

2. Drivetrain

BMW's heritage of producing class-leading, high performance and efficient engines is unrivalled. To highlight this fact, no other manufacturer has won the overall honour at the International Engine of the Year awards more times than BMW. 2008 sees BMW retain the title through the 3.0-litre twin-turbo petrol engine in the X6 xDrive35i meaning that BMW has scooped the outright title six times in the last 10 years, winning more categories than any other manufacturer.

The BMW X6 is the latest model to benefit from BMW engineers' technological prowess. The all-new range is offered with a quartet of turbocharged engines – the first time an entire BMW model range has been turbocharged. Three of these are award-winning powerplants, while the 4.4-litre twin-turbocharged V8 petrol engine is new to BMW. All four variants come as standard with a sport-oriented six-speed automatic transmission and all models use elements of BMW EfficientDynamics to achieve impressive performance, economy and emissions statistics.

BMW X6 xDrive30d

Powered by a 2,993cc engine, the BMW X6 xDrive30d offers the driver the optimum combination of performance and economy which is unmatched by any other performance-oriented Sports Activity Vehicle.

The in-line six-cylinder diesel powerplant comes with a single turbocharger and third-generation common-rail injection system with piezo injectors for efficient fuel combustion. This latest incarnation of common-rail diesel operates at 1,600bar pressure. Such an arrangement helps the unit produce 235hp at 4,000 rpm. With peak torque of 520Nm available from 2,000rpm through to 2,750rpm, the BMW X6 xDrive30d provides effortlessly smooth, swift acceleration. It accelerates from zero to 62mph in 8.0 seconds before going on to a top speed of 137mph.

The BMW X6 xDrive30d's unique balance of economy, emissions and performance is why BMW expects the model to become the biggest selling variant in the UK. The vehicle records a CO₂ emissions figure of 217g/km - low enough for the vehicle to qualify for Band F Vehicle Excise Duty and to remain classed as an £8-a-day London Congestion Charge vehicle in the future if current proposals become statute. It also records 34.4mpg on the combined cycle. An all-aluminium engine block, the weight of which has been reduced by 25kgs compared to the previous, similar 3.0-litre BMW diesel engine, aids the overall performance statistics.

Compared to conventional 4x4 competitors, none can offer the all round capability of the BMW X6 xDrive30d. While the Audi Q7 records marginally higher horsepower and torque output, this advantage is not translated to on-road performance as the table below indicates. Meanwhile, the Audi, the Range Rover Sport and the Mercedes fall short on all other counts.

Model	Power (hp)	Torque (Nm)	0 – 62mph (secs)	Top Speed (mph)	Combined mpg	CO ₂ (g/km)	VED Band
BMW X6 xDrive30d	235	520	8.0	137	34.4	217	F
Range Rover Sport TDV6	190	440	11.9	120	28.3	265	G
Audi Q7 3.0TDI S line	240	550	8.5	134	28.8	260	G
Mercedes ML 320CDI Sport	224	510	8.6	134	29.4	254	G

BMW X6 xDrive35d

With its twin turbochargers and third generation common-rail diesel technology, the 3.0-litre engine that propels the xDrive35d is the most powerful six-cylinder production diesel engine in the world. Weighing just 210kgs, this high-performance diesel weighs some 50kgs less than a comparable eight-cylinder engine with a similar output. This weight and power advantage serves to maximise the dynamic driving qualities of the BMW X6 xDrive35d, which accelerates from zero to 62mph in 6.9 seconds before going on to a top speed of 147mph.

It achieves these benchmark performance figures, in part, due to the unique way its brace of turbochargers operate. The first, small turbocharger functions at low engine speeds, developing superior power and torque with the slightest movement of the accelerator. Then, with engine speed increasing, the second, larger turbocharger spools into action. At higher engine revolutions a flap in the exhaust system closes off the smaller turbocharger so that the larger one can operate alone. This process delivers a seamless wave of acceleration and power from low revs with one turbocharger passing the performance baton to the other at the point its peak operational capability falls away.

