye – and highlight the unusually generous levels of space on board. The car's functional qualities are also underlined by the opposing “coach” doors, which allow extremely easy access to the airy interior.

### **Black belt and stream flow: two signature BMW i features.**

One of the signature features of BMW i cars is the “black belt” extending from the bonnet over the roof into the rear, where it spreads around the central section of the rear apron, framing the licence plate recess and reflectors. At the front end, the black belt is framed by the body-coloured front apron and side panels. This creates a striking segmentation of the car body, emphasising the lightweight construction of the BMW i3.

Another element of the standalone BMW i design language is the “stream flow” tapering dynamically to the rear of the car. This feature is formed by the convergence between the upward sweep of the shoulderline around the C-pillar and the downward slope in the roofline. The dip in the shoulderline just rearwards of the front doors creates a larger side window surface for the rear compartment, giving passengers a particularly generous feeling of space. Passengers are also immersed more deeply in the driving experience than ever before. The shoulderline and stream flow provide distinctive features to match the Hofmeister kink at the trailing edge of the rear side windows on BMW models, while also setting the tone for the aerodynamically optimised body shape of the BMW i3.

### **Front end: a new interpretation of familiar BMW features.**

A powerfully formed front apron, eye-catching colour combinations and a fresh interpretation of hallmark BMW features are the headline elements of the front end. In the centre stands the distinctively styled BMW kidney grille, which has a blue- or silver-coloured surround (depending on the body colour) and is blanked off, as the electrically powered BMW i3 does not require cooling air to be channelled through its front end. Positioned at the same height are the headlights which extend well into the car's flanks. The headlights display an individual character and are framed by U-shaped LED

light units. A black border connects the lower edge of the apron with the circular foglamps positioned to its outer edges.

### **Glazed tailgate with integrated U-shaped light units.**

The design of the rear section accentuates both the functionality and surefooted roadholding of the BMW i3. The large tailgate opens high and the slim, upright roof pillars make it easier to load items into the boot, whose capacity can be expanded by folding down the rear seat backrests as and when required.

The tailgate takes the form of a homogeneous black glass surface. It forms part of the black belt which continues down to the lower edge of the body at the outer extremities of the rear end. In combination with the side panels, which extend slightly into the rear, it creates an eye-catching colour contrast. This, in turn, underlines the car's planted stance as the "cascading" body gains in width towards the road. The light units appear to be floating in the tailgate's glass. Intricate LED lights provide a striking night design, their U-shape adopting the now characteristic BMW i headlight profile.

Six colour shades designed exclusively for BMW i are available for the paintwork of the side body panels and the front and rear aprons of the BMW i3. The two non-metallic and four metallic colours form a prominent contrast to the black belt. The accent surfaces on the side skirts and the BMW kidney grille surround come in BMW i Blue or Frozen Grey metallic, depending on the variant.

### **Interior: freedom in design creates freedom of movement.**

The LifeDrive architecture, including the CFRP passenger compartment, also opens up new freedoms in the design of the BMW i3 interior. Opposing "coach" doors and the absence of B-pillars pave the way for the unusually generous levels of space and freedom of movement (given the car's exterior dimensions). Thanks to the positioning of the electric motor directly on the driven axle, the central tunnel – normally a feature of conventional vehicles – has also been omitted, allowing for a totally open connection between the footwells on the right- and left-hand side of the car. Again, this contributes to the generous impression of space on board and also has functional benefits – such as when getting in and out of the car in particularly tight city parking spaces. Sliding from the right rear seat to the left is as refreshingly easy as moving over from the front passenger seat to behind the steering wheel. Folding down the rear seat backrests creates a totally level load compartment floor and allows the car's variable load capacity to expand to 1,100 litres.

A slightly raised seating position optimises the view out over city traffic. The BMW i3 is fitted with lightweight seats whose slim backrests also provide additional legroom in the rear. The freestanding steering column has a two-section construction that exudes lightness and elegance, attributes that are underlined by the colour concept. The gear selector and start/stop button share a control element projecting from the steering column. The driver selects gears using a rotary control, which moves forwards or backwards according to the desired direction of travel.

Both the instrument cluster and the 10.2-inch Control Display of the iDrive system in the BMW i3 come in free-standing display form. The positioning of the displays lends further emphasis to the heavily three-dimensional design of the cockpit. In the centre of the cockpit, a flat control surface – tilted slightly towards the driver – for climate control and audio functions forms the lower edge of the instrument panel. The Controller and direct menu control buttons for the iDrive system are arranged between the driver and front passenger at seat surface height.

### **Striking colour contrasts, natural materials.**

The lines and surfaces of the cockpit and door panels reinforce the impression of lightness and modern functionality. Taut lines, powerful contours and small radii are the dominant geometrical forms. The most prominent feature of the instrument panel design is the layering structure employed for the interior as well as the exterior. The layers cover three levels which adopt different colours and materials depending on the equipment variant. A central design element is the curved trim surface which extends from the air vents on the left-hand side of the cockpit, continues behind the steering column and reaches its full height above the glove compartment. This surface can be specified in bright, open-pored eucalyptus wood. The range of other materials available includes naturally treated leather, wood, wool and other renewable raw materials, and ensures that the premium character of the BMW i3 – complemented by the added allure of impressive sustainability – is something you can both see and feel.

The leather used inside the BMW i3 is treated solely with natural substances. For example, with olive tree leaf extract which serves as a tanning agent. Plus, the instrument panel surround and door trim panels use fibres from the kenaf plant which are made into technically high-quality surfaces and whose natural structure has distinctive visual and tactile properties. Added to which, 25 per cent (by weight) of the plastic used in the interior has been replaced with recycled materials or renewable raw materials.

The Loft, Lodge and Suite equipment lines can be specified as alternatives to the standard Atelier trim. The basic variant stands out with colour and material contrasts which underline the contours of the interior design. The Loft equipment line uses a stylish balance of colours to provide a relaxing ambience. The surfaces for the seats and door panels are made using a PUR-Sensatec material and a textile made entirely from recycled raw material. Light colours dominate every area of the interior. The leather steering wheel in a warm Carum Grey tone has an accent strip in BMW i Blue.

The combination of high quality and sustainability associated with a “next premium” character is embodied – in the Lodge equipment line in particular – by the trim strip in eucalyptus wood, a climate-active wool fabric, and leather surfaces with a coarse grain for the seats and armrests, as well as an extremely fine structure for the instrument panel. The light Carum Grey colour shade is complemented by the light brown of the leather surfaces. Dalbergia Brown leather surfaces for the seats, centre console and door armrests lend the Suite equipment line a particularly exclusive appeal. This variant also includes the eucalyptus wood trim strip and an accent ring in Satin Silver for the leather steering wheel.



## 4. Driving pleasure with zero emissions: Drivetrain, chassis and BMW EfficientDynamics.

The familiar sense of driving pleasure embodied by the BMW i3 is the result of a rigorously implemented overall concept, part of which has involved creating the optimum balance of weight, performance and range for urban mobility. The key elements here are the LifeDrive architecture and BMW eDrive technology. The use of lightweight CFRP for the passenger cell cancels out the extra weight contributed by the lithium-ion battery. The low, central position of the battery pack enhances the car's agility by lowering its centre of gravity significantly and creating perfectly balanced 50 : 50 weight distribution. The battery is encased in aluminium sections and is particularly well positioned from a crash safety perspective. The instantaneous power delivery of the electric motor, the stiff chassis set-up and precise steering also help to give the car its manoeuvrability – a direct response to the demands of city driving.

The electric motor and transmission unit are located in direct proximity to the driven rear axle. Underpinning their space-saving integration into the Drive module is a compact and harmonised construction facilitated by the in-house development of the drive components at the BMW Group.

