



electric sedan produced and sold by Tesla Model S. Motor vehicle Tesla, Inc. Also calledCode name: WhiteStar[1][2][3]Production2012-presentAssemblyUnited States: Fremont, California (Tesla Factory)Netherlands: Tilburg (all parts)DesignerFranz von HolzhausenBody and chassisClassFull-size / Luxury Car (E) / Grand tourer (S)Body style5-door liftback sedanLayout Rear-motor, rear-wheel drive (D models) RelatedTesla Model XPowertrainElectric motorFront and rear motor combined output up to 615 kW (825 bhp). 1.300 N·m (960 lb·ft), 3-phase AC induction motorTransmission1-speed fixed gear ratio (9.734:1 or 9.325:1); direct-drive[4][5]Battery100 kWh lithium ion60, 70, 75, 85, 90 kWh discontinuedElectric range75 kWh (270 MJ)249–259 mi (401–417 km) (EPA)85 kWh (310 MJ)253–272 mi (407–438 km) (EPA)310 mi (500 km) (NEDC)90 kWh (320 MJ)270-294 mi (435-473 km) (EPA)100 kWh (360 MJ)348-402 mi (560-647 km) (EPA)Plug-in chargingOnboard charger 3 400 V 16 A[6] (Type 2);[7] 1 485-300 V 48 A (new front fascia variant)Optional charger: 20 kW from 1 427 V 72 ADual charger: 21.1 kW from 1 4264 V 80 A and 22 kW from 3 400 V 32 A; 19.2 kW from 2 400 V 16 A[6] (Type 2);[7] 1 485-300 V 48 A (new front fascia variant)Optional charger: 20 kW from 1 427 V 72 ADual charger: 21.1 kW from 1 4264 V 80 A and 22 kW from 3 400 V 32 A; 19.2 kW from 2 400 V 16 A[6] (Type 2);[7] 1 485-300 V 48 A (new front fascia variant)Optional charger: 20 kW from 1 427 V 72 ADual charger: 21.1 kW from 1 4264 V 80 A and 22 kW from 3 400 V 32 A; 19.2 kW from 2 400 V 16 A[6] (Type 2);[7] 1 485-300 V 48 A (new front fascia variant)Optional charger: 20 kW from 1 427 V 72 ADual charger: 21.1 kW from 1 4264 V 80 A and 22 kW from 3 400 V 32 A; 19.2 kW from 2 400 V 16 A[6] (Type 2);[7] 1 485-300 V 48 A (new front fascia variant)Optional charger: 20 kW from 1 427 V 72 ADual charger: 21.1 kW from 1 4264 V 80 A and 22 kW from 3 400 V 32 A; 19.2 kW from 2 400 V 32 A; 19.2 kW from 3 400 V 16 A[6] (Type 2);[7] 1 485-300 V 48 A (new front fascia variant)Optional charger: 20 kW from 1 427 V 72 ADual charger: 21.1 kW from 1 4264 V 80 A and 22 kW from 3 400 V 32 A; 19.2 kW from 240 V 80 A[8] (old front fascia variant); 16.5 kW from 36 400 V 24 A (new front fascia variant)[6]Offboard chargerSupercharger at 150-250 kW DCDimensionsWheelbase116.5 in (2,960 mm)Width77.3 in (1,964 mm) (ex. mirrors)86.2 in (2,189 mm) (inc. mirrors)Height56.5 in (1,440 mm)Curb weight4,323-4,960 lb (1,961–2,250 kg)[9][10][11] The Tesla Model S is an all-electric five-door liftback sedan produced by Tesla, Inc., and was introduced on June 22, 2012.[12] As of August 2020[update], the Model S cars built from October 2014 have a feature called Autopilot, [16] an advanced driver assistance system that allows the car to operate without assistance from the driver. [17] However, the driver must supervise continuously and take control if there is an issue. Autopilot 2.0, introduced in October 2016, also includes "Enhanced Summon", which allows the car to navigate through a parking lot to its owner without anyone in the driver's seat.[18] Sentry mode, available on cars built after August 2017,[19] senses and records suspicious activity around the car. In 2013, the Model S became the first electric car to top the monthly new-car-sales ranking in any country, twice leading in Norway, in September and December 2013[20][21][22][23] and also in Denmark in December 2015.[24] Global Model S sales passed 250,000 units in September 2018 (more recent numbers are not available because Tesla combines sales of Model S and Model S. [25][26][27][28] The U.S. is its leading market, with about 158,000 units delivered through December 2019.[29] The Tesla Model S was the top-selling plug-in electric car worldwide in 2015 and 2016.[30][31][32] The December 2017 Consumer Reports owner satisfaction survey had the Tesla Model S at the top for all cars; [33] in December 2019, it is in fifth position.[34] In 2019, the US magazine Motor Trend named the 2013 Tesla Model S the ultimate "car of the year" over the magazine's 70-year history.[35] History Tesla Model S prototype at the 2009 Franz von Holzhausen, who previously worked for Mazda North American Operations,[36] and was based on the Mercedes Benz CLS 4-Door Coupe for the overall design.[37] The car was codenamed WhiteStar during research and preliminary development.[1][2][3] It was officially announced in a press release on June 30, 2008.[38][39] The prototype vehicle was displayed at a press conference on March 26, 2009.[40] Exclusive premier of their Model S electric car was held at their Menlo Park store on April 8, 2009. In February 2008 it was reported that Tesla, Inc. (then Tesla Motors) was planning to offer a range-extended version of its Model S. This version would have included a gasoline engine to extend the driving range of the vehicle, [41] but it was removed in later revisions. At the GoingGreen conference in September 2008 Tesla's CEO, Elon Musk, announced that Tesla was developing only electric cars.[42] First production Model S, with owner and Tesla board member Steve Jurvetson Construction of an assembly factory in Albuquerque, New Mexico (a central location for shipping) was supposed to begin in April 2007, but was cancelled.[43] A factory to be built in San Jose, California was also announced.[44][45][46] In May 2010 Tesla announced it would produce the Model S at the former NUMMI assembly plant in Fremont, California,[47] now known as the Tesla Factory. This third plan was implemented. The Tesla Model S was the 2013 World Green Car of the Year. 2013 Motor Trend Car of the Year. 2013 Car of the Year. Automobile magazine's 2013 Car of the Year. Time Magazine's 2013 Car of the Year. 2015. Car and Driver named the Model S the Car of the Year. 2013 Motor Trend Car of the Year. 2013 Motor Trend Car of the Year. 2013 Car of the Year. 2014 Car of the Year. 2015 Car and Driver named the Model S the Car of the Year. 2014 Car of the Year. 2015 Car and Driver named the Model S the Car of the Year. 2014 Car of the Year. 2015 Car and Driver named the Model S the Car of the Year. 2014 Car of the Year. 2015 Car and Driver named the Model S the Car of the Year. 2014 Car of the Year. 2014 Car of the Year. 2015 Car and Driver named the Model S the Car of the Year. 2014 due to poor reliability, one year later, Consumer Reports added the car to its recommended list.[49][50] Pre-facelift Tesla Model SFacelifted Tesla Model S miles (1.6 billion km), the first plug-in all-electric car to reach that total.[51][52] (In 2014 the hybrid-electric Chevy Volt had travelled 1 billion miles, but only 629 million were all-electric Leaf had accumulated 625 million total miles.[52]) Tesla said 68% of Model S travel was in North America, 25% in Europe and 7% in Asia-Pacific.[52] Global Model S sales passed the 100,000 units in 2015,[53] and the 150,000 mark in November 2016.[54] The 200,000 milestone was achieved by early in the fourth quarter of 2017.[25] In April 2016, Tesla removed the black nose cone and added a body colored fascia, commonly referred to as a facelifted Tesla.[55] The front fascia has a similar design as the Model X, adding adaptive LED headlights. A HEPA cabin air filtration system was added. The standard charger increased from 40 to 48 amps, speeding charging at higher-amperage outlets. Two ash wood interior options were added.[56] In June 2017, Tesla discontinued selling the 90 kWh battery pack option as the 100 kWh battery pack was in plentiful supply.[57] In August 2017, Tesla announced that HW2.5 included a secondary processor node to provide more computing power and additional wiring redundancy to slightly improve reliability; it also enabled dashcam and sentry mode capabilities.[58][59] In March 2018 it was announced that Tesla upgraded the Media Control Unit (MCU) to version 2.[60] MCU 2 improved the performance of the 17 in (430 mm) center console screen, allowing for Tesla Arcade and Tesla Theater.[61] In May 2018 Tesla released incomplete source code[62] for the Model S on a GitHub repository as part of their software license compliance process in collaboration with the Software Freedom Conservancy.[63][64] In January 2019, Tesla discontinued the 75D version, making the 100D the base version of the Model S.[65] In an engineering refresh in May 2019, range was increased to 370 mi (600 km) and smart air suspension was added.[66] In February 2020 Tesla increased the range of the Model S to 390 mi (630 km) of range.[67] In August 2020 the range test results where updated by the EPA to 402 miles (647 km), higher than that of any other battery electric car.[13][14][15] On October 15, 2020, the U.S. price of the long-range Tesla Model S was lowered to \$69,420.[68] [69][70][71] On January 28, 2021, Model S was updated with a modified exterior and interior. The new Model S was launched alongside Model S lineup in favor of the new Plaid and Plaid+ branding. Production Main article: Tesla Factory § Tesla Model S manufacturing process Model S manufacturing at the Tesla Factory Tesla manufactures the Model S at the 5.4-million sq ft (500,000 m2)[72] Tesla Factory in Fremont, California. For the European market, Tesla assembles and distributes from its European Distribution Center in Tilburg, the Netherlands.[73] Cars are built and tested in Fremont, California. The battery pack, the electric motor and parts are disassembled and shipped separately to Tilburg, where the cars are reassembled. [74] The center occupies a 203,000 sq ft (18,900 m2) industrial building that also serves as a workshop and spare parts warehouse. Tesla expects the Model S to "pay back" the energy that went into producing the car in fewer than 10,000 miles (16,000 km).[75] The first ten customers received their cars at the Fremont factory on June 22, 2012, at the official launch.[76] Production grew from 15–20 cars completed per week in August 2012[76] to about 1,000 cars per week in 2015.[77] In October 2015,