The technology means the BMW X6 xDrive35d produces 286hp at 4,400rpm, while peak torque of 580Nm is available from 1,750rpm to 2,250rpm. Despite this impressive performance and like the X6 xDrive30d, this model falls below the 225g/km higher Vehicle Excise Duty and London Congestion Charge tiers. The 2,993cc engine records an emissions figure of 220g/km while also being capable of 34.0mpg on the combined cycle. So, not only is the xDrive35d rapid transport it also makes financial sense for the personal and company car buyer, and challenges the environmental assumptions of the anti-4x4 brigade.

Model	Power (hp)	Torque (Nm)	0 – 62mph (secs)	Top Speed (mph)	Combined mpg	CO ₂ (g/km)	VED Band
BMW X6 xDrive35d	286	580	6.9	147	34.0	220	F
Audi Q7 4.2TDI S line	326	760	6.4	146	25.4	294	G
Range Rover Sport TDV8 HSE	271	640	9.2	130	25.5	294	G

BMW X6 xDrive35i

The twin-turbocharged petrol engine that powers the BMW X6 xDrive35i has retained its International Engine of the Year award in 2008. This 2,979cc unit is capable of propelling the X6 from zero to 62mph in 6.7 seconds and on to a top speed of 149mph. It achieves this through a combination of twin-turbocharger technology and a high-precision direct injection system.

Compared to the twin-turbocharged diesel engine in the X6 xDrive35d, the forced-induction technology operates in a different way. It is more efficient for the engine to operate with two same-sized turbochargers with each one helping to supply three cylinders due to the characteristics of petrol power. This sees the X6 xDrive35i produce a diesel-engine style flat torque curve courtesy of its variable vane turbo technology. The engine's output is 306hp at 5,800rpm while peak torque is attained at just 1,300rpm through to 5,000rpm.

The advanced turbocharging system on the BMW X6 xDrive35i enables it to deliver class-leading performance figures. The 2,979cc-powered X6 is still capable of achieving 25.9mpg and a CO₂ figure of 262g/km.

Model	Power (hp)	Torque (Nm)	0 – 62mph (secs)	Top Speed (mph)	Combined mpg	CO ₂ (g/km)	VED Band
BMW X6 xDrive35i	306	400	6.7	149	25.9	262	G
Porsche Cayenne	290	385	8.5	141	21.9	310	G

BMW xDrive50i

Completing the quartet of forced-induction engines is an all-new twin-turbocharged, high-precision direct injection 4.4-litre V8 powerplant. This engine makes its debut in a BMW product and is the most powerful non-M V8 engine the marque has ever offered. It is also unique as the two turbochargers and the catalytic converter are located within the vee of the engine for the first time. This reduces the length of the ducts while also allowing for a wider cross-section, so pressure loss is significantly minimised both on the intake and exhaust side. This enhances engine performance and benefits packaging too.

The BMW X6 xDrive50i produces 408hp from 5,500rpm to 6,400rpm from its 4,395cc engine. Peak torque is an impressive 600Nm and this is attained from 1,750rpm to 4,500rpm. The breadth of the engine's flexibility and power ensures the flagship in the X6 range reaches 62mph from standstill in 5.4 seconds and can hit an electronically-limited top speed of 155mph.

This is the first time that the use of two turbochargers has boosted output on a BMW eight-cylinder petrol engine. Each of the two turbochargers supplies compressed air to four cylinders, ensuring unparalleled spontaneity and an instantaneous response to the accelerator. A further, important, point is that the engine develops its high torque from low speeds and then maintains this superior torque plateau over an unusually broad speed range.

The new V8 is the most efficient power unit in its class. Combined with a wide range of BMW's EfficientDynamics features, it gives the BMW X6 xDrive50i a standard of fuel economy and emission management far better than rivals. Average fuel consumption is 22.6mpg and CO₂ emissions are 299g/km. The table below underscores the competitive advantage this BMW X6 model enjoys. Neither the Porsche Cayenne nor the Range Rover Sport can match the BMW X6's all round capability.