### **Ideal conditions for agility and driving pleasure.**

The car's rear-wheel drive allows the front axle to remain free of torque steer and fulfil its steering function to full effect. As with current models from the BMW and MINI brands, electric power assistance also sends the BMW i3 driver's steering commands to the road with smoothness and precision. Its extraordinarily small turning circle of 9.86 metres and a steering set-up that demands just 2.5 turns from lock to lock enhance the agile handling of the BMW i3. This agility is the defining characteristic of the driving experience, especially in the car's preferred urban habitat. In addition, a long wheelbase (2,570 millimetres), the Drive module's rigid aluminium frame and advanced chassis technology provide the perfect ingredients for a sure-footed and relaxing ride.

The suspension components of the BMW i3 stand out with their minimised weight yet extremely stiff construction. The BMW i3 has MacPherson single-joint front suspension and a five-link rear axle mounted directly to the Drive module. This design assists the functional separation of wheel location and suspension, resulting in sporting driving characteristics defined by impressive

longitudinal and lateral dynamics combined with superior suspension comfort. The rigorous adherence to lightweight design principles yields a reduction in unsprung masses to the benefit of ride comfort at all speeds. The BMW i3's forged aluminium wheels also boast outstanding rigidity and extremely low weight at less than seven kilograms each.

The dimensions of the standard tyres (155 / 70 R19) are specific to the BMW i3. The large and comparatively narrow tyres allow an excellent balance between dynamics and drag, and the aerodynamic properties and rolling resistance of the tyres are designed to provide extremely efficient driving. However, their contact patch barely differs from that of the tyres fitted as standard on conventional cars. Indeed, even when the BMW i3 is driven with sporting intent, longitudinal and lateral dynamic forces are always transferred with great assurance and poise. Interventions by the BMW i3's DSC (Dynamic Stability Control) driving stability system are only required in extreme situations, and body movements are minimal.

The standard DSC system offers all the functions familiar from current BMW models, including the Anti-lock Braking System (ABS), Cornering Brake Control (CBC), Dynamic Brake Control (DBC), Brake Assist, Brake Standby, Start-Off Assistant, Fading Compensation and the Brake Drying function. The DTC (Dynamic Traction Control) mode raises the intervention thresholds of the stability control system and allows a controlled degree of slip through the BMW i3's driven wheels when pulling away on snow or loose sand or in particularly dynamic cornering.

### **BMW eDrive: electric motor sets new standards in power density and efficiency.**

The hybrid synchronous electric motor developed and produced specially by the BMW Group for use in the BMW i3 generates output of 125 kW/170 hp and puts maximum torque of 250 Newton metres (184 lb-ft) on tap from the moment the car pulls away. The BMW i3 dashes from 0 to 100 km/h (62 mph) in 7.2 seconds, having accelerated from rest to 60 km/h (37 mph) in just 3.7 seconds. With a time of 4.9 seconds for the sprint from 80 to 120 km/h (50 – 75 mph), it boasts a level of sporting ability that comparably sized combustion-engined cars would require far higher outputs to achieve.

Beyond the traditional immediacy of response offered by electric motors when pulling away, power development in the BMW i3 also remains unbroken through higher speeds. Power is sent to the rear wheels through a single-speed transmission, allowing the BMW i3 to accelerate with an uninterrupted flow of power up to its top speed, which is limited to 150 km/h (93 mph) in the interests of efficiency.

The output from the electric motor remains constant into high rev ranges, which can be attributed to a special motor design developed exclusively for the BMW i3. BMW eDrive technology has been employed to take the principle of the permanently excited synchronous motor to another new level through detailed optimisations. A specific arrangement and dimensions for the components used to generate drive produces – in addition to the torque developed by the permanent magnets – what is known as reluctance. This is caused by the magnetic asymmetry of the rotor and, in contrast to other types of motor, allows impressive torque to remain available at high revs. The hybrid synchronous motor takes its name from the torque development properties of two different types of machine. The electric motor developed for the BMW i3 revs to a maximum 11,400 rpm.

The innovative design principle behind the electric motor in the BMW i3 helps it to run extremely effectively across a wide load band. The motor's average power consumption of around 0.13 kilowatt hours per kilometre (0.21 kilowatt hours per mile) in the New European Driving Cycle (NEDC) plays a key role in optimising the car's range. This is an extraordinarily low figure, especially considering its maximum output and torque. The BMW i3 is therefore the most economical electrically powered car of its size and output class. The power density of the electric motor, weighing in at no more than around 50 kilograms, sets a new benchmark for electric vehicles. The BMW i3's motor also stands out with its smooth running and low vibrations, while acoustic comfort and vibration damping similarly meet the high standards expected of a premium car.

**Driving pleasure, BMW i-style: instantly responsive, agile and uniquely assured.**

Zero local CO<sub>2</sub> emissions provide the most compelling argument for electric mobility in urban areas. But the appeal of all-electric vehicles is further enhanced by their instantaneous power delivery – which also allows the BMW i3 to deliver rousing acceleration in city traffic – and their quietness, which is a major contributor to the relaxed and comfortable driving experience on board the BMW i3.

Also helping to deliver the BMW i3's engaging driving experience is the single-pedal control feature carefully configured by the BMW Group's drive system development engineers. Recuperation mode is activated the moment the driver takes his foot off the accelerator. The electric motor switches from drive to generator mode, feeding power into the lithium-ion battery. At the same time, it generates a precisely controllable braking effect. This recuperation is speed-sensitive, which means the car "coasts" with maximum efficiency at high speeds and generates a strong braking effect at low speeds.

The ability to accelerate and brake using just one pedal creates an unusually direct interaction between driver and car. Thinking ahead in city traffic can allow the driver to carry out 75 per cent of braking manoeuvres without applying the brake pedal. The brake lights illuminate if the amount of recuperation in progress produces the same braking effect as actually pressing the brake pedal. The conventional braking system only joins the action if the driver summons greater braking power by depressing the brake pedal.

Intensive use of this form of brake energy recuperation through the motor also increases the range of the BMW i3 by as much as 20 per cent compared with conventional recuperation concepts. And the “coasting” facility further enhances the user-friendly nature of single-pedal control. The BMW i3’s accelerator has a distinct “neutral” position; i.e. rather than switching straight to energy recuperation when the driver eases off the accelerator, the electric motor uses zero torque control to decouple from the drivetrain and deploy only the available kinetic energy for propulsion. In this mode, the BMW i3 glides along using virtually no energy at all. This is another example of how an anticipatory driving style can preserve energy and further increase the car’s range on electric power.

### **Optimised performance and range through the in-house development of storage technology and energy management.**

Specially developed lithium-ion storage cells supply the drive system with the energy required. The BMW Group also utilises its technological expertise in the development of numerous battery system components in order to bring about a comprehensive optimisation of the high-voltage battery pack. These include specific components which ensure the interconnection of the cells themselves as well as the connection between the battery system and the vehicle. They also comprise the integrated control unit and the electronic components in the proximity of the cells, including battery management sensors. Apart from procurement of storage cells from a specialist manufacturer, all the development and manufacturing stages are carried out at the BMW Group. The high-voltage battery is produced on a state-of-the-art assembly line at BMW Plant Dingolfing.

The high-voltage battery in the BMW i3 consists of eight modules (each with 12 individual cells), which together produce a rated voltage of 360 volts and generate gross energy of approximately 22 kilowatt hours, of which a net amount of 18.8 kWh is used. The lithium-ion cells used in the battery stand out with their high energy density and impressive cycle life. They are designed to perform their energy storage function over the vehicle’s entire lifespan. In order to maintain their output and storage capacity over time, the

battery management system therefore controls both the charging and the discharging processes, as well as the operating temperature of the cells. When the vehicle is on the move all the cells are used equally to supply energy. However, it is also possible to replace individual modules in the event of a fault. The air conditioning coolant is used to provide extremely effective cooling of the high-voltage battery, while a heating system also allows the battery to be warmed. All this enables the optimum operating temperature of around 20 degrees Celsius to be reached before a journey begins, even when the ambient temperature is low. This preconditioning ensures the battery operates to optimum effect in terms of power output, range and durability.