Tesla announced the company is negotiating with the Chinese government on producing its electric cars domestically. Local production has the potential to reduce the sales prices of Tesla models by a third. [78][79] Agreement for a production facility with capacity for up to 500,000 vehicles was formally announced in July 2018. [80] Design Model S chassis with powertrain and battery pack[81] The Model S is notable for being designed from the ground up with an electric vehicles where the manufacturer has simply swapped out or supplanted an internal combustion engine with an electric motor.[83][84][85] As a result, the Model S is able to offer features such as a front trunk (a "frunk") in addition to a large rear trunk space and an enlarged front crumple zone compared to the typical combustion, differing in energy capacity (battery size), and equipment. It is classified as a fullsize luxury car in the US, or as a "Large Car"[87] (greater than or equal to 120 cu ft or 3.4 m3) or "Luxury Sedan"[88] by the EPA. The Euro Car Segment (sports car),[89][90] or "Oberklasse" (F-segment) in Germany.[91] Powertrain Model S P85+ using regenerative braking power in excess of 60 kW. During regenerative braking, the power indicator is green. The 2012 Tesla Model S Performance model has a three-phase, four-pole AC induction 416 hp (310 kW) and 443 ft·lb (601 N·m) rear-mounted electric motor with copper rotor. [92] The base model uses a 270 kW (362 hp) and 441 N·m (325 ft·lb) motor. The P100D outputs 439 kW (589 hp) and 1,248 N·m (920 lbf·ft) torque on a dyno.[93] The company initially claimed a drag coefficient of Cd=0.24,[94] lower than any other production car when released.[95] Independent measurement by Car and Driver in May 2014 bore out Tesla's claim by exactly confirming a drag coefficient of Cd=0.24,[96] As of 2019, Tesla specifies Cd=0.23 for the Model S.[97] The rear axle has a traditional open differential. Models with Dual Drive dual motors also have no mechanical linkage – with dual motors, the power distribution among them is controlled electronically.[98] The Model S P90D has a top speed of 155 mph (249 km/h) and it can accelerate from 0 to 60 miles per hour (0 to 97 km/h) in 2.8 seconds, despite the lower total motor powertrain. The Model S P85D, a dual-motor all-wheel-drive vehicle has a governed top speed of 155 mph (249 km/h)[99] and it accelerates from 0 to 60 miles per hour (0 to 97 km/h) in 3.2 seconds (tested to 3.1 seconds), under "Insane Mode", with 1g of acceleration.[99][100] New P85Ds have an optional "Ludicrous Mode" hardware package available with the 90 kWh battery upgrade (thus becoming a P90D) that improves the 0 to 60 miles per hour (0 to 97 km/h) acceleration to 2.8 seconds and 1.1g.[101][102][103] Tesla initially reported the total output in the P85D as the arithmetic addition of the maximum power of the individual electric motors (as required by the European Union)[104] at 515 kW (691 hp) but later reported it as 345 kW (463 hp) because the two motors do not give their maximum power at the same time.[105] As of March 2017, the P100D variant is the quickest production vehicle with a NHRA rolling start to 60 mph in Motor Trend tests with 2.28 seconds (acceleration clock started after 0.26 seconds at 5.9 mph) in ludicrous mode.[106] Owing to overheating issues (the radiator has no blower),[84] Tesla limits the number of times that a driver is able to use Ludicrous mode within a certain amount of time, as driving the car in that mode may shorten the battery's lifespan and can cause damage to the car. [107][108] According to Motor Trend, selecting the "Yes, bring it on!" option for maximum acceleration "initiates a process of battery and motor conditioning, wherein the battery temperature is raised slightly and the motors are cooled using the air-conditioning system. It usually takes just a few minutes, longer in extreme ambient temperatures or after repeated runs. You should expect to wait a minimum of 10 minutes in-between runs."[106] The powertrain provides regenerative braking power of more than 60 kW, which both reduces energy consumption and improves brake lifetime. Owners reported many powertrain issues from 2012, improving significantly over the years.[109] In July 2015, Tesla announced its goal to make the Model S powertrain last for one million miles.[110] By 2017, in the Consumer Reports Car Reliability Survey, Tesla's position on the list had moved up four spots; the predicted reliability rating for Model S reached "above average" for the first time.[111] In April 2019, Tesla started making the Model S and Model X Performance and Long Range Plus cars with the "Raven" powertrain.[112] It includes the permanent magnet synchronous reluctance motor from the Tesla Model 3 as the front motor of the Model S and Model X.[112] The motor is both more efficient than the previous motor.[112] The Raven powertrain also includes a new adaptive air suspension.[112] Dual-motor all-wheel-drive versions On October 9, 2014, Tesla announced the introduction of "Dual Drive" all-wheel drive (AWD) versions of the Model S 60, 85, and P85 models, designated by a D at the end of the model number.[113][114][115] On April 8, 2015, Tesla introduced the Model S 70D as its new entry-level car, with all-wheel drive and an improved range of 240 miles (385 km). The 70D replaced the 60 and 60D in the Model S lineup, with the latter two models no longer being available for purchase. The P85 option was also dropped.[116][117] In the 85D, the rear drive unit is replaced by one with a smaller motor, while a second motor of similar size is added to the front wheels. This results in an AWD car with comparable power and acceleration to the rear wheel drive (RWD) version. Additionally, Tesla said the 85D has a 2% (5-mile) range increase and 11% increase in top speed over the 85.[118] In the P85D, the high-power rear-drive unit is retained, while the additional front-drive motor boosts the total power by about 50%. This results in a significant increase in acceleration and top speed. Deliveries of the P85D started in December 2014, with the 85D models starting in April 2015.[114] On June 9, 2016, Tesla reintroduced the 60 and 60D, which has a 75 kWh battery, software locked to 60 kWh[119] and there is an option to purchase an unlock for the 75 kWh capacity. The early 2016 refresh also offers the "Bioweapon Defense Mode" air filter first offered on the Model S P100D with Ludicrous Mode as its new top-level car, with all-wheel drive and an improved EPA estimated range of 315 mi (507 km). [121] This version of the Model S is notable for being the first electric vehicle to have an EPA estimated range greater than 300 miles (485 km) and for being the fastest accelerating vehicle currently in production, with a 0-60 mph (0-97 km/h) time of 2.5 seconds, when optioned with Ludicrous Mode.[86][122] On April 16, 2017, Tesla removed the model 60 and 60D options, since most customers pick the larger 75 kWh-battery option. This made the Model S 75 the entry-level Model S teased that a tri-motor version (one motor on the front axle, and a motor on each of the rear wheels) of the Model S would be available.[125] The version is referred to as "Plaid", which is a reference to the only speed faster than "ludicrous" in the movie Spaceballs.[126] It was expected to go into production in fall of 2020.[127] In September 2020, Tesla started taking orders for the tri-motor version, but the delivery was pushed to the end of 2021.[128] It is expected to have 520 miles (840 km) of EPA range, a top speed of 200 mph (320 km/h), go from 0-60 mph (97 km/h) in less than 2 seconds, drive a quarter-mile in under 9 seconds, and start at \$139,990.[128] On January 27, 2021, Tesla updated its website to remove the Performance trim and replace it with the Plaid trim. The previous Plaid trim was renamed to Plaid trim. The previous Plaid trim was renamed to Plaid trim. The previous Plaid trim was renamed to Plaid trim. (97 km/h) in 1.99s, and start at \$119,990. Battery Tesla Model S battery is made of several thousand cylindrical cells (18650) In 2012, the EPA range for the 60 kWh battery was 265 miles (426 km).[131] According to Musk, the Model S has a battery with twice the energy density of that on the Nissan Leaf, but the difference in range is more than double. This is also due to other factors such as drag coefficient, weight, motor efficiency and rolling resistance.[132] Musk stated that driving at 65 mph (105 km/h), under normal conditions, gives a reasonable range of 250 miles (400 km).[133] [better source needed] The energy-saving sleep state powers off the display and other vehicle electronics, after the car goes into sleep state. This increases the time it takes the touchscreen and instrument panel to become usable. This mode can decrease the loss of the car's range when not being used to 2.3 mi (3.7 km) per day, as of 2013[update].[134] The 85 kWh battery pack weighs 1,200 lb (540 kg)[135][better source needed] and contains 7,104 lithium-ion battery cells in 16 modules[136] wired in series (14 in the flat section and two stacked on the front).[137] Each module contains 6 groups of 74 cells[138] wired in parallel; the 6 groups are then wired in series within the module.[138][139][140][141] As of June 2012[update], the battery pack used modified Panasonic cells with nickel-cobalt-aluminum cathodes.[142] Each cell was of the 18650 form factor (i.e., an 18 mm diameter, 65 mm height cylinder), similar to the Panasonic NCR18650B cell that has an energy density of 265 Wh/kg.[143] Analysts estimate battery cost to be around 21–22% of the car cost.[144] Lithium-ion batteries operate best at certain temperatures are controlled by a liquid cooling/heating circuit.[145] and the battery is uninsulated.[84] Waste heat from the motor heats the battery in cold conditions, and battery performance is reduced until a suitable battery temperature is reached.[146] The
battery can be pre-heated by a 6 kW internal heater, either from itself using battery power, or from a charger.[84] The battery is guaranteed for eight years or 125,000 miles (200,000 km in metric countries) for the base model with the 60 kWh battery pack. The 85 kWh battery pack is guaranteed for eight years and unlimited miles. [147][148] A poll among drivers indicate that accumulated battery loss steadies around 5% after 30,000 miles (50,000 km), [109][149] decreasing further about 1% per additional 30,000 miles (50,000 km). Whereas Nissan offered a 70% battery limit, Tesla did not specify a limit for battery loss for S/X[150][151] until 2020, when a 70% warranty was specified, similar to Model 3.[152] Some early battery replacement guarantee takes effect after the eighth year for the 60 kWh and 85 kWh batteries.[154] In 2013, Tesla canceled a 40 kWh version of the car due to lack of demand, saying that only 4% of pre-orders were for the 40 kWh battery option. Customers who ordered this option. Customers who ordered this option instead received the 60 kWh pack, with charge software-limited to 40 kWh (139 miles, 224 km[155]). It has the improved acceleration and top speed of the bigger pack and can be upgraded to use the full 60 kWh.[156] On April 8, 2015, Tesla discontinued the Model S 60, and replaced the base model with the Model S 70.[157] In 2015, Tesla introduced a 70 kWh battery to replace the existing 60 kWh batteries and base 60 kWh Model S vehicles, as the 60 was low margin and not sufficiently welcomed by customers.[158][159] All 70 kWh cars can be had with rear-wheel drive or all wheel drive.[160] The 60 was re-introduced its 70, 90, 90D and P90D variants along with a "ludicrous mode" for the performance model. The P90D combines a front axle power of 259 horsepower (193 kW) and rear axle power of 503 horsepower (375 kW) for a 0-60 mph time of 2.8 seconds. The acceleration of the P90D can reach 1.1q, described by Tesla as "faster than falling".