Model	Power (hp)	Torque (Nm)	0 – 62mph (secs)	Top Speed (mph)	Combined mpg	CO ₂ (g/km)	VED Band
BMW X6 xDrive50i	408	600	5.4	155	22.6	299	G
Porsche Cayenne GTS	405	500	6.5	156	20.3	332	G
Range Rover Sport Supercharged	396	550	7.6	140	17.8	374	G

EfficientDynamics

All four BMW X6 models utilise facets of BMW's award-winning EfficientDynamics technologies. Brake Energy Regeneration is standard across the range in conjunction with active aerodynamics and low viscosity fluids in the steering and transmission systems. Third generation common-rail systems for the diesel-engined vehicles and high-precision direct injection on the petrol models serve to optimise the combustion process.

On-demand management of ancillary units likewise serves to further optimise the efficiency of the BMW X6. The power required to drive the fuel and steering assistance pumps has been significantly reduced by matching the uptake to current driving conditions, saving substantial energy in the process. In addition, the clutched air-conditioning compressor automatically disconnects the compressor as soon as the air conditioning is switched off to save energy.

The X6's aerodynamics also serve to enhance efficiency, with the cooling air flaps behind the BMW kidney grille and air intake open and close electronically as required in all but the X6 xDrive50i. The flaps reduce air resistance when closed and open only in response to a greater demand for cooling air.

Transmission

Power in the BMW X6 is transmitted to the road via a standard fit six-speed automatic transmission with an emphasis on sporting gear change characteristics. Gear changes can be delivered using the ergonomically designed gear selector or by the gearshift paddles behind the steering wheel.

The gearbox's default setting is a fully automatic drive mode. However, manual gear changes can be instigated by either moving the gear selector to the left or using the steering wheel paddles. Pulling one of the paddles backwards serves to shift up gears and pressing the paddle forwards changes to a lower gear. Using this paddle gearshift is the quickest way for the driver to change gears.

1. Chassis

The BMW mantra of 'the ultimate driving machine' is delivered, in most part, by class-leading drivetrains and innovative chassis technologies. Award-winning engines, BMW's intelligent xDrive four-wheel-drive technology, Dynamic Stability Control + and optional equipment such as Active Steering and Adaptive Drive, set the foundation for benchmark driving dynamics. Adding to this already impressive line-up on the BMW X6 is the world debut of Dynamic Performance Control – a highly advanced differential that enhances the performance of the X6 as standard across the range.

Dynamic Performance Control

New to BMW, Dynamic Performance Control marks the introduction of a new standard in drivetrain capability. Available only in the BMW X6, Dynamic Performance Control is unique in its ability to make a four-wheel-drive vehicle, with its inherently mild understeer characteristic, to perform with the responsiveness of a rear-wheel-drive car.

It works by switching power between the left and the right rear wheels to stabilise the vehicle within milliseconds to help increase traction and lateral acceleration. Handling is lighter and more precise as a consequence during all driving conditions.

To visualise how it works, the mechanics of canoeing provides a good analogy. If you want to turn right when canoeing, you can brake the paddle on the right side of the canoe. This is how most common electronic stability programmes work. Alternatively, you could use the left-hand paddle powerfully to deliver more control in moving forwards and turning right. This is the principle behind Dynamic Performance Control.

The new system links the standard rear differential with a mechanical planetary gear set and an electronically-controlled multi-plate clutch for each rear wheel. This system combines advanced electronics and precise mechanics to process complex data such as the yaw rate, wheel speeds, steering angle and engine torque so it can react immediately. When required, the system ensures that drive power distribution to the rear wheels can be freely varied and increased on either side as needed.

Dynamic Performance Control increases directional stability when accelerating out of bends and provides the driver with extra support in difficult driving conditions. Before under- or oversteer can take place, lateral guided force is used to keep the vehicle on track.

The system is also effective when the vehicle is coasting. If the rear wheels are on different types of surface, Dynamic Performance Control improves traction by supplying more power to the wheel with more grip. This increases driving stability and allows for much faster acceleration should it be needed. A wheel torque difference of up to 1,800Nm can be actively created between the left and the right rear wheels.

As a logical addition to the xDrive all-wheel-drive system, Dynamic Performance Control can be matched to all drive concepts and engines. Whereas xDrive variably controls the power distribution between the front and rear axles, Dynamic Performance Control intelligently distributes power between the two rear wheels for precise handling, whatever the driving conditions.