The BMW Group has planned and developed this battery to last for the full life of the vehicle. Customers are given a battery warranty that is valid for eight years or 100,000 kilometres (62,000 miles).

As well as the drive unit, all the other electrically powered systems on board the BMW i3 are also designed to run as efficiently as possible. For example, energy-saving light diodes are used to provide interior and exterior illumination. And an optional interior heating system based on the principle of a heat pump uses up to 30 per cent less energy in city driving than conventional electric heating.

The battery pack is mounted flat in the Drive module and weighs approximately 230 kilograms. The battery casing and its model-specific attachment systems were developed by the BMW Group to provide the high-voltage battery with extensive protection against environmental factors and in the event of a crash. Three levels of safety, including a cut-off mechanism, for the car's software and hardware provide reliable protection for the electrical system as a whole.

The power electronics responsible for the interaction between the battery and electric motor are also developed by the BMW Group. The power electronics serve both as an inverter for the power supply from the battery to the electric motor and as a voltage transducer interacting between the high-voltage battery and the 12-volt onboard power system. Highly sophisticated software control ensures the best possible current flow during energy recuperation on the overrun. And the operation of battery charging systems is also integrated into the power electronics, which regulate charge outputs of between 3 kW and 50 kW, depending on the electricity source.

**Optional range extender acts as a spare tank.**

If desired, the BMW i3 is also available with a range extender engine, which maintains the charge of the lithium-ion battery at a constant level while on the move as soon as it dips below a certain value. Performing this role is a 650cc

two-cylinder petrol engine developing 25 kW/34 hp, which is mounted immediately adjacent to the electric motor above the rear axle. Specifying the range extender has no effect on luggage capacity: the nine-litre fuel tank is located in the front section of the car.

The combustion engine develops maximum output of 25 kW/34 hp and drives a generator to produce electricity. It is brought into play as required, responding optimally to match the load and running extremely efficiently. Driving in ECO PRO mode or ECO PRO+ mode can increase the range of the BMW i3, in each case by around 20 kilometres (12 miles). And if the range extender is specified, the BMW i3 will be able to travel more than 100 kilometres (over 60 miles) further before refuelling. Maximum range stands at approximately 300 kilometres (185 miles). The BMW i3 is the world's first electrically powered car with a range extender engine used exclusively to generate electric power.

### **Lightweight design at its best: kerb weight (DIN) 1,195 kg.**

Weight is a key factor in the development of an electrically powered vehicle – as with battery capacity and energy consumption, it has a direct impact on how far the car can travel on a single charge. That is why a particularly sharp focus on intelligent lightweight design has been a key factor in achieving the greater driving pleasure, lower energy requirement and longer range of the BMW i3.

The LifeDrive architecture developed specifically for BMW i models has created the perfect framework for purpose-built electrically powered car concepts. Here, the carbon-fibre-reinforced plastic (CFRP) construction of the passenger cell (Life module) plays a central role. Such extensive use of this lightweight and crash-safe high-tech material is unique in volume car production. The principle of lightweight design also governs the aluminium Drive module and the connection between the two elements. The body structure – shaped by its LifeDrive architecture – enables the use of a trailing edge element made by glass-fibre-reinforced plastic injection moulding. And that contributes a 30 per cent weight saving compared with a conventional sheet steel solution. The direct connection between the power electronics and electric motor in the rear of the BMW i3 reduces the length of cabling required and cuts the overall weight of the drivetrain by around 1.5 kilograms. Weight-minimising construction also sets the tone for the chassis components of the BMW i3. For example, the forged aluminium suspension links weigh around 15 per cent less than in a conventional design, the hollow drive shaft is 18 per cent lighter than a conventional equivalent, and the standard 19-inch forged aluminium wheels of the BMW i3 are 36 per cent lower in weight than comparable steel rims of the same size.

Using a magnesium supporting structure for the instrument panel saves weight on two fronts. Superior material attributes over conventional sheet steel allow these components to boast optimised geometry, which results in a weight reduction of some 20 per cent. In addition, the high composite rigidity of the magnesium supporting structure lends it a strengthening effect, which allows a reduction in components and lowers weight by a further 10 per cent. The door trim panels are made from renewable raw materials and tip the scales around 10 per cent lighter than conventional equivalents. And the rigorous application of the lightweight design strategy extends to screws and bolts made from aluminium. The engineers' detailed commitment to the principle of lightweight design is lent visible expression by the honeycomb structure of the windscreen wiper blades. In addition, a cast aluminium mount was developed specially for the wipers of the BMW i3, its force-flow-optimised geometry also yielding a reduction in weight.

## 5. Lightweight, solidly built, pioneering: Body and safety.



The body of the BMW i3, providing a unique pairing of lightweight design and stability, typifies the groundbreaking achievement of its vehicle architecture. The LifeDrive concept of the BMW i3, with its combination of aluminium and carbon-fibre-reinforced plastic (CFRP), is on a par with other structures and even performs better in some areas of crash testing. CFRP possesses an impressive ability to absorb energy and is extremely damage-tolerant. But at the same time, the use of this high-tech material also provides an ideal platform for the construction of super-lightweight car bodies. CFRP is the lightest material that can be used in this area of a vehicle without compromising on safety.

The LifeDrive concept is based around two horizontally separate independent modules. The Drive module – the aluminium chassis – gives the car its high-strength foundations and integrates the battery and drive system into a single structure. The centrepiece of the Life module is the high-strength and extremely lightweight passenger compartment made from CFRP. With this innovative concept, the BMW Group takes the combination of lightweight design, vehicle architecture and crash safety into an entirely new dimension.

### **LifeDrive module offers optimum safety.**

The development of the LifeDrive architecture for the BMW i3 incorporated the latest knowledge from safety and accident research and the requirements of international crash test procedures. The high-strength passenger compartment teams up with the intelligent distribution of forces within the LifeDrive structure to provide the cornerstones for optimum occupant protection. Even after the structurally debilitating offset front crash with an impact speed of 64 km/h (40 mph), the extremely rigid material used for the passenger cell maintains an intact survival space for passengers. The crash-activated aluminium structures at the front and rear end of the Drive module provide additional safety.

Due to the impressive strength of CFRP, combined with its ability to absorb an enormous amount of energy, the passenger cell displays less deformation than comparable bodies made from steel – even at high impact speeds. As in a Formula One cockpit, this exceptionally stiff material provides an extremely strong survival space. Furthermore, the doors can be opened without any problem and the interior remains largely free of intrusions

Rescue scenarios were worked through and checked as part of the development process. In standard cutting tests, the process of rescuing occupants involved in an accident was, in various scenarios, even more straightforward than that for conventional vehicles. That is because body components made from CFRP are lighter and can be more easily cut than high-strength steels, for example.

### **Unbeatable protection in a side-on impact.**

CFRP also demonstrates its impressive ability to absorb energy in pole impacts and side-on collisions. Despite the heavy, in some cases concentrated forces, the material barely sustains a dent, and passengers enjoy unbeatable protection. All of which makes CFRP perfectly suited for use in a vehicle's flanks, where every centimetre of undamaged interior is invaluable.

### **Aluminium and CFRP: the best of both worlds.**

The new Drive module has also been carefully designed and structured with these exacting crash requirements in mind. Crash-active aluminium structures in the front and rear sections of the vehicle absorb a large proportion of the energy generated. The battery, meanwhile, is mounted in the underbody section of the car to give it the best possible degree of protection. Statistically, this is the area that absorbs the least energy in the event of a crash, and the vehicle shows barely any deformation here as a result. Moreover, positioning the battery in the underbody allows the BMW Group development engineers to give the vehicle an optimum low centre of gravity, which makes it extremely agile and unlikely to roll over.