[110][161] Model S front trunk, which Tesla calls the frunk[162] Tesla described its July 2015 introduction of the 90 kWh battery as a "range upgrade" of the 85 kWh battery and explained that the 6% energy increase was due to "improved cell chemistry"[110] and the introduction of silicon into the cell's graphite anode.[163] Tesla additionally announced its expectation of an annual improvement in battery capacity of about 5%. Tesla also explained that apart from the P90D the Model S has its main battery conductor protected by a fuse rated for 1,300 A and that this rating is somewhat conservative given the uncertainty Tesla has for the P90D introduced Inconel battery contactors[164] and an electronically controlled pyroactivated fuse, which monitors the current at the millisecond level, cuts the power with "extreme precision and certainty" and has a rating of 1,500 A.[110] In February 2016, the 85 kWh battery option was discontinued in countries including the US, Australia and Canada.[165] In August 2016, Tesla announced the availability of a new 100 kWh battery with 315 miles (507 km) of range.[166][167] The P100D battery weighs 625 kg in a 0.40 m³ volume; a density of 160 Wh/kg.[168] In April 2017, Tesla ceased offering the 60 kWh software-limited battery option. The lowest-capacity option became the 75 kWh, and at the same time Tesla significantly reduced the software upgrade options for facelifted 60 and 70 models to be upgraded over-the-air to 75 (and rebadged at their next visit to a Tesla service centre). In January 2019, Tesla discontinued the 75 kWh battery option, leaving two possible configurations with the 100 kWh battery pack as the 100D and the P100D. Energy consumption Under its fivecycle testing protocol, the United States Environmental Protection Agency (EPA) rated the 90 kWh Model S model with a combined fuel economy equivalent 102 mpg-imp), with an equivalent 102 mpg-US (2.3 L/100 km; 122 mpg-imp) in city driving and 107 mpg-US (2.2 L/100 km; 129 mpg-imp) on highways.[169] The following table shows the EPA's official ratings for fuel economy in miles per gallon gasoline equivalent (MPGe). 2012–16 Tesla Model S fuel economy (MPGe) Combined City Highway RWD 6060 kWh[170][171][172] 2013–15 95; 35 kWh/100 mi22 kWh/100 km 94; 36 kWh/100 mi22 kWh/100 km 97; 35 kWh/100 mi22 kWh/100 km 101; 33 kWh/100 mi20 kWh/100 mi20 kWh/100 mi20 kWh/100 mi20 kWh/100 mi20 kWh/100 mi20 kWh/100 km 107; 31 kWh/100 mi20 kWh/100 mi20 kWh/100 mi20 kWh/100 km 107; 31 kWh/100 mi20 kWh/100 kWh/100 mi20 kWh/100 kWh/100 kWh/100 kWh/100 kWh/ 33 kWh/100 mi20 kWh/100 km AWD 75D75 kWh/100 km 102; 33 kWh/100 mi21 kWh/100 km 105; 32 kWh/100 km 102; 33 kWh/100 km 105; 32 [170] 2014 89; 38 kWh/100 mi24 kWh/100 mi25 kWh/100 mi25 kWh/100 mi22 kWh/100 mi22 kWh/100 mi21 kWh/100 mi21 kWh/100 mi22 kWh/100 mi22 kWh/100 mi22 kWh/100 mi22 kWh/100 mi21 kWh/100 mi21 kWh/100 mi21 kWh/100 mi22 kWh/100 mi22 kWh/100 mi22 kWh/100 mi21 kWh/100 mi21 kWh/100 mi21 kWh/100 mi22 kWh/100 mi22 kWh/100 mi21 kWh/100 mi21 kWh/100 mi21 kWh/100 mi22 kWh/100 mi21 kWh/100 mi21 kWh/100 mi21 kWh/100 mi21 kWh/100 mi22 kWh/100 mi20 kWh/100 mi20 kWh/100 mi21 35 kWh/100 mi22 kWh/100 km 106; 32 kWh/100 mi20 kWh/100 km 89; 38 kWh/100 mi21 kWh/100 mi21 kWh/100 mi21 kWh/100 km 107; 32 kWh/100 mi20 kWh/100 km 407; 32 kWh/100 km 107; 32 kWh/100 k 35 kWh/100 mi22 kWh/100 km AWD P90D90 kWh[170][172] 2015 93; 36 kWh/100 mi22 kWh/100 km 89; 38 kWh/100 mi22 kWh/100 km 98; 35 kWh/100 km AWD P90D90 kWh[173][176] 2016 95; 35 kWh/100 mi22 kWh/100 km 91; 37 kWh/100 mi23 kWh/100 mi23 kWh/100 mi21 kWh/100 km 98; 35 kWh/100 km AWD P90D90 kWh[173][176] 2016 95; 35 kWh/100 mi22 kWh/100 km 91; 37 kWh/100 mi23 kWh/100 mi22 kWh/100 mi21 kWh/100 mi22 kWh/100 km 98; 35 kWh/100 mi22 kWh/100 km 98; 35 kWh/100 mi22 kWh/100 km 98; 35 kWh/100 P100D100 kWh[173] 2016 98; 35 kWh/100 mi21 k dependent ranges of various Model S Speed-dependent on speed; the Model S & Roadster Vehicle energy consumption is highly dependent on speed; the Model S can use 10 kW (14 hp) at 70 mph (110 km/h), but 31 kW (42 hp) at 100 mph (160 km/h).[96] The motor consumes most of the battery's energy in operation. Other equipment (climate control, battery conditioning, etc.) may consume 15-25%, depending on outside temperature.[84] Battery placement In contrast to most earlier battery pack of the Model S forms the floor of the vehicle between the axles, providing the vehicle with several advantages: Most notably, since the battery pack is the heaviest component of the vehicle, the Model S has a center of gravity height of only 18 inches (460 mm)[135][177] (about the same as a Lotus Elise),[178] helping it to achieve a lateral acceleration of 0.9 g[179] and good protection against rollover.[180][181] The absence of a heavy engine between the front or rear axle allows the bulk of the mass to be centralized between the axles, which lowers rotational inertia and allows it to turn more quickly for its weight. The placement of the battery pack under the vehicle makes it possible to remove or replace the entire battery unit in 90 seconds for maintenance. Charge port located in front of the left tail light[182] For comparison: Illuminated non-round Tesla's own "charge port" on a US Model S Tesla Universal Mobile Connector (UMC), NEMA 5-15 Adapter (plugged in wall AC socket), NEMA 14-50 Adapter and SAE J1772 to Tesla TSL02 Charging Connector Adapter Universal Mobile Connector (UMC) intermediate connector allowing the use of different adaptor plugs. Europe/Rest of World (left) and North America (right). In all markets the charge port is located behind a door in the left taillight. During charging, the charge port pulses green. The frequency at which the charge port's light pulses slows down as the charge level approaches full. When charger and is solid green. [183] Type 2 connector in Europe/Worldwide (left) and North America (right) The Model S comes equipped with a different charger and connector in North America versus other markets, derived from differences in the local electric grid systems. North America The standard North America The standard North America on board charger accepts single phase 120 or 240 volt sources at a rate of up to 10 kW. Included adapters allow the car to charge from a standard 120 volt outlet, a 240 volt NEMA 14-50 outlet, a 208 volt leg to leg of a 208Y/120 V 3-phase configuration, a 277 volt leg to neutral of a 480Y/277 V 3-phase configuration and SAE J1772 public chargers. An optional upgrade for a second 10 kW onboard charger supports a total of up to 20 kW charging from an 80 amp available Tesla Wall Connector.[142] The North American connector uses a proprietary Tesla design. Charging times vary depending on the battery pack's state-of-charge, its overall capacity, the available circuit breaker amperage. From a 120 volt/15 amp household outlet, the range increases by 3.75 miles (6 km) for every hour of charging. From a 10 kW, NEMA 14-50 240 V/50 A outlet (like those used by RVs or standard cooking ranges), the charge rate is 28.75 miles (46 km) per hour. Using Tesla's 20 kW, 240 V High Power Wall Connector increases the rate to 57 miles (92 km) per hour. Ising Tesla's 20 kW, 240 V High Power Wall Connector increases the rate to 57 miles (46 km) per hour. Using Tesla's 20 kW, 240 V High Power Wall Connector increases the rate to 57 miles (92 km) per hour if the car is configured with dual chargers (20 kW).[184] Europe/Asia-Pacific Type 2 compatible inlet implementing a three-phase AC charging and DC Supercharging on European Model S[185][186] The standard European charger accepts single phase 230 V (400 V) at up to 11 kW. The Type 2 connector on the car directly accepts "Mennekes" IEC 62196 charging from public stations at up to 400 V, and included adapters allow the car to charge from standard continental European outlets and IEC 60309 230 volt (blue 3-pin) or 400 volt (red 5-pin) or 400 volt (red 5-pin) outlets, depending on region. The addition of
a second charger supports charging at up to 22 kW (up to 16.5 kW with new charger for 3 phase 400 V 24 A on new front fascia Model S), providing up to 68 mi (110 km) (50 mi (80 km) on new front fascia Model S) of range per hour of charge. The 22 KW option was discontinued in 2016. Tesla also offers an adapter that allows Model S to be charged at charging stations with CCS connectors. A CCS retrofit is available for older vehicles, which includes both an upgrade of the vehicle charger and the adapter.[187] Type 2 compatible outlet found on Tesla Superchargers in Europe, Middle East and Asia-Pacific Suspension on all four wheels - front double wishbone, virtual steer axis control arm and rear independent multilink.[92] The car comes with self-leveling, height-adjustable air suspension, which was originally an extra cost option. This is accomplished via adjustable Bilstein shock absorbers controlled by the driver. The car lowers itself at highway speeds and can be set to a higher level to traverse steep driveways and rough terrain, mitigating the default low 6 inches (150 mm) ground clearance and relatively long 116 inches (2,900 mm) wheelbase. [188] The suspension system has been changed retroactively on several occasions in "over-the-air" software updates. During the 2013 'fire investigation', NHTSA asked Tesla to disable the car's ability to lower itself at speed on the theory that ground clearance below 6 inches (150 mm) might cause the batteries underneath the car to contact road debris.[189] In September 2014, Tesla upgraded the height adjustment feature for Model S cars equipped with air suspension to remember locations where the driver has requested higher clearance and automatically apply the setting each time the car enters the area.[190] Autopilot Main article: Tesla Autopilot See also: Autonomous car and Lane centering Beginning in September 2014, Model S vehicles come equipped with a camera (supplied by Mobileye) mounted at the top of the windshield, forward looking radar (supplied by Bosch)[191][192] in the lower grille, and ultrasonic acoustic location sensors in the front and rear bumpers that provide a 360-degree buffer zone around the car. This equipment allows Model S to detect road signs, lane markings, obstacles, and other vehicles. In addition to adaptive cruise control and lane centering, a "Tech Package", together known as Autopilot, option enables semi-autonomous drive and parking capabilities.[193][194][195] All Model S cars sold since October 2014 have the option to enable Autopilot, which allows limited hands-free driving. Autopilot, which allows limited hands-free driving. Autopilot, which allows limited hands-free driving. "We really designed the Model S to be a very sophisticated computer on wheels. Tesla is a software company as much as it is a hardware company. We view this the same as updating your phone or your laptop."