The power distribution can be displayed on the onboard computer screen located between the speedometer and the rev counter.

Integrated Chassis Management

To allow Dynamic Performance Control to work it has to be co-ordinated by the Integrated Chassis Management (ICM) system. This high-performance electronic control network uses high capability computing power to control the drive and suspension functions of the X6 to deliver maximum dynamic capability regardless of driving condition. ICM controls the xDrive, Dynamic Stability Control + and Dynamic Performance Control actuators and, when fitted, the Active Steering and Adaptive Drive functions.

To enable ICM to function to the desired level, FlexRay technology, the fastest method of data transmission currently available in a production car, is employed. Through the use of more powerful computer processors, offering what is essentially a greater bandwidth, FlexRay is able to cope with far greater amounts of data than previous car electronic systems.

The result of ICM featuring FlexRay technology is that all the technological features of the BMW X6 respond near instantaneously to inputs to deliver a large Sports Activity Vehicle with sportscar-like handling and performance.

Suspension

The BMW X6 front suspension consists of a double wishbone arrangement similar to that of an open-wheeled racing car. This allows engineers to fine-tune the suspension for the best kinematic configuration which, in turn, delivers outstanding lateral acceleration and directional stability. At the same time, it minimises the impact forces transmitted back through the car. The rear suspension of the new X6 features BMW's patented Integral IV rear axle.

The standard sport suspension configuration can be enhanced by specifying Adaptive Drive. This optional system uses active hydraulic anti-roll bars to counteract the cornering forces of the car to keep the body from leaning too heavily in a corner and unsettling the occupants. In addition to this, Adaptive Drive incorporates Electronic Damper Control (EDC) that uses sensors to continuously adjust the damper setting for the optimum comfort. The driver can adjust EDC to one of two settings, Normal and Sport, dependent on required ride performance.

A unique four-wheel-drive system

xDrive is BMW's unique four-wheel-drive system which first appeared on the revised first-generation BMW X5 in 2003. xDrive works by ensuring that drive forces are instantly delivered to the axle that needs them most. The xDrive concept has two key ingredients – a centrally mounted, electronically activated, multi-plate clutch to distribute drive between axles, and the DSC+ system outlined below.

The electronically controlled clutch in the BMW X6 is superior in all but extreme off-roading to rival all-wheel drive systems, simply because it is able to respond more quickly. Many conventional four-wheel drive systems require the build-up of hydraulic pressure to change drive distribution. With xDrive being allied to the DSC+ system, it is more predictive. The DSC+ sensors constantly monitor individual wheel speed, steering angle, lateral acceleration, throttle input and yaw rate angles, and feed this back to enable xDrive's multi-plate clutch to switch power between axles.

The result of this class-leading technology, allied to Dynamic Performance Control, is a vehicle that offers predictable, safe handling but one that still feels as nimble as a sports car.

Dynamic Stability Control+

Dynamic Stability Control+ (DSC+) is standard on the new X6 and offers four additional functions for added safety and comfort:

- **Brake Pre-tensioning** shortens stopping distances during an emergency stop by priming the brakes should the car detect the driver lifting off the accelerator sharply in reaction to an incident ahead.
- **Brake Drying** improves braking performance in the wet by periodically applying the brake pads to scrub away the film of water that can build up on the brake discs.
- **Hill-start Assistant** allows a car to pull away smoothly on a steep gradient without rolling backwards. The brakes are held for the short time it takes the driver to apply the accelerator after releasing the foot or handbrake.

- **Brake Fade Compensation** applies additional braking without any extra effort from the driver should sensors detect that the brake pads are starting to lose 'bite' due to heat build up.

The driver of a BMW X6 is also able to select the Dynamic Traction Control (DTC) function of DSC+. DTC allows for a greater degree of wheel slip to enable a driver to pull away on loose surfaces such as snow or gravel without the DSC+ intervening through a loss of grip. DTC allows for more spirited driving in the dry without interruption and can be selected via a button on the centre console.