The high-voltage battery also benefits from the excellent deformation properties of the CFRP Life module. In the standard side crash test, the pole does not penetrate as far as the battery. Added to which, the mix of materials used and the intelligent distribution of forces within the LifeDrive structure ensure that the battery is optimally protected even in the side sill area.

### **Lithium-ion batteries are safe even in the event of a fire.**

The high-voltage system of the BMW i3 is designed to cope with accidents beyond the legal requirements and includes features that ensure the battery pack reacts safely in all situations. The latest series of tests conducted by the renowned DEKRA E-Mobility Competence Center were extremely extensive – ranging from how a car might catch fire, how the flames might spread and what would be required to extinguish the fire, to the pollution caused by run-off of the water used for fighting the fire. The experts concluded that electric and hybrid cars with lithium-ion drive system batteries are at least as safe as vehicles with conventional drive systems in the event of fire.

To ensure maximum safety in such a crash scenario, the high-voltage battery is disconnected from the high-voltage system and the connected components discharged when the occupant restraint systems are triggered.



## 6. Intelligent connectivity for sustainable mobility: BMW ConnectedDrive in the BMW i3.

The BMW i3 is the world's first electric car offering complete connectivity. Cutting-edge driver assistance systems coupled with mobility services from BMW ConnectedDrive that have been specially tailored for the all-electric drive technology serve to optimise safety, convenience and the usability of in-car infotainment products, as well as providing the ideal conditions for completing everyday journeys with zero emissions. BMW ConnectedDrive is unique in the way it helps drivers to implement their mobility plans to combine sustainability and driving pleasure in perfect harmony.

Navigation services that have been purpose-developed with the demands of electric mobility in mind complement the proven products from the revised BMW ConnectedDrive portfolio unveiled in 2013. These include mobility services, such as the Concierge Services for information and the Intelligent Emergency Call function, along with an array of innovative driver assistance systems that make an effective contribution to enhancing the convenience and safety of urban mobility. Access to the BMW ConnectedDrive services is ensured by a SIM card that comes built into the vehicle as standard.

Connectivity between driver and car is also taken into a whole new dimension in the BMW i3. The BMW i Remote app also makes the vehicle data used for mobility planning available on the customer's smartphone. Alongside the pedestrian navigation function for finding the way from the parked car to the final destination and back again, BMW ConnectedDrive also boasts a first in the automotive sector – an intermodal route guidance system that is capable of incorporating local public transport connections into route planning. The BMW i Connected Drive Services guide customers to any destination accurately and efficiently; they can plot the route for the BMW i3 from the driveway to a parking space, assist in the driver in changing to the correct bus or underground line, and help complete the final leg of the journey on foot.

### **BMW ConnectedDrive driver assistance systems for safe, convenient mobility in the urban environment.**

The Driving Assistant Plus that is optionally available for the BMW i3 comprises camera-based Cruise Control with Stop & Go function, the Traffic Jam Assistant, the Speed Limit Info system and Proactive Driving Assistant, along with Collision Warning and Pedestrian Warning with brake priming function. Speed Limit Info uses symbols on the dashboard to flag up speed limits along the current route, while the Proactive Driving Assistant uses data

from the navigation system to indicate to the driver the optimum time to ease off the accelerator ahead of bends, turnoffs, roundabouts and speed limit zones in the interests of an energy-efficient driving style.

Cruise control maintains the desired distance to vehicles in front and, in stop-go traffic, brakes the BMW i3 – all the way to a standstill if necessary. To complement this, the Traffic Jam Assistant not only relieves the driver of the task of accelerating and braking in stop-go traffic, but also takes over the steering movements to keep the car in lane. The Collision Warning and Pedestrian Warning systems have been specifically designed for urban traffic. At speeds of up to 60 km/h (37 mph) they help avoid collisions with other cars as well as pedestrians. Collision Warning calculates excessive speed differentials to alert the driver to the danger of hitting other cars, while Pedestrian Collision recognises the danger of hitting pedestrians on the road and alerts the driver with visual and audible warning signals. The system can also automatically decelerate the vehicle with up to maximum stopping power.

The likewise optional Parking Assistant not only takes over the steering movements but also controls the accelerator and brake pedal and selects the correct gear to automatically manoeuvre the BMW i3 into a parking space parallel to the road. To complement the standard Park Distance Control (PDC) system with rear sensors, the BMW i3 can also be ordered with a rear view camera.

### **Precise, up-to-date and reliable: navigation system with dynamic range map.**

The BMW i3 comes as standard with the Navigation system Professional whose functionality has been extended to include the BMW ConnectedDrive services developed specifically for BMW i. The Driving Range is engaged both for route planning and during journeys already under way. If the destination programmed into the navigation system is beyond the car's range, the system suggests switching to ECO PRO or ECO PRO+ mode and calculates a more efficient route. If the driver needs to charge the battery at a public charging station, a list of available stations along the planned route is displayed.

A further key element of the linked-up navigation unit is a dynamic range map, which delivers remarkably precise, up-to-date and reliable information by factoring in all the relevant variables. The battery's charge status, the driving style, activity of electric comfort functions and the selected driving mode are all taken into account for the calculation, along with the route's topography, current traffic levels and the outside temperature. The system is therefore able to make allowance for the extra energy required for an upcoming climb, stop-start traffic or a traffic jam on the selected route, and lower its range

calculation accordingly. The up-to-the-minute and detailed real-time traffic information provided by the RTTI system is also added to the equation. The information is analysed and evaluated centrally by the BMW ConnectedDrive server that is in permanent communication with the vehicle. The SIM card that comes built into the BMW i3 ensures a reliable connection between the vehicle and the BMW ConnectedDrive server.

The dynamic range display is visualised on the central information display in the BMW i3 as a peripheral contour within the navigation map. Taking the vehicle's current location as a starting point, all points that can be reached in the various driving modes are displayed in the form of a range spidergram.

### **BMW ConnectedDrive Services enable mobility planning to the current destination and beyond.**

Apart from the information required for the route guidance currently in progress, the navigation system also helps drivers to plan mobility requirements beyond their present destination. For the purpose of energy management, not only are the current battery capacity levels taken into account, but the various options for recharging are also considered. The lithium-ion battery in the BMW i3 can be recharged from a standard domestic socket to give maximum flexibility since the charging lead for connecting to the mains supply is carried in the vehicle at all times. However, energy levels can be topped up very quickly and conveniently at one of the charging stations specially designed for electric vehicles. The BMW ConnectedDrive services help drivers to quickly pinpoint these charging points by displaying all available charging stations along the route or in the vicinity of the destination on the navigation map.

In the same way that points of interest such as restaurants, hotels and tourist sights are visualised, charging stations and parking facilities can also be shown in the information display if desired. The driver can see which car parks and charging stations are full or have spaces, and the information is constantly updated via the connection to the BMW server. Complete connectivity will in future give customers the option of booking these and other products from BMW ConnectedDrive after taking delivery of their vehicle. The wealth of functions offered by the navigation system with its BMW i-specific BMW ConnectedDrive services makes it possible to plan journeys using electric power alone with supreme precision, reliability and convenience.

### **Intelligent link-up between driver and vehicle: the BMW i Remote app.**

The mobility planning information provided is made available on the customer's smartphone as well as in the vehicle. This connectivity is provided

by an application developed especially for BMW i for mobile phones with the iOS and Android operating systems. The app is an enhanced version of the remote services offered by BMW ConnectedDrive.