[196] Full autonomy is "really a software limitation: The hardware exists to create full autonomy, so it's really about developing advanced, narrow AI for the car to operate on."[197][198] First fatal accident The first known fatal accident involving a Model S when Autopilot was active occurred in Williston, Florida on May 7, 2016. In June 2016, the U.S. National Highway Traffic Safety Administration (NHTSA) opened a formal investigation into the accident, working with the Florida Highway Patrol. According to the NHTSA, preliminary reports indicate the crash occurred when a tractor-trailer made a left turn in front of the Tesla at an intersection on a non-controlled access highway, and the driver and the car failed to apply the brakes. [199][200][201] The NHTSA's preliminary evaluation was opened to examine the design and performance of any automated driving systems in use at the time of the crash, which involves a population of an estimated 25,000 Model S cars. [202] According to Tesla, "neither autopilot nor the driver noticed the white side of the tractor-trailer against a brightly lit sky, so the brake was not applied." The car attempted to drive full speed under the trailer, "with the bottom of the trailer, "with the bottom of the trailer impacting the windshield of the Model S." Tesla also stated that this was Tesla's first known Autopilot-related death in over 130 million miles (208 million km) driven by its customers while Autopilot was activated. According to Tesla there is a fatality every 94 million miles (150 million km) among all type of vehicles in the U.S.[199][200][203] In January 2017, the NTSB report concluded Tesla was not at fault since the driver in the crash had seven seconds to see the truck and take action; the investigation revealed that the Tesla car crash rate dropped by 40 percent after autopilot was installed. [204] [205] Instrument panel is a 12.3-inch (310 mm) touchscreen control panel (right) As there are no buttons or dials, the instrument panel is a 12.3-inch (310 mm) liquidcrystal display electronic instrument cluster that indicates speed, power usage, charge level, estimated range and active gear, as well as navigation directions (driven by Garmin). The gear selector can be set to drive, neutral, reverse, and park. The infotainment control touchscreen is a 17-inch (430 mm) multi-touch panel divided into four areas. A top line displays status symbols and provides shortcuts to Charging, HomeLink, Driver Profiles, vehicle information (software version and the vehicle information (software version and thus is separate from the navigation on instrument panel), Energy, Web, Camera and Phone. The central main viewing area displays the (two) active apps, subdivided into upper and lower areas. (Most apps can be expanded to take up the entire area). At the bottom is access to various controls and settings for the vehicle such as doors, locks and lights as well as temperature controls and a secondary volume control. The instrument cluster and the infotainment panel are driven by separate Nvidia Tegra 3 3D Visual Computing Modules until mid 2018.[206][207] Tesla was the first company to ship this technology. The Tegra system on a chip (SoC) integrates eight specialized processors, including a multi-core ARM CPU, a GPU, and dedicated audio, video and image processors. Nvidia claimed that it consumes 2% of the energy of a typical CPU.[208] The navigation system uses GPS and a mix of Garmin and Google Maps route guidance. The map display on the 17 inches (430 mm) screen requires a constant Internet connection, so navigation is limited in areas without mobile network coverage. The Nav on the instrument panel is loaded on the car and does not need Internet access to function. Update 6.2 features automatic navigation guidance to charging stations if range is insufficient. [209] Enthusiasts have developed the Open Vehicle Monitoring System (OVMS) which allows the owner to remotely observe a variety of different vehicle operating parameters, such as window switches, cruise control lever, and drive selector. According to Elon Musk, the Model S runs on the open-source Linux operating system.[210] In 2014, Autoblog reported that Tesla Models S owners had determined via the car's combined diagnostics and Ethernet port that an Ubuntu system controlling the central touchscreen is connected to the car's internal Ethernet.[211] The same users determined that another Ubuntu system controlling the dashboard/navigation screen also is connected to the internal network, together with a third computer of unknown type with an unknown function. Options Until 2018, the Model S had an optional folding third row with rear-facing seats for two children with a five-point harness All versions of the Model S have the same body and normally seat five passengers. A four passenger version with executive rear seats was an option briefly in 2015 in the United States; other locations may still offer this option. An optional folding third row (discontinued in November 2018) becomes a rear-facing two-place child seat with a five-point harness.[177][181] Consumer Reports said that the 7-passenger capacity afforded by this option is larger than any other electric vehicle, though not really the same as a full-size SUV that seats are only for children over 37 in (940 mm) tall and weighing between 35 to 77 lb (16 to 35 kg), which the magazine described as "a narrow size range. It's too big for smaller kids, and larger ones won't fit under the sloping glass window."[212][213] The seats fold away under the rear cargo area, which Consumer Reports said is a "cumbersome and awkward" operation, though for the third row seats are "useful for occasional extra passengers when your kids bring friends along", provided the driver had planned ahead and left the cargo area empty.[212] Though the rear-seat option includes a stronger rear bumper, the magazine also said that seating behind the rear stronger rear bumper, the magazine also said that seating behind the rear stronger rear bumper, the magazine also said that seating behind the rear stronger rear bumper, the magazine also said that seating behind the rear stronger rear bumper, the magazine also said that seating behind the rear stronger rear bumper, the magazine also said that seating behind the rear stronger rear bumper, the magazine also said that seating behind the rear stronger rear bumper, the magazine also said that seating behind the rear stronger rear bumper, the magazine also said that seating behind the rear stronger rear bumper, the magazine also said that seating behind the rear stronger rear bumper, the magazine also said that seating behind the rear stronger rear bumper, the magazine also said that seating behind the rear stronger rear bumper, the magazine also said that seating behind the rear stronger rear bumper, the magazine also said that seating behind the rear stronger rear bumper, the magazine also said that seating behind the rear stronger rear bumper, the magazine also said that seating behind the rear stronger
rear bumper, the magazine also said that seating behind the rear stronger rear bumper, the magazine also said that seating behind the rear stronger rear bumper, the magazine also said that seating behind the rear stronger rear bumper, the magazine also said that seating behind the rear stronger rear bumper, the magazine also said that seating behind the rear stronger rear bumper, the magazine also said that seating behind the rear stronger rear bumper, the magazine also said that seating behind the rear stronger rear bumpe which Tesla calls the "frunk". In October 2014, the upgraded Model S 85D ("D" for dual motor) was introduced.[214] The upgraded version, and one driving the front wheels. The dual motor version was available for both the performance and non-performance version. The rear wheel drive version of the P85 was removed, and the dual motor option is not available for the 60 kWh version.[116] The 2015 model year update introduced electromechanical brakes.[215] In 2016, the 85 kWh and later 90 kWh battery was discontinued from all markets. A glass roof with no horizontal roof bar between the Bpillars was introduced in late 2016.[216] In 2017, the option for leather seat coverings was replaced with an option for synthetic seat coverings.[217] In 2018, the three roof options (body colored roof, or the panoramic sunroof) were removed and the car now has only an all-glass roof.[218][219] Also, the optional folding third row with rear-facing seats for two children configuration was removed. [219] Vehicle warranty and maintenance The Model S is covered by a 4-year, 50,000 mi (80,000 km) limited warranty, [220] that includes all standard equipment, the transmission and the complete powertrain (excluding tires). [221] The warranty can be extended an additional 4 years or 50,000 miles (80,000 km) beyond the original terms. [221] Warranty coverage includes a complementary loaner car—a Performance 85 or Tesla Roadster—when service is required. [222] In April 2013, Tesla announced that a previously mandatory annual vehicle inspection and maintenance fee would be made optional, and would not be required to maintain warranty coverage.[222] If chosen, the fee covers a complete inspection, tire alignment, new brake pads, hardware upgrades and miscellaneous other maintenance items as needed. In California alone, Tesla offers their own insurance, as the computer in the car can tell if you drive the car safely, then Tesla will make an evaluation and give you a more custom tailored, and quite likely cheaper insurance package. The battery and drive unit are covered for eight years or 125,000 miles (200,000 km in metric countries) for the 60 kWh base model, or eight years and unlimited distance for all 70 and 85 kWh models.