Steering

The BMW X6 comes as standard with a performance-oriented steering rack for precise, short steering inputs. Drivers wishing to build on this can opt for BMW's unique Active Steering system. This varies the steering ratio depending on road speed. It does this by way of an electronically operated planetary gear that intersects the steering shaft. The planetary gear, in conjunction with an electric motor, is able to add more lock than provided by the driver at slow speeds to make parking and slow speed manoeuvres effortless. When driving at higher speeds the opposite occurs with Active Steering actually retarding the input from the driver ensuring a smoother, more composed, drive. It also makes a larger car feel more nimble than its outward dimensions might suggest.

Safety

A body structure conceived and designed for maximum occupant safety underpins the BMW X6. In combination with the car's passive safety systems, it fulfils all prerequisites for excellent results in all crash-tests. Occupant safety is ensured by front and side airbags, as well as head airbags all-round, and crash-activated headrests at the front. Bi-xenon dual headlights including a daytime light function, fog lamps, two-stage brake lights, and Run-flat tyres all come as standard.

2. Market

BMW broke the mould when it launched the X5 in 1999. The decision to break out of the 3, 5 and 7 Series cast has been subsequently justified by buoyant sales. The number of similar concept products now on offer, following the X5's market introduction to the large 4x4 arena that previously only offered hardcore off-roaders, is further flattering proof of the model's success. Step forward a decade and BMW has rewritten the 4x4 rule book once again. The BMW X6 is the first car of its type in the premium market and offers customers an enticing blend of coupé styling and four-wheel-drive capability and practicality.

The rationale for the BMW X6 is best appreciated when viewed in terms of the choice between the BMW 3 Series Saloon, Touring, Coupé and Convertible. People buy all four versions of the 3 Series depending on their circumstances and desires. The same will apply to the BMW X6 when compared with other BMW X models.

The BMW X6 is undeniably a niche car. However, research has shown that three key buyer profiles exist:

- Buyers who want the command driving position an xDrive product provides, but who also aspire to the sporting style of a coupé.
- Early adopters. BMW broke the mould when launching the X5 and the interest for that model came from early adopters looking for something different. BMW X6 customers will come from a similar demographic.
- The BMW X5 or other Sports Activity Vehicle owners whose families have left home and still want a similar car, but one that doesn't scream 'family'.

Historically, BMW X products have proved popular with new car buyers as the table overleaf indicates. The desirability of BMW X product is backed up by the knowledge that a BMW X5 3.0d is the third biggest selling new vehicle at BMW dealerships*. The BMW X3 2.0d is also popular being the ninth best selling new vehicle.

*Note: In 2007 the BMW 320d Saloon accounted for 12,015 sales, BMW 520d Saloon 8,365 sales and the BMW X5 3.0d 6,233 sales.

BMW UK expects to sell approximately 2,300 X6s in a full year, with the X6 xDrive30d and the X6 xDrive35d accounting for approximately 85 per cent of sales. To put this sales outlook into perspective the table below outlines the popularity of the other X models in the BMW range.

Model	2000	2001	2002	2003	2004	2005	2006	2007
BMW X5	469	5,650	6,665	8,536	8,421	10,808	6,254	7,202
BMW X3	N/A	N/A	N/A	N/A	6,711	7,536	7,616	4,888

The BMW X6 sits alongside these models to offer buyers something totally unique. The majority of buyers are expected to be conquest sales from rival manufacturers. High on customers shopping lists will be the bold styling and the advanced drivetrain and chassis.

Tim Abbott, Sales Director at BMW UK, said: "BMW sales have grown exponentially in the last decade from 64,013 in 1997 to 121,831 in 2007. Key to this growth has been our ability to introduce niche vehicles to cater for our growing and more demanding customer base. The BMW X6 is a logical progression. There is a market for this type of vehicle and BMW expects two thirds of buyers to be conquest customers from other manufacturers."

A new nomenclature

Given the proliferation of BMWs producing varying outputs from the same capacity engine, a new solution had to be found for the naming of a vehicle. New models will now adopt 'virtual capacity'. For example, the 325d, 330d and the 335d are all powered by a 3.0-litre diesel engine. When looking at the X6 xDrive30d and the xDrive35d both follow this path. The addition of xDrive to the vehicle name underscores the four-wheel-drive capability.