The BMW i Remote app allows drivers to access vehicle data and relevant information on route planning at any time. The driver is also able to use the app to call up a display of charging stations that are either full or have spaces, and see whether they are located within the vehicle's current driving range. To this end, the range contour is also displayed here just as it is in the vehicle's navigation system. This highly intelligent form of connectivity allows drivers to check the status of their BMW i3 and even plan forthcoming journeys while away from their vehicle – whether at home, at work or walking to the car park. A real-time overview of charging stations and parking facilities can also be found online by visiting the BMW ConnectedDrive internet portal. The recharging facilities provided by the ChargeNow network of charging stations are also shown.

If the vehicle is plugged into a public charging station or the BMW i Wallbox, the charging procedure can be controlled both remotely and using a timer function. The charging time can be programmed by means of the app to make use of favourable off-peak rates, e.g. at night. A range calculation graphic identical to that in the vehicle can be viewed on the smartphone as well. The BMW i App can also be used to search for and select a navigation destination or a free charging station and then import it to the vehicle's system.

Drivers have the ability to control not just the charging process remotely but also the advance preparation of the vehicle. If the BMW i3 is plugged into a charging station or the BMW i Wallbox, the vehicle's air conditioning and the heating of the high-voltage battery can likewise be activated by smartphone. Pre-heating the battery ensures optimum operating status for performance, range and battery durability, even at low ambient temperatures.

**Intermodal route planning: BMW i mobility services guide you to your destination efficiently and easily.**

The navigation system specially developed for BMW i and the demands of urban centres includes the world-first function of intermodal route guidance. If necessary – e.g. in slow-moving traffic – this system will take public transport options into account as part of the route planning. The display shows the driver the route to a Park and Ride and then the ongoing route by public transport all the way to the destination. The driver parks the car and is guided by the BMW i Remote app to the relevant bus or underground line, then on foot for the final leg of the journey to the destination. Guidance for the return

route is likewise given. The app also comes with the option of displaying the car's location at any time. To this end, the navigation destination selected by the driver in the car is automatically sent to the BMW i Remote app via the BMW ConnectedDrive Server so that route guidance can continue via smartphone.

Once a journey has been completed, customers are able to compare the efficiency of their driving style anonymously with that of other BMW i3 users. At the same time, they are given further efficiency-enhancing pointers as well as tips for honing the way they drive.

Beyond this, the BMW i-specific BMW ConnectedDrive Services in Germany also offer the option of using the forward-looking car sharing network "flinc". BMW i3 drivers can use the flinc smartphone app or the car sharing portal on the web to advertise their destination and find people to share the ride quickly and easily. The focus of such services is to create car pools for commuter traffic, which perfectly suits the BMW i3, designed as it is for urban mobility.

## 7. Innovative ideas for personalised style: Equipment and accessories.



With the BMW i3, the launch of a new era in electric mobility is combined with hallmark BMW driving enjoyment and a unique premium experience that is strongly focused on sustainability while at the same time meeting the highest standards of design, comfort, functionality and individuality. The all-electric, locally emission-free driving experience is complemented by a host of features designed to ensure everyday practicality and wellbeing aboard the BMW i3. This can be further enhanced by a range of optional equipment and accessories which, like the BMW ConnectedDrive range of driver assistance systems and mobility services, comprises not only innovative solutions developed specially for BMW i but also features that are already available for models of the BMW parent brand. Embracing this new form of personal mobility thus opens up an experience in which the familiar aspects of a BMW premium vehicle are enhanced by new impressions that point the way forward.

Like all cars from the BMW Group, the BMW i3 allows drivers to custom-configure their vehicle of choice. The personalisation process begins with the selection of exterior and interior design features. For example, the BMW i3 offers a choice of two non-metallic and four metallic exterior paintwork shades. And as an alternative to the standard 19-inch alloy wheels, three optional wheel styles – two 19-inch and one 20-inch wheel – are available. All three are supplied with mixed-size tyres. For the interior, customers can choose between the standard Atelier equipment line and the optional Loft, Lodge and Suite lines.

### **iDrive control system and Navigation system Professional as standard.**

The cutting-edge premium character of the BMW i3 is underscored by unusually extensive standard specification. The list includes climate control, electric windows, electrically adjustable exterior mirrors, radio remote-controlled central locking, hands-free telephone system, leather steering wheel and the Park Distance Control system with rear sensors, which takes the strain out of parking. Also standard is the Navigation system Professional. It is operated using the iDrive control system, which comprises a 10.2-inch Control Display and a Touch Controller whose touch-sensitive interface features character recognition. Navigation data is stored on an integrated hard

drive which also offers 20 GB of storage for personal audio files and other content. AUX-in and USB connections provide access to further entertainment sources.

The BMW i-specific functions of the Navigation system Professional include a dynamic range display. The Intelligent Emergency Call and BMW TeleServices functions, which operate using the vehicle's built-in SIM card, are further standard features of the BMW i3, as is the BMW i Remote App, whose smartphone-based functions include charge level and vehicle status monitoring, trip analysis and next-trip planning.

### **Optional equipment for extra comfort and convenience – premium ambience with an individual touch.**

The optional equipment range for the BMW i3 includes high-quality stand-alone options as well as options packages specially compiled to enhance the comfort and functionality of this model. Optional stand-alone features include sun protection glazing, an electrically operated glass roof, heated front seats, Comfort Access, a digital radio receiver and a Harman Kardon hi-fi system with a 360-watt 7-channel amplifier and 13 speakers. For best possible visibility and an eye-catching nighttime look there is the option of LED headlights as well as LED sidelights and daytime driving lights.

The optional Comfort Package includes Cruise Control with braking function, Automatic Climate Control, automatically dimming rear-view and exterior mirrors, an armrest with integrated storage compartment between the front seats, multifunction steering wheel buttons, a rain sensor with automatic headlight activation and the storage compartment package. The latter includes an additional storage facility and a net on the centre console, a sub-compartment in the glovebox, rubber mats for the door pockets, additional portable rear and centre console drink holders, and nets on the backs of the front seats. In addition to the standard 12-volt power socket in the centre console, two further sockets are provided, one in the instrument panel and one in the luggage compartment.

### **Original BMW Accessories: proven quality, tailored design.**

The Original BMW Accessories range for the BMW i3 comprises products that combine highest quality standards with styling specially tailored to this model. This innovative portfolio includes the BMW i Collection – a range of lifestyle products made from recycled materials and eco-friendly, naturally treated raw materials. The articles include the BMW i Urban Mega Shopper (a bag whose surface is made of olive leaf-tanned leather and whose material parts are made from recycled PET plastic) and the BMW i Notebook, with a cover likewise made from recycled fabric in a felt look. The BMW i Solar

Charger is an eco-friendly portable energy-generating device with a large solar panel and rechargeable battery, which can be used as a power source for mobile phones and MP3 players.

The model-specific accessories range for the BMW i3 also includes winter complete wheel sets, a weather protection cover for the front windscreen and side windows, sun protection glazing for the rear window and rear side windows, and all-weather floor mats. For personalised entertainment and communication, smartphone- and music-player-specific adapters, the BMW Bluetooth headset and the BMW LTE Car Hotspot are available.

The Original BMW Accessories range also contains many other products designed for extra practicality and convenience, such as a cabin case which stows in the under-bonnet luggage tray, a folding fitted mat, a rear sill protector, a transport net, a collapsible box and load-securing straps for the rear luggage compartment of the BMW i3. The standard ISOFIX child seat attachment system provides safe and convenient mounting for child seats, including the new BMW child seats for children aged from 0 to around 12 years.