[147][223] The unconditional battery warranty covers everything except deliberate damage, even including user error. [224] However, loss of battery capacity over time or usage is not covered under warranty. [clarification needed] [223] [225] Specifications Model S performance figures Model Year Battery Capacity Drivetrain Power Torque 0–60 mph Top Speed Range "40 kWh"* 2012 – 2013 40 kWh RWD 285 kW (382 hp) 430 N·m (317 lb·ft) 6.5 s 177 km/h (110 mph) EPA:[226] 224 km (139 mi) NEDC: 60 2012 – 2015 2016 – 2017 60 kWh RWD 285 kW (382 hp) 430 N·m (317 lb·ft) 5.5 s 209 km/h (130 mph) EPA:[227] 335 km (208 mi) NEDC: 375 km (233 mi) 60D 2016 – 2017 AWD 386 kW (518 hp) 441 N·m (325 lb·ft) 5.2 s EPA: 351 km (218 mi) NEDC: 408 km (254 mi) 70 2015 - 2016 70 kWh RWD 285 kW (382 hp) 525 N·m (387 lb·ft) 5.5 s 225 km/h (140 mph) EPA: 370 km (230 mi) NEDC: 420 km (261 mi) 70D AWD 386 kW (518 hp) 441 N·m (325 lb·ft) 5.2 s EPA: 390 km (240 mi) NEDC: 442 km (275 mi) 75 2016 - 2017 75 kWh RWD 285 kW (382 hp) 659 N·m (486 lb·ft) 4.3 s [228] EPA: 401 km (249 mi) NEDC: 480 km (298 mi) 75D / Standard Range 2016 - 2019 AWD 386 kW (518 hp) 441 N·m (325 lb·ft) 4.2 s [228] EPA: 417 km (259 mi) NEDC: 490 km (304 mi) 85 2012 - 2016 85 kWh RWD 285 kW (382 hp) 658 N·m (485 lb·ft) 5.4 s 225 km/h (140 mph) EPA: 426 km (265 mi) NEDC: 502 km (312 mi) 85D 2014 - 2016 AWD 386 kW (518 hp) 601 N·m (443 lb·ft) 3.8 s [229] 249 km/h (155 mph) EPA: 430 km (270 mi) NEDC: 528 km (328 mi) P85 2012 - 2014 RWD 350 kW (469 hp) 601 N·m (443 lb·ft) Performance Plus: 931 N·m (687 lb·ft) 4.2 s 209 km/h (130 mph) EPA: 430 km (270 mi) NEDC: 528 km (328 mi) P85 2012 - 2014 RWD 350 kW (469 hp) 601 N·m (443 lb·ft) Performance Plus: 931 N·m (687 lb·ft) 4.2 s 209 km/h (130 mph) EPA: 426 km (265 mi) NEDC: 502 km (312 mi) P85D 2014 - 2016 AWD 397 kW (532 hp) 931 N·m (687 lb·ft) 3.1 s Ludicrous: 2.8 s 249 km/h (155 mph) [230] EPA: 407 km (253 mi) NEDC: 480 km (298 mi) 90 2015 - 2016 90 kWh RWD 285 kW (382 hp) 658 N·m (485 lb·ft) 5.4 s 225 km/h (140 mph) EPA: 426 km (265 mi) NEDC: 502 km (312 mi) 90D 2015 – 2017 AWD 386 kW (518 hp) 931 N·m (687 lb·ft) 3.8 s 249 km/h (155 mph) [230] EPA: 473 km (294 mi) NEDC: 557 km (346 mi) P90D 2015 – 2016 397 kW (532 hp) Ludicrous: 1 373 N·m (1 013 lb·ft) 3.1 s Ludicrous: 2.8 s EPA: 430 km (270 mi) NEDC: 509 km (316 mi) 100D 2016 - 2019 100 kWh AWD 386 kW (518 hp) 441 N·m (325 lb·ft) 3.6 s [231] 249 km/h (155 mph) EPA: 539 km (335 mi [232][233]) NEDC: 632 km (762 hp) 989 N·m (729 lb·ft) Ludicrous: 1 373 N·m (1 013 lb·ft) 2.4 s 262 km/h (163 mph) EPA: 507 km (315 mi) NEDC: 613 km (381 mi) Raven (Performance) 2019 – 2021 580 kW (778 hp) 1 140 N·m (841 lb·ft) 2.3 s 262 km/h (163 mph) EPA: 623 km (387 mi) NEDC: 671 km (417 mi) Raven (Long Range Plus) 2019 – present 415 kW (557 hp) 755 N·m (557 lb·ft) 3.7 s 249 km/h (155 mph) EPA: 647 km (402 mi [234]) NEDC: 713 km (443 mi) Range-limited 60 kWh versions actually delivered Environmental impact Tesla's lithium-ion batteries contain small amounts of nickel and cobalt, the extraction and refining of which has been identified by the EPA as having a high potential for environmental impact due to the toxicity of the refining processes. [235][236] Tesla claims to recycle all the battery packs that are returned to the company,[237] and is optimistic that its Gigafactory 1, once fully operational, will be capable of recycling a significant part of the elements from old batteries are turned into new batteries.[238] Tesla has worked with ToxCo/Kinsbursky in the US since 2008 and Umicore in Europe[239] to recycle worn out RoHS batteries, [240][241] which will be performed at the new factory. [242] While ToxCo/Kinsbursky uses a hydro-metallurgical process to recover lithium from the battery, including the battery's lithium, into slag that is sold to steel refiners and cement manufacturers. [238][239][243] In February 2014, the Automotive Science Group (ASG) published the result of a study conducted to assess the life-cycle of over 1,300 automobiles across nine categories sold in North America. The study ranked the Model S as the best environmental performer in the 2014 full-size cars category. [244] Based on the assessment of life-cycle environmental footprint, the study used the average electricity mix of the U.S. grid in 2014. The Nissan Leaf had the smallest life-cycle environmental footprint of any model year 2014 automobile available in the North American market. [245] The Automotive Service Group is an advertising-supported website and marketing consulting company founded by a Seattle couple in 2009. [246] In 2012, a study by the Union of Concerned Scientists found that unless it is charged by solar or wind power, currently, an electric vehicle in the united States with similar efficiency to the Model S is responsible for the production of the same amount of CO2 as a gasoline-powered car that gets 34 to 115 MPG, depending on the source of electricity in the region in which the car is being charged. The study estimated that nearly half of Americans lived in regions where an electric vehicle.[247] A 2015 study by Union of Concerned Scientists found that in the US regions where the Model S is popular, the 68% higher manufacturing emissions are offset within a few years of average driving. During their lifecycle, EVs emit about half the amount of comparable fossil cars. [243][248] The report assumes electric materials are recycled at a rate similar to other cars, but excludes the problem of battery disposal, "because there are sparse data on how industry is currently recycling batteries or intends to do so in the future".[243] Charging Taxi Model S, charging in Moscow Home charging at up to 72 amps[249] the your mobile phone". Tesla Model S vehicles come with the Mobile Connector, which allows charging at up to 72 amps[249] and includes adapters for connecting to a variety of electricity sources. [250] In North America, adapters for 120 volt NEMA 5-15 outlets, as well as an adapter for SAE J1772 charging stations, are included. [250] Other adapters included. Connector. In Europe, adapters for CEE red 3P+N+E, CEE blue 2P+E, CEE 7, and BS 1363 are available (inclusion varies by country), and an adapter cable for connector is also included.[251][252] The Tesla Wall Connector is available for installation at a home or business, and it allows charging at up to 19.2 kW in North America and 22 kW in Europe (although charging the vehicle at 11.5 kW requires the High Amperage Charger option on the vehicle).[250][251] Destination charging the vehicle at 11.5 kW requires the High Amperage Charger option on the vehicle). businesses by Tesla for free or at a heavily discounted price, although the business is responsible for the cost of electricity. As of September 2019[update], Tesla has also distributed 23,963 destination chargers to locations worldwide.[253] Not all destination chargers are available to the public, as some businesses limit them to customers, employees, or residents only.[254] Tesla vehicles are also able to utilize public charging stations using the SAE J1772, Type 2, and CHAdeMO charging standards via adapters.[250][251] SAE J1772 and Type 2 adapters are included in the appropriate
regions, while the CHAdeMO adapter is available for purchase.[255] Tesla Superchargers Tesla Model S charging at the Supercharger network station in Harris Ranch, California, United States Main article: Tesla Superchargers, to facilitate long-distance travel. The Tesla network is currently usable only by Tesla vehicles, which are engineered for compatibility. Supercharging hardware is a standard on almost all vehicles sold by Tesla. [147][256][257][258] The Supercharger is a proprietary DC rapid-charging station that provides up to 250 kW of power, providing up to 15 miles per minute (depending on circumstances). [253] As of March 2020[update], Tesla operates 16,103 superchargers in 1,826 stations worldwide; these include 908 stations in the U.S., 98 in Canada, 16 in Mexico, 520 in Europe, and 398 in the Asia/Pacific region.[259] Battery swapping Tesla designed the Model S to allow fast battery swapping, which also facilitates vehicle assembly.[260] At a demonstration Tesla showed a battery swap operation taking around 90 seconds, about half the time it takes to refill an empty fuel tank. [261][262] In June 2013, Tesla stations, with facilities to support battery pack swaps, although by June 2015 Tesla said that it was unlikely that more battery swap stations would be added.[263] Battery swapping was planned to be deployed along Interstate 5 in California between San Francisco to Los Angeles, followed by the Washington, D.C., to Boston corridor. Each swapping station costs US\$500,000 and stocks about 50 batteries.[261] Owners can pick up their original battery pack fully charged on the return trip, which is included in the swap fee. Panoramic view of Tesla Supercharger rapid charging station in Tejon Ranch, California, and was available for pilot testing in late December 2014.[264] As of 2015[update], Tesla said they had hundreds of cars in the battery swap program, although few owners were interested in using the service. [265] In June 2015, Tesla said that it was unlikely that more battery swap stations would be added due to lack of demand for swapping [263] and shut down its only swap station in November 2016. [266] Editions The official car of the Chief Minister of Gibraltar, a Signature Model S bought in 2014[267] Tesla allocated the first 1,000 units to its Signature Performance limited edition configurations, equipped with the 85 kWh battery pack. [268][269] Tesla does not make a convertible Model S. [270][271] A custom Model S was designed for the Oceanic Preservation Society in collaboration with Obscura Digital, and was used to project images of endangered animals to help educate the public about the ongoing Holocene mass extinction, as featured in the 2015 documentary Racing Extinction. Sales and markets Researchers from the University of California, Davis, conducted a study in 2016 to identify the factors influencing the decision to adopt high-end battery electric vehicles (BEV), such as the Tesla Model S, as these vehicles are different from mainstream BEVs. The study found that "environmental, performance, and technological motivations are reasons for adoption; the new technology brings a new segment of buyers into the market; and financial purchase incentives are not important in the consumer's decision to adopt a high-end BEV."[272] Global Model S first retail deliveries ceremony at the Tesla Factory in Fremont, California, held on June 22, 2012 Tesla reported 520 reservations for the Model S during the first week they were available[273] and by December 2012, a total 15,000 net reservations (after deliveries and cancellations) had been received by year-end.[274] The special edition Model S Signature model was sold out before deliveries began in June 2012, and according to Tesla all models were sold out for that year shortly after. A car ordered in May 2012 would be delivered in early to mid-2013.[275][276] Initially Tesla expected its annual production to increase by over 50% in 2014 to 33,000 units due to a deficit in production of 2,000 units during the third guarter of 2014. The company expected its annual production to increase another 50% in 2015.[277] Tesla set a target of between 50.000 and 52.000 deliveries for Model S and Model S cars globally in 2016, making it the world's top selling plug-in electric that year.[280] In 2017, it became only the second EV to sell more than 200,000 units behind the Nissan Leaf. 2012 U.S. deliveries began June 2012.[12] Deliveries of the 60 kWh model were rescheduled from November 2013.[281] A total of 2,650 cars were delivered in North America in 2012.[282] 2013 During the first six months of 2013, 10,050 were delivered.[283] The Model S was released in Europe in early August 2013, and the first deliveries took place in Norway, Switzerland and the Netherlands, [284] and by November 2013, the Model S was on sale in 20 countries. [285] Sales totaled about 22,477 units in North America and Europe, [286] surpassing Tesla's annual sales target of 21,500 units. [287] Global cumulative sales passed the 25,000 unit milestone in December 2013. [287] By the end of 2013, according to Elon Musk, Norway and Switzerland became the company's largest per capita sales markets. [288] Tesla Model S global sales by quarter Q

17,272 1Q 2016 12,420 2Q 2016 9,764 3Q 2016 16,047 4Q 2016 12,700 1Q 2017 13,450 2Q 2017 12,000 3Q 2017 14,065 4Q 2017 15,200 1Q 2018 11,730 2Q 2018 10,930 3Q 2018 14,470 4Q 2018 13,500 Tesla Model S global sales by quarter 3Q 2012 4Q 2018 2014 Retail deliveries in China began in April 2014. [289] The righthand-drive model was released in the UK in June 2014,[290] followed by Hong Kong in July 2014[291] and Japan in September 2014.[293] Global cumulative sales of the Model S passed the 50,000 unit mark in October 2014,[294] A total of 31,655 units were sold worldwide in 2014, allowing the Model S to rank as the world's second best selling plug-in electric vehicle after the Nissan Leaf that year. [295] In 2014 about 55% of Model S deliveries took place in North America, 30% in Europe, and 15% in the Asia-Pacific market. [296] 2015 A total of 21,577 units were sold worldwide during the first half of 2015, of which, 11,532 were delivered during the second quarter alone, up about 52% over the same quarter the previous year. [297] [298] [299] As of June 2015 [update], the Model S was sold in 30 countries. [297] A total of 11,597 Model S cars were delivered during the third quarter, up about 49% over the same quarter in 2014. [278] A total of 17.272 Model S were delivered during the fourth quarter, up 76% over the same quarter the previous year, and setting a new record for the most cars delivered in a quarter. [279][300] Global Model S sales passed the 100,000 unit milestone in December 2015, three years and a half after its introduction. [53] A total of 50,446 Model S sedans were sold globally in 2015, making the Model S the world's best-selling plug-in electric car in 2015, ahead of the Nissan Leaf (about 43,000 units).[279][301] As of December 2015[update], a total of 107,228 Model S sedans had been sold worldwide since its introduction, ranking as the world's second best selling plug-in car ever after the Nissan Leaf (200,000).[279][301] The United States continued as the largest market with 63,161 units sold.[279][302] Norway listed as the Model S largest overseas market,[303] with 10,062 new units registered,[304][305][306] followed by China with 5,524 units registered through September 2015,[78][307] and the Netherlands with 4,382 units registered at the end of December 2015.[308] 2016 Model S global sales totaled 12,420 units during the first guarter of 2016.[309] Sales during the second guarter of 2016.[309] Sales during the second guarter of 2016.[309] Sales during the second guarter of 2016 were lower than anticipated by Tesla, with 9,764 Model S cars delivered worldwide during the guarter. Although production was up 20% from the previous guarter, the number of vehicles in transit at the end of June 2016 was much higher than expected (5,150 including Model X cars), representing 35.8% of the number of cars delivered in the guarter (14,402 vehicles including the Model X).[310][311] Deliveries in the third guarter of 2016 totaled 16,047 units, for cumulative sales of 38,231 Model S cars during the first nine months of 2016,[309][310][312] allowing the Model S to rank as the world's top selling plug-in car during this period, just ahead of the Nissan Leaf.[313] Global Model S sales passed the 150,000 units in November 2016, four years and five months after its introduction, with the largest share, 57%, in the US.[54] With an estimated 12,700 units delivered during the fourth quarter of 2016, sales totaled about 50,931 units in 2016,[309][310][312][314] making the Model S the world's top selling plug-in car for the second year running.[31][32] The United States had about 29,156 units delivered, followed by China with 6,334, surpassing Norway as the largest Model S overseas market.[31][315][316] As of December 2016[update], about 158,159 Model S cars have been sold worldwide since its introduction,[54][314] making the Model S the world's second best-selling plug-in electric car ever after the Nissan Leaf (250,000), and ahead of the Volt/Ampera family of plug-in hybrids (134,500).[317] 2017 Tesla delivered its 200.000th Model S in the fourth quarter of 2017.[25] About 54,715 Model S cars were sold globally in 2017.[318][319][320][321] Of these, an estimated 26,500 were delivered in the United States (48.4%), its main market.[322] After being the world's top selling plug-in car for two consecutive years, the Model S ranked in 2017 as the world's second best seller plug-in after the BAIC EC-Series city car, which sold over 78,000 units in China during 2017.[25] As of December 2017[update], with global deliveries of about 212,874 units, the Tesla Model S continued to rank as the world's all-time second best selling plug-in car after the Nissan Leaf (300,000).[25] 2018 Global Model S sales passed the 250,000 unit milestone in September 2018, and by the end of 2018 continued to rank as the second most-sold electric car in history after the Nissan Leaf.[25][26][27][28] Global deliveries totaled 50,630 vehicles in 2018.[26][27][28][323] As of December 2018[update], global sales totaled about 263,504 units since inception. [25][26][27][28][323] The U.S. is Tesla's largest market, with almost 144,000 units delivered since 2012. China ranks second, followed by Norway. [324][325][326] Sales by country The following table shows sales by year for the top selling countries through December 2019: Tesla Model S sales/registrations by top national markets(June 2012 – December 2018) Country Cumulativesales % of globalsales[a] 2019 2018 2017 2016 2015 2014 2013 2012 USA[324][30][279][302][322] ~144,562 55.9% ~25,745 26,500 29,156 25,202 16,689 ~18,650 ~2,620 China[78][307][315] 11,858[b] [c] [c] [c] 6,334 3,025[b] 2,499 N/A N/A Norway[304][305][306][327][328][329] 20,639 7.4% 1,181 3,633 3,712 2,051 4,039 4,040 1,983 N/A Netherlands[330][331][332][333][334][335] 13,839 5.3% 5,633 2,051 1,693 1,805 1,465 1,192 N/A Canada[336] 6,731 3.2% 1,675 1,466 2,010 847 638 95 Germany[91][337][338][339][340][341] 7,551 2.9% 1,248 2,241 1,474 1,582 815 191 N/A UK[342][343][344][345] 9,300[d] 2.9% 1,756 2,518 2,367 1,389 698 N/A N/A Switzerland [e][346] 4,695 2.2% 1,131 1,299 1,556 496 213 N/A Denmark[347][352][353][354] 3,788 1.4% 883 800 838 996 266 5 N/A France[355][356][357][358] 3,455 1.3% 749 850 785 708 328 35 N/A Belgium[359][360][361][362][363] 3,358 1.3% 535 659 675 820 521 148 N/A Hong Kong[364] 2,221[f] 1.0% [c] [c] 2,221 N/A N/A Australia[369][370] ~1,319 0.6% [c] [c] ~1,250 69[g] N/A N/A Italy[371][372] 662 0.3% 264 218 120 52 8 N/A Global[25][26][27][28][323] 263,504 50,630[26][27][28][323] 54,715[25] 50,931[31] 50,446[279][301] 31,655[295] 22,477[286] ~2,650[274] ^ Percentage of global sales by country, inception through December 2019. ^ a b Chinese market sales in 2015 only through September. ^ a b c d e f g Sales figures not available ^ UK registrations at the end of June 2019 (not cumulative sales). ^ Includes registrations in Liechtenstein. ^ Hong Kong sales for 2015 only. ^ Only includes registrations in New South Wales and Victoria. Asia/Pacific Model S at a quick charging CHAdeMO station in Japan[373] Australia The first nine units were delivered in Sydney on December 9, 2014. Tesla also opened its first store and service centre in St Leonards, and its first Supercharger station at Pyrmont in December 2014. Initially, only two versions were available, the 60 and the 85. The Model S P85D had deliveries scheduled to begin in June 2015.[374][375] As of December 2014[update], a total of 65 Model S cars were registered in New South Wales and only four in Victoria. [376] At the end of March 2015, registrations totaled 119 in New South Wales and 54 in Victoria. Although there were no sales figures reported for Tesla in other states, the combined sales of these two states alone were enough for the Model S to rank as the top selling all-electric car in the country for the first quarter of 2015, ahead of the BMW i3 (46) and the Nissan Leaf (31).[376] China The first deliveries took place on April 22, 2014.[289] The Model S has the same standard equipment as the continental European version, but was adapted to provide larger back seats because the car was expected to be driven by a chauffeur.[377] Only two versions with an 85 kWh battery pack are available in the Chinese market, standard and performance.[378] Chinese sales up to June 2014 were estimated between 1,000 to 1,300 units.[379][380] JLWarren Capital, an equity firm, estimated that about 2,800 Tesla Model S cars have been imported to China by mid September 2014, but only 432 had received the license plates.[381] According to a Tesla spokesman, the major reasons for the discrepancy could be that registration rules were holding deliveries in Shanghai, and Tesla only recently was able to start delivering the electric cars to customers who bought them in Shanghai. Secondly, many Chinese customers have delayed taking possession of their Model S car while waiting for the government to add the Tesla to the list of electric vehicles exempt from its 8% to 10% purchase tax.[381][382] As of December 2014[update], Tesla had imported 4,800 Model S cars, but only 2,499 of those vehicles were registered for road use in China.[307] Tesla's CEO expressed disappointment with the Chinese sales, as stock continued to be high by early 2015.[383] As sales improved, Model S sales reached 2,147 units representing an 80% share of the imported plug-in hybrid or electric car segment in China for the first half of 2015.[384] Sales totaled 3,025 units during the first nine months of 2015,[78] for cumulative registrations of 5,524 units through September 2015.[78][307] Tesla's initial sales target for 2015 was 10,000 units.[385] Sales totaled 6,334 units in 2016.[315] By mid-2018, China ranked as Tesla's second largest market after the U.S.[325] Hong Kong Sales of the Model S began in July 2014. [291] According to Tesla, as of June 2015[update], Hong Kong has the world's highest density of Tesla