## 8. BMW thinks beyond the car: 360° ELECTRIC, sales and services.



An extensive range of products and services is available for the BMW i3 which cover the customer's individual needs beyond the vehicle alone. The comprehensive 360° ELECTRIC package provides an especially reliable, convenient and flexible way of harnessing the benefits of electric mobility during everyday driving, with customers deciding for themselves which particular features they wish to use. The 360° ELECTRIC portfolio has four mainstays essentially covering the areas of home charging, public charging stations, safeguarding mobility, and integration into innovative mobility concepts to overcome range restrictions.

### **Home charging: the most convenient option.**

BMW i is able to offer customers who have their own garage or a private parking space tailor-made solutions to make domestic charging a safe, simple and particularly quick procedure. As an alternative to a conventional domestic socket, customers can have a BMW i Wallbox installed, which uses the maximum current strength available at the property to charge the battery in less than five hours (BMW i Wallbox Pure) or less than three hours (BMW i Wallbox Pro) – even in its basic configuration. Different versions of the BMW i Wallbox are available, depending on the country, to reflect the current strength and voltage in the individual markets. Charge times will therefore vary according to the power supply and type of wallbox. BMW i not only offers the Wallbox, but also checks installation options in customers' homes, supplies and assembles it, as well as providing maintenance, advice and other services.

BMW i also backs the use of electricity from renewable sources and has joined forces with selected partners to offer a choice of green power products. A strategic alliance between BMW AG and German eco power supplier Naturstrom AG will in future give customers in Germany the opportunity to obtain an eco power package for running their BMW i3. Naturstrom AG supplies electricity entirely from renewables, with a very high proportion of wind power, ensuring that the electric vehicle can be operated with zero CO<sub>2</sub> output. And BMW i can also assist if the customer decides, for example, to install a carport with solar panels.

### **Public charging: topping up on the move.**

For customers who do not have private charging facilities, BMW i 360° ELECTRIC offers solutions in partnership with car park operators and public charging station providers. Through ParkNow Long Term, for example, customers can reserve a long-term parking space near their home or office via a car park operator involved in the scheme. BMW i together with its partners also fosters connectivity between vehicle, driver and the outside world, providing users with convenient features such as the display of available charging stations in the navigation system and on the customer's smartphone, along with a simple and transparent payment method with the ChargeNow card. This card enables universal access to charging poles and provides a cashless means of payment. In so doing, it groups together the maximum number of public charging infrastructure suppliers in all BMW i markets, allowing the customer to access the charging stations of different providers with a single card and receive a single standardised invoice from BMW i.

Using a modern, public fast-charging station (50 kW) it only takes about 30 minutes for the battery to reach 80 per cent capacity. Even in the unlikely case of the car dropping down to almost zero range, a lunch break is still long enough to recharge the battery.

### **Flexible mobility: making smart use of alternatives.**

When the range of the BMW i3 is not sufficient for requirements, customers have recourse to various complementary mobility modules to help them cover larger distances, such as the temporary use of a BMW with a conventional engine or hybrid drive. For this purpose, individual annual quotas can also be booked through 360° ELECTRIC. In certain cities the DriveNow premium car sharing scheme is also available as a flexible mobility service for spontaneous use.

### **Assistance services.**

With the BMW i3, drivers can enjoy driving a reliable vehicle with the additional reassurance of being able to call on help and support round the clock if needed, thanks to a comprehensive servicing system and mobility guarantees as well as intelligent comfort and convenience features.

To make sure the BMW i3 runs smoothly in everyday operation, the battery and other electrical systems are monitored at all times, even while the vehicle is being driven. In the unlikely event of a malfunction, BMW Mobile Service vehicles or service workshops can diagnose the problem, pinpoint faulty parts and get the BMW i3 up and running again as quickly as possible.

The service provided is of exactly the same scope and standard as offered for conventionally powered BMW cars. Even in the rare case of a breakdown or depleted battery, customers can count on the BMW service: an onboard charging facility in the BMW Mobile Service vehicle acts as a sort of “spare fuel can”, powering up the high-voltage battery in the BMW i3 so that customers can quickly resume their journey.

### **Electric mobility: an ecologically and economically sustainable solution.**

Electric, locally emission-free driving is a highly sustainable solution for individual mobility not just from an environmental point of view but also in economic terms. This is clearly evident from the running costs that accrue in day-to-day use of the BMW i3. In the EU test cycle, energy usage amounts to 12.9 kWh per 100 kilometres (62 miles). At a cost of 0.25 euros per kWh, that comes to approximately 3.25 euros per 100 kilometres. In terms of current fuel prices in Germany, that is equivalent to the cost of around two litres of premium fuel. Moreover, with a CO<sub>2</sub> value of under 50 grams per kilometre, the BMW i3 – even when fitted with the optional Range Extender – is exempt from vehicle tax for 10 years following initial registration.

### **Repair costs for the BMW i models are normal for their class.**

Tests by vehicle insurers and BMW Accident Research show that 90 per cent of accidents today primarily result in minor damage to the outer skin. That is why the BMW i3 is equipped with robust, all-round screw/clip-on plastic plating. Minor bumps are absorbed and damage to the paintwork does not lead to corrosion. Individual outer components can be replaced quickly and economically, with costs around 40 per cent lower than for conventionally built cars. Overall, repair costs are on a par with those for the BMW 1 Series. The favourable German insurance rating of “VK type class 18” also reflects the repair-friendly overall concept of the BMW i3.

### **“Cold” repair methods for aluminium and CFRP components.**

The aluminium Drive module structure welded in series production is repaired using the “cold” repair methods of bonding and riveting. These methods have been in successful use in BMW workshops since 2003.

The reparability of the CFRP structure of the Life module was already taken into account during development of the vehicle concept. For example, several repair stages were defined for the side frame together with the option of replacing it as a whole. If only a damaged side sill needs to be replaced after a side impact, the workshop carries out a visual inspection and damage assessment, and then removes only the side sill repair section using a patented milling tool. The required side sill component is manufactured to fit,

and then installed on the damaged vehicle. The new part is bonded to the separation points using repair elements.

Any authorised BMW i dealer can repair the outer skin. Due to the product-specific features of the LifeDrive structure, there will be repair centres in which specialised employees repair vehicles with damage to the aluminium or CFRP structure.

**New sales models: flexible and customer-oriented.**

New BMW i sales channels are designed to allow simple and customer-oriented access to the range of available products and services. A key aim is to meet buyers' expectations of flexibility during the purchasing process. A consistent focus on customer requirements opens up a completely new brand experience that marks a clear differentiation from the competition.

The sale of BMW i products and services will be handled via an innovative multi-channel model which will be applied in various ways according to the specific markets. In addition to the established "stationary" sales channel, i.e. the authorised dealer, a Customer Interaction Centre (CIC), internet sales and a mobile sales team will also be available. All the new sales channels will be fully interlinked, which means that during the buying process the customer can select or switch sales channels at any time according to preference. The Customer Interaction Centre offers the customer personalised and specialised support as well as information on every aspect of mobility services and sustainability.

The traditional sales channel of independent BMW i authorised dealers will of course remain and continue to play an important role in future vehicle sales. Not all BMW dealers will handle sales of BMW i models. Depending on the target groups and vehicle characteristics, the aim is to focus on areas with the highest demand, i.e. major urban areas, which will be served by specially appointed BMW i dealers. To begin with, it is anticipated that slightly more than 10 per cent of BMW dealers in Europe will sell the BMW i models. The fundamental target, however, remains a clear focus on providing a full network of service outlets to maximise customer satisfaction and cater to the specific needs of BMW i vehicles in terms of driving range.

## 9. Sustainability at every stage: Production.



Systematic lightweight design is of key significance to electric-drive vehicles in particular. That is because, next to battery capacity, the limiting factor in terms of operating range is vehicle weight. Therefore, in order to compensate for the extra weight of the electrical components, BMW i makes rigorous use of lightweight construction techniques and innovative materials in its vehicles. The Life module of the BMW i3 consists primarily of carbon-fibre-reinforced plastic, or CFRP for short. This innovative material is manufactured by the SGL Automotive Carbon Fibers (SGL ACF) joint venture.