superchargers, with eight stations comprising a total of 36 supercharger stalls. This infrastructure allows most Model S owners to have a supercharger within 20 minutes' drive. [386] Sales totaled 2,221 units in 2015, [364] and by August 2016 about 80% of 5,800 EVs in Hong Kong were Teslas.[387] Europe are Norway, and the Netherlands.[284] The two biggest markets for the Model S in Europe are Norway and the Netherlands.[388] The Model S, with about 3,900 units sold, ended 2013 as the third-best selling all-electric car in Europe after the Nissan Leaf and the Renault Zoe [389][390] A total of 8,734 Model S cars were sold in 2014, representing a market share of 15,5% of new all-electric passenger car sales in Europe [391] and again allowing the Model S to rank as the third best selling all-electric car in Europe after the Leaf and the Zoe.[391] Accounting for sales during the first nine months of 2014, the Model S outsold the Audi A8, BMW 7 Series and Jaguar XJ, ranking second in the European luxury vehicle segment after the Mercedes-Benz S-Class.[392] European Model S sales in 2015 totaled 15,515 units, ranking second after the Renault Zoe (18,727) and ahead of the Leaf (15,455). The Model S captured 15.9% of the European luxury car segment in 2015, ahead of the Mercedes-Benz S-Class (14,990), the segment's leader in previous years. [394] Norway was the largest market in 2015 with 4,039 units sold. [306] Cumulative Model S sales in Europe totaled 28,149 units by the end of 2015. [389][391][393] Czech Republic A total of 23 units were sold during 2014. [395] Denmark During its first full month in the Danish market, the Model S was the top selling electric vehicle with 42 units sold.[396] Sales were 112 units in 2013 and 460 in 2014.[347] Model S sales constituted 35% of the sales of luxury cars by mid 2014.[397] A Model S was tested as a taxi, but high price and low range made the project uneconomical.[398][399] When the AWD model was announced in Autumn 2014, used Model S were sold fast at high price. [400] In October 2015, the Danish Parliament approved to phase out the tax exemption for electric vehicles, and customers rushed to order the most sold car of any kind in Denmark in December 2015, with 1.248 cars delivered that month, out of 1.573 electric cars sold in December. This is the first time ever that an electric car is the best selling car in Denmark. [24] The Model S comprised 98% of luxury cars sold in Denmark in 2015. [401] Cumulative sales in the country reached 3,308 units through December 2015, of which, a record of 2,736 units were sold in 2015. [347] Sales plummeted to 78 units in 2016 after the phasing out of the country's tax break for electric vehicles at the end of 2015.[348][402] Germany The company announced that by November 2013 the first Tesla Supercharger stations would open between Munich and Stuttgart, Munich and Zurich, Switzerland, and Cologne and Frankfurt. Tesla planned to cover more than 50% of Germany by the end of March 2014, and 100% by the end of 2014. Germany would then have the most Superchargers per capita of any country. By late 2013 Tesla announced a goal to sell 10,000 Model S in Germany in 2015. [403] Registrations totaled 815 units in 2014, representing 2.7% of the luxury segment sales in the country.[338] As of November 2015[update], cumulative registrations totaled 2,354 units.[337][338][404] A total of 1,474 Model S cars were registered in Germany in 2016.[339] Netherlands Model S cars were registered in Germany in 2016.[339] Netherlands Model S cars were registered in Germany in 2016.[339][404] A total of 1,474 Model S cars were registered in Germany in 2016.[339] Netherlands Model S cars were registered in Germany in 2016.[339] Netherlands Model S cars were registered in Germany in 2016.[339] Netherlands Model S cars were registered in Germany in 2016.[339] Netherlands Model S cars were registered in Germany in 2016.[339] Netherlands Model S cars were registered in Germany in 2016.[339] Netherlands Model S cars were registered in Germany in 2016.[339] Netherlands Model S cars were registered in Germany in 2016.[339] Netherlands Model S cars were registered in Germany in 2016.[339] Netherlands Model S cars were registered in Germany in 2016.[339] Netherlands Model S cars were registered in Germany in 2016.[339] Netherlands Model S cars were registered in Germany in 2016.[339] Netherlands Model S cars were registered in Germany in 2016.[339] Netherlands Model S cars were registered in Germany in 2016.[339] Netherlands Model S cars were registered in Germany in 2016.[339] Netherlands Model S cars were registered in Germany in 2016.[339] Netherlands Model S cars were registered in Germany in 2016.[339] Netherlands Model S cars were registered in Germany in 2016.[339] Netherlands Model S cars were registered in Germany in 2016.[339] Netherlands Model S cars were registered in Germany in 2016.[339] Netherlands Model S cars were registered in Germany in 2016.[339] Netherlands Model S cars were registered in Germany in 2016.[339] Netherlands Model S cars were registered in Germany in 2016.[339] Netherlands Model S cars were registered in Germany in 2016.[339] Netherlands Model S cars were registered in Germany in 2016.[339] Netherlands Model S cars were registered in Germany in 2016.[339] Netherlands M Tesla's European Distribution Center in Tilburg.[74] A total of 1,194 units were sold in 2013.[330] After the end of the registration tax exemption, sales fell significantly, and only 262 units were sold during the first four months of 2014.[405] In April 2014 the Schiphol Group announced that three companies were selected to provide allelectric taxi service in Amsterdam Airport Schiphol. The concessions started on June 1, 2014, and service is provided with 100 Tesla Model S cars, which jointed service to the electric buses and hybrid cars already operating at the airport. [406] Sales in 2015 totaled 1,805 units, [332] and declined to 1,693 in 2016. [333] As of October 2016[update], combined registrations of the Model S (5,681) and the Model X (250) represented 48.6% of the 12,196 all-electric cars on Dutch roads at the end of that month.[407] The Model S remained as the all-time top selling all-electric cars in the Netherlands with 6,049 cars registered at the end of December 2016.[408] Norway The first delivery of a Model S in Europe took place in Oslo on August 7, 2013.[409] By the end of August 2013, Europe's first six charging stations were opened, in Lyngdal, Aurland, Dombås, Gol, Sundebru and Lillehammer.[410] That month 186 units were delivered, ranking second among all-electric cars behind the Nissan Leaf (448 units).[411] Sales surged in September totaling 616 units, beating the Leaf and achieving an overall new car market share of 5.1%.[20][21][22] Norway is the Model S' largest European country market by volume In 2013, a five-month waiting list emerged creating a used market.[412][413] Sales dropped to 98 units in October,[414] before jumping back to 527 units in November, ranking it number two in new car registrations after the Volkswagen Golf.[415] In December, sales of 553 units made it the top-selling new car again and capturing a 4.9% market share of new car sales.[23] With less than five months of sales, the Model S ranked 20th for the year with a market share of 1.4% of Norwegian new car sales, Tesla's largest in Europe.[416][417] The Model S topped the monthly sales ranking for a third time in March 2014, with 1,493 units sold, breaking the 28-year-old monthly sales record, surpassing the Ford Sierra, which sold 1,454 units in May 1986.[418][419] Sales totaled 2,056 Model S cars during the first quarter of 2014, making the Model S the best selling new car in Norway during this period. The Model S captured a 5.6% market share of new car sales and 38.8% of the new plug-in electric car segment during this quarter.[418][420][421] By the end of 2014, the Model S ranked as the fifth best selling new car in the Norwegian market, with 4,040 units registered and a market share of 2.8% of new car sales in the country that year. [305] As of July 2014 [update], Norway ranked as Tesla's largest overseas market, with an average of 436 Model S sedans sold per month since August 2013. In comparison, the average in the United States was about 1,630 units delivered per month since the electric car went on sales in 2012.[303] As of December 2015[update], Norway continued as the second largest Model S market by volume, with about 9.4% of cumulative global sales.[301] After a stagnant year of 4,000 plus deliveries for 2015, deliveries of Tesla dropped 54% in the first quarter and 52% in the second quarter of 2016 in Norway.[422] Tesla Model S registrations in Norway totaled 2,051 new units in 2017.[328] Since its introduction, a total of 15,825 new Model S cars have been registered in Norway through December 2017.[304][305][306][327][328] Switzerland Retail deliveries began in August 2013,[284] and a total of 213 units were registered in 2013.[346] The Model S, with 496 units registered, ranked as the top selling plug-in electric car in the country in 2014.[423] With 835 units sold during the first seven months of 2015, the Model S outsold combined Swiss sales of the luxury segment including such models as the Mercedes S-Class, Audi A8 and BMW 7 Series during the same period.[424] Cumulative Model S sales totaled 3,060 units up until June 2016, which includes units sold in Liechtenstein.[346] United Kingdom Deliveries began in June 2014,[290] and a total of 698 units were registered in the UK by the end of 2014.[425] Model S owners are also exempted from the London congestion charge. [426] During the first half of 2016, slightly more Model S cars were registered in the UK than in Norway, the largest Model S market in Europe. During the first six months of 2016 a total of 1,263 Model S market in Europe. sedans were registered in the UK at the end of September 2016.[345]