Even at the carbon fibre production stage in Moses Lake, all the necessary energy is acquired solely from renewable, locally generated hydroelectric power, making it entirely CO<sub>2</sub>-free. This state-of-the-art plant in Washington State also sets standards for energy efficiency.

### **Processing into carbon fibre laminates in Wackersdorf.**

At the joint venture's second site, the Wackersdorf Innovation Park, the rovings produced in Moses Lake are processed further into lightweight carbon fibre laminates. After an investment of 20 million euros and the creation of some 150 new workplaces, the Wackersdorf plant is able to produce several thousand tonnes of carbon fibre laminates a year.

### **Further processing into CFRP components in Landshut and Leipzig.**

Wackersdorf then sends so-called stacks – several layers of carbon fibre laminate with varying fibre alignments – to the innovation and production centres at BMW's Landshut and Leipzig plants, where they are turned into body components for the BMW i3 and BMW i8. Each of the facilities runs three production lines for CFRP body parts.

Over more than 10 years, the BMW Group's specialists have steadily refined and automated the CFRP production process so that it is now possible to volume-produce CFRP body components cost-efficiently, to a high quality and with high process stability. This has allowed manufacturing costs for CFRP body components to be cut by around 50 per cent over this period.

A heat source is used to give the carbon fibre stacks a stable, three-dimensional form. Several of these preformed blanks can then be joined to form a larger component. In this way CFRP can be used, for example, to

produce body components with a large surface area that would be difficult – or significantly more expensive – to manufacture from aluminium or sheet steel. Preforming and preform joining are followed by the next stage in the process: high-pressure resin injection using Resin Transfer Moulding (RTM). Here, liquid resin is injected into the preforms under high pressure. As the fibres and the resin bond, and in the subsequent hardening process, the material acquires the rigidity which is key to its outstanding qualities.

The CFRP process can no longer be compared with conventional sheet steel manufacturing. This industrialised manufacture of CFRP is extremely economical, which makes the production of large CFRP composite components for the automotive industry possible.

### **New precision processes in CFRP body manufacture.**

The CFRP composite components are bonded together in the new bodyshop in Leipzig. This is where the basic structure of the Life module takes shape. A high level of geometric integration means that the CFRP structure of the Life module for the BMW i3 requires only a third of the number of body components used in a conventional steel body; the module's basic CFRP structure comprises around 150 CFRP parts in total.

There is no noise from bolting or riveting and no sparks from welding in the manufacturing process for a CFRP body. Instead, only the latest bonding technology is used, which is 100 per cent automated. In this unique, BMW-developed assembly process the individual components are positioned at a precisely defined bond line gap in order to ensure the resulting joint is as strong as possible. The bonded joints of each BMW i3 measure a total of 160 metres in length.

### **Lightweight and robust: the thermoplastic skin.**

The BMW i3 is the first ever BMW with an outer skin made entirely of thermoplastic. The only exception is the roof, which is made of recycled CFRP. The weight of the plastic parts is around half that of sheet steel parts. Plastic also provides corrosion-free outer protection and requires less energy to manufacture, as well as being resistant to minor damage. The thermoplastic outer skin is produced using 25 per cent recycled or renewable material.

The entire outer skin of the BMW i3 is produced at BMW's Leipzig plant. The final painting process gives the outer skin parts their sheen while also protecting against the effects of environmental exposure, for example due to stone chipping or sunlight. The new paintshop in Leipzig uses dry overspray separation and is therefore completely wastewater-free, while its energy consumption is just a quarter that of a conventional paintshop. At the same

time water consumption for the paint process of the BMW i3 is reduced by 70 per cent. That is because production of the BMW i models does not involve priming, painting and drying of the complete body, as with conventional models. Instead the bumpers and the front, rear and side parts can simply be painted individually, which conserves resources. Dispensing with conventional cathaphoretic dip priming reduces the weight of each vehicle by a further 10 kg. Approximately 300 employees work on the production of the plastic outer skin for the BMW i3 in Leipzig.

### **Drive module: basic structure, high-voltage battery and electric motor built at Bavarian plants.**

The basic load-bearing structure of the BMW i3 Drive module, built at BMW's Dingolfing plant, consists of cathaphoretically coated aluminium members and aluminium castings. The body-on-frame design provides ideal packaging for the battery and also makes for optimal weight distribution with a very low centre of gravity, which has benefits for driving dynamics. The use of aluminium combines the advantages of lightweight construction with good crash performance and therefore contributes to the overall safety of the BMW i models.

A further important BMW i component produced in Dingolfing is the high-voltage battery. The production process starts with a beginning-of-line test, in which the externally supplied lithium-ion cells undergo an initial performance check. The battery cells are then plasma-cleaned. Following this, the individual cells are clamped into modules, bonded and welded in a fully automated process involving more than 20 robots.

Extensive BMW expertise goes into the special packaging and assembly of the battery. In all, the assembly process comprises 400 operations. The battery casing protects the lithium-ion cells and at the same time improves the rigidity of the vehicle as a whole. After the battery cells have been packaged into modules, the assembly process begins. The modules are lifted one by one into an aluminium tray, then manually connected in series using a communication cable harness. Finally, the battery top cover and bottom cover are fitted and the finished batteries undergo an end-of-line test. The battery is designed in such a way that individual battery modules can be easily swapped for repair purposes.



At BMW, powertrain design has always been a key focus and differentiator. The BMW Group therefore decided to develop the BMW i3's 125 kW electric motor and drive electronics in-house – namely, at the BMW Landshut plant.

**Parallel processes: assembly.**

Unlike vehicles with integral body and frame construction, the BMW i3 has a horizontally split LifeDrive architecture consisting of two separate, independent modules. As a result, the Leipzig assembly shop is the first in the history of BMW to feature two separate, parallel production lines – one for the Life module and one for the Drive module. This has led to significant advances in terms of the ergonomic design of the workstations, which provide optimal accessibility for all assembly operations.

During assembly of the Drive module in Leipzig, the aluminium chassis is fitted with the battery and the motor/transmission unit. First of all the high-voltage battery, weighing 230 kilograms, is installed in the floorpan and bolted to the basic Drive module structure. The Drive module is then fitted with the motor/transmission unit supplied by the Landshut plant, which is likewise bolted in place. Optionally, a range extender (a twin-cylinder petrol engine) is also available, which is positioned immediately next to the electric motor. Once the front axle subframe – preassembled in Dingolfing – and further structural parts have been fitted, the BMW i3 Drive module is ready to move on to the final assembly stage.

Meanwhile, the CFRP passenger cell makes its way from the bodyshop to the assembly shop where, on the so-called “Life” line, its customer-specific equipment is fitted. This is the final step before the “marriage” with the aluminium Drive module, during which the CFRP passenger cell and the aluminium chassis are bonded together. The two units are also bolted together at four points, resulting in optimal stiffness and strength.

After the bonding agent has been applied to the Drive module by two robots, it is conveyed to the “marriage” station, lifted and centred. A robot gripper then lowers the Life module onto the Drive module and the joining process is launched by the body’s own weight. Only at this stage is the BMW i3 fitted with its outer plastic skin.

At 20 hours, the total processing time in the bodyshop and on the assembly line is only half of what would be required in a conventional production process. This is due to the parallel assembly processes and the fact that the CFRP structure comprises fewer parts. Together with the other BMW vehicles built in Leipzig, the BMW i3 then makes its way to the finishing shop. Here comprehensive quality controls are performed, ensuring that the BMW Group’s

first all-electric volume-production model meets the company's customary high quality standards, just like any other product of the group. At the same time, it is also possible to harness valuable synergy effects.

In total, 400 million euros has been invested in the Leipzig plant for production of the BMW i and 800 new jobs have been created.

# 10. Technical specifications. BMW i3.



		BMW i3	BMW i3 (Range Extender)
<b>Body</b>			
No of doors / seats		5 / 4	5 / 4
Length	mm	3999	3999
Width	mm	1775	1775
Height (* with roof fin)	mm	1578 (* 1597)	1578 (* 1597)
Wheelbase	mm	2570	2570
Turning circle	m	9.86	9.86
Front / rear overhang	mm/mm	707 / 722	707 / 722
Ground clearance	mm	140	140
Luggage compartment volume	m <sup>3</sup>	0.260 – 1.100	0.260 – 1.100
Tank capacity	ltr	0	9
Weight, unladen, according to DIN/EU	kg	1195 / 1270	1315 / 1390
Max permissible weight / load	kg / kg	1620 / 425	1730 / 415
Air resistance (C <sub>d</sub> /A/C <sub>d</sub> x A)	- / m <sup>2</sup> / m <sup>2</sup>	0.29 / 2.38 / 0.69	0.30 / 2.38 / 0.71
<b>Drive system</b>			
Type of electric motor		BMW eDrive technology: Hybrid synchronous motor with integrated power electronics, charger and generator mode for recuperation	
Output	kW/hp	125 / 170	125 / 170
Torque	Nm	250	250
Recuperation	kW	up to 50	up to 50
<b>High-voltage battery</b>			
Rated voltage	V	360	360
Energy capacity (gross/net)	kWh	22.0/18.8	22.0/18.8
Storage technology		Lithium-ion	Lithium-ion
<b>Combustion engine</b>			
Torque	Nm	–	55
Config / No of cyls / Valves per cyl		–	in-line / 2 / 4
Capacity	cm <sup>3</sup>	–	647
Stroke / bore	mm/mm	–	66 / 79
Output / at rpm	kW/hp / rpm	–	25 (34) / 4300
Torque / at rpm	Nm / rpm	–	55 / 4300
Compression ratio / poss fuel (recommended)	:1/-	–	10.6 / RON87-98 (RON95)
Exhaust standard / fuel		–	EU6 / RON 95
<b>Driving dynamics</b>			
Drive concept		Rear-wheel drive	
Front suspension		Aluminium single-joint MacPherson spring strut with anti-dive	
Rear suspension		Five-link axle directly mounted to the Drive module	
Tyres front / rear		155/70 R19 / 155/70 R19	155/70 R19 / 175/65 R19
Rims front / rear		5J x 19 light-alloy / 5J x 19 light-alloy	5J x 19 light-alloy / 5.5J x 19 light-alloy
<b>Transmission</b>			
Type of transmission		Automatic, single speed with fixed ratio	
<b>Performance</b>			
Power-to-weight ratio (DIN)	kg/kW	9.6	10.5
Acceleration			
0–100 km/h	s	7.2	7.9
0–60 km/h	s	3.7	3.9
80–120 km/h	s	4.9	5.5
Top speed	km/h	150	150
Range in everyday driving			
(Comfort mode)	km	130 – 160	240 – 300
(most efficient driving mode)	km	up to 200	up to 340
Range in EU cycle			
(Comfort mode)	km	190	170

		<b>BMW i3</b>	<b>BMW i3 (Range Extender)</b>
<b>Charging times (for 80% charge)</b>		from < 30 min at 50 kW fast charge to ~ 8 h at domestic socket	

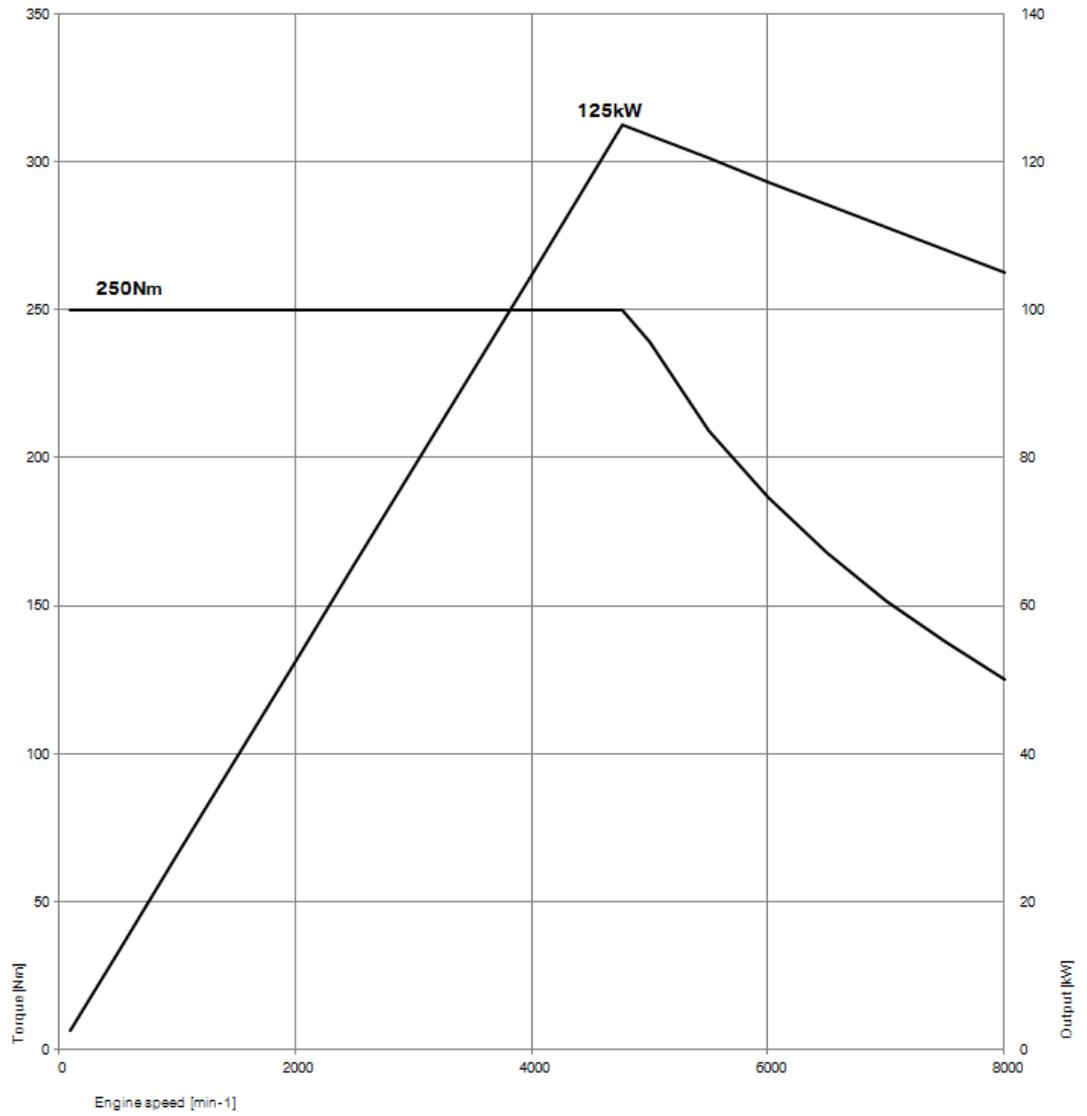
**Consumption in EU cycle**

Power	kWh/100 km	12.9	13.5
Fuel / CO <sub>2</sub> *	ltr/100 km / g	0	0.6 / 13

Specifications apply to ACEA markets; data relevant to homologation applicable in part only to Germany (weight)

\* Based on EU cycle calculation regulation for vehicles with range extender; also applies if the range extender is not used in the test cycle.

# 11. Engine output and torque.



## 12. Exterior and interior dimensions.