North America Canada The first Model S sedans were delivered in December 2015[update], and ranks as the second best-selling plug-in car in the country ever after the Chevrolet Volt (5,415) and ahead of the Nissan Leaf (3,198). The Model S was the top selling plug-in electric car in Canada in 2015 with 2,010 units sold.[336] Mexico Retail sales began in Mexi 2012.[429] Deliveries for retail customers in the United States started on June 22, at a special event held at the Tesla Factory in Fremont, California.[12] The first 1,000 production units were Signature Performance limited editions equipped with an 85 kWh battery pack.[274] Cumulative sales passed the 50,000 unit milestone in early July 2015.[430] About 2,620 units were sold in the U.S. during 2012 out of 2,650 units delivered in North America.[274][302] California is the largest American regional market for the Model S.[388] In March 2013, Tesla reported the delivery of the 3,000th Model S in California, representing around 50% of US sales to that date.[431][432] During the first quarter of 2013 the Model S ranked as the top selling plug-in electric vehicle in the U.S. with about 4,900 units delivered, followed by the Chevrolet Volt with 4,244 units.[283][433][434] During 2013, the Model S was called as the least stolen car in the United States by the Value Walk financial website, with a theft rate of 0.15 per 1,000 units produced. By comparison, the U.S. average is 3.51 cars stolen per 1,000 produced. [435] According to Edmunds.com, between January and August 2013 the Model S achieved a high market share of new car sales among the U.S. most expensive ZIP codes, as rated by Forbes, led by California. Atherton ranked first with a 15.4% share, followed by Los Altos Hills with 11.9%, and Portola Valley with 11.2%. During this period the Model S had the highest number of new passenger car registrations in 8 of the 25 most expensive American ZIP codes. [436] With 8.347 units sold in 2013, it was the third-best selling luxury car in California (after the Mercedes-Benz E-Class and BMW 5 Series sedans),[437] with a 9.8% share of the Californian luxury and sports segment.[438] As of November 2013[update], the Model S was available nationwide, with California having 48% share U.S. sales.[439] California is the top selling regional market of the Model S. Shown in San Francisco. [439] American sales totaled about 18,650 units in 2013,[440][441] placing the Model S as the third selling plug-in electric car after the Chevrolet Volt (23,094) and the Nissan Leaf (22,610).[302] Also in 2013, the Model S was the top seller in the full-size luxury sedan category, ahead of the Mercedes-Benz S-Class at 13,303.[440] In 2014 16,689 Model S sedans were delivered, down 10.5% from 2013, but the electric sedan ranked again as the third best selling plug-in car in the U.S. [279][441] In 2015 the Model S ranked as the top selling plug-in electric car in the U.S. with 25,202 delivered, surpassing both the Leaf (17,296) and the Volt (15,393). [279][442][443] The Model S ranked as the top selling plug-in car in the U.S. [279][441] In 2015 the Model S ranked as the top selling plug-in car in the U.S. [279][441] In 2015 the Model S ranked as the top selling plug-in electric car in the U.S. with 25,202 delivered, surpassing both the Leaf (17,296) and the Volt (15,393). [279][442][443] The Model S ranked as the top selling plug-in electric car in the U.S. [279][441] In 2015 the Model S ranked as the top selling plug-in electric car in the U.S. [279][441] In 2015 the Model S ranked as the top selling plug-in electric car in the U.S. [279][441] In 2015 the Model S ranked as the top selling plug-in electric car in the U.S. [279][441] In 2015 the Model S ranked as the top selling plug-in electric car in the U.S. [279][441] In 2015 the Model S ranked as the top selling plug-in electric car in the U.S. [279][441] In 2015 the Model S ranked as the top selling plug-in electric car in the U.S. [279][441] In 2015 the Model S ranked as the top selling plug-in electric car in the U.S. [279][441] In 2015 the Model S ranked as the top selling plug-in electric car in the U.S. [279][441] In 2015 the Model S ranked as the top selling plug-in electric car in the U.S. [279][441] In 2015 the Model S ranked as the top selling plug-in electric car in the U.S. [279][441] In 2015 the Model S ranked as the top selling plug-in electric car in the U.S. [279][442] [142][443] The Model S ranked as the top selling plug-in electric car in the U.S. [279][441] In 2015 the Model S ranked as the top selling plug-in electric car in the U.S. [279][442][443] The Model S ranked as the top selling plug-in electric car in the U.S. [279][441] In 2015 the Model S ranked as the top selli S was also the country's best-selling car in the large luxury segment among comparably priced four-door sedans, ahead of the Mercedes-Benz S-Class (21,934) and BMW 7 Series (9,292).[279] Registrations in California totaled 10,723 units in 2015, representing a 12.1% market share of the state's luxury and sports segment, making the Model S the third best selling car in the segment after the Mercedes-Benz E-Class (12,324) and BMW 5 Series (11,133).[444] By the end of 2015, cumulative sales in the American market represented almost 60% of Model S global sales since its introduction.[301] Tesla reported 9,156 units sold nationwide in the third quarter of 2016, up 59% from the same quarter in 2015, allowing the Model S to lead national sales in the large luxury car segments, representing almost a third of the segment sales, and ahead of the Mercedes-Benz S-Class (4,921) and the BMW 7 Series (3,634).[445] The Model S was the top selling plug-in electric in the American market for the second year in a row with an estimated 29,156 units delivered in 2016.[30] Registrations in California totaled 11,326 units in 2016, representing a 14.1% market share of the state's luxury and sports segment, making the Model S the second best selling car in the segment after the Mercedes-Benz E-Class (11,684) and ahead of the BMW 5 Series (10,551).[446] According to Wards's Auto, the Model S topped the American upper luxury segment in 2016, followed by the Mercedes S-Class (18,803) and the BMW 7-Series (12,918).[447] An estimated 92,317 Model S cars have been sold in the United States up until December 2016,[30] representing about 57% of Model S global sales through November 2016.[54] Model S sales in the American market passed the 100,000th unit mark in early June 2016, achieving this milestone in less time since inception than both the Chevrolet Volt and the Nissan Leaf. [448][449] A total of 11,813 Model S were sold in California in 2017, representing of 16.0% of the state's luxury and sports segment, ranking second after the Mercedes-Benz E-Class (12,326).[450] Among all-electric models sold in California in 2017, the Model S listed second after the Chevrolet Bolt (13,487).[451] An estimated 26,500 Model S cars were sold in the U.S. in 2017, down 9.1% year-on-year,[322] but allowing the Model S to end 2017 as the best selling plug-in car in the American market for the third consecutive year. [25] California registrations represented 44.6% of national sales. [322][450] Cumulative sales since inception totaled an estimated 118,817 units through December 2017. [30][322] Owners profile Owners of the Model S are overwhelmingly male and over 45 years old.[452] Retail sales model disputes Main article: Tesla US dealership disputes Tesla sells its cars directly to consumers without creating a dealer network, as other manufacturers have done and as many states require by legislation. In support of its approach, the company has fought legal and legislative battles in Ohio, New Jersey, New York and other states [453][454] With law changes in recent years in New Jersey, New York, Maryland, Ohio, and Pennsylvania the Tesla direct sales model is permitted in 22 states as of March 2015.[455][456] As of May 2015[update] the sales procedure in other states such as Texas is somewhat different with the Tesla salesperson being prevented from discussing prices, the actual sale having to be made online and the sales tax having to be paid up front. Delivery of a Tesla car to a Texas address is no different than in other states.[457] Consequently, while Tesla showcases and sells its cars directly to the consumer in Tesla Stores abroad, it operates a mix of Tesla Stores and Tesla Galleries in the US.[458] Safety Safety features External video NHTSA Frontal crash test on YouTube Euro NCAP crash test on YouTube Tesla EV Safety Training for rescuers on YouTube In 2014, the Model S has a 5-star safety rating from both Euro NCAP and the U.S. National Highway Traffic Safety Administration (NHTSA).[459][460] At that time, only two other cars had earned the same recognition since 2011 (when the NHTSA introduced its latest rating scheme).[461] NHTSA[462] Euro NCAP[463] IIHS[464][465] Overall Overall Small overlap Acceptable Frontal, driver Adult occupant 31 pts / 82% Moderate overlap frontal offset Good Frontal, passenger Child occupant 38 pts / 77% Side impact Good Side, passenger Driver assist 9 pts / 71% Roof strength (P100D) Acceptable Side pole, driver Headlights Poor Rollover / 5.7% However, in July 2017, the Insurance Institute for Highway Safety (IIHS) found that during front crash tests, the Model S safety belts let the driver's torso move too far forward, resulting in the head striking the steering wheel hard through the airbag. This problem was already pointed out in one of the IIHS's earliers tests, to which Tesla responded they would improve their safety belt design, which, according to the IIHS's latest tests, has not been done. The IIHS also gave the Model S the worst possible rating for its headlights.[466] The report caused Tesla to lose 6.4% of its stock value.[465] First crash with battery fire See also: Tesla Model S fire incidents The first widely reported Model S fire occurred
several minutes after the vehicle hit metal debris on the Washington State Route 167 highway as instructed by the onboard alert system, bring the car to a stop and depart the vehicle without injury". [468] He then contacted authorities and, while awaiting their arrival, smoke began coming out the front of the vehicle. The driver stated that he hit something while exiting the HOV lane. [467][469][470] Tesla stated that the fire was caused by the "direct impact of a large metallic object to one of the 16 battery modules", and that by design, the modules were separated by firewalls, limiting the fire to "a small section in the front of the vehicle". [467] The module was evidently punctured by a "curved section" that fell off a truck and was recovered near the accident. Tesla stated that the debris punched a 3-inch (76 mm) diameter hole through the .25-inch (6.4 mm) armor plate under the vehicle, applying force of some 25 tons. Built-in vents directed the flames away from the vehicle so that the fire did not enter the passenger compartment. According to Tesla, the firefighters followed standard procedure; using large amounts of water to extinguish the fire was correct, [471] however, puncturing the metal firewall to gain access to the fire also allowed the flames to spread to the front trunk.[468] Tesla also stated that because the battery pack contained in a gasoline tank", the effective combustion potential of a single module is only about 1% that of a conventional vehicle.[468] On October 24, 2013, the U.S. National Highway Traffic Safety Administration (NHTSA) announced, "After reviewing all available data, the National Highway Traffic Safety Administration has not found evidence at this time that would indicate the recent battery fire involving a Tesla Model S was the result of a vehicle safety defect or noncompliance with federal safety standards." [472] But the following month, the NHTSA opened a preliminary evaluation to determine "the potential risks associated with undercarriage strikes on model S vehicles". [473][474] On March 28, 2014, NHTSA closed its investigation, claiming that the new titanium underbody shield and aluminum deflector plates, along with increased ground clearance, "should reduce both the frequency of underbody strikes and the resultant fire risk".[475] Subsequent fires On November 6, 2013, another fire broke out after a Model S struck a tow hitch on the roadway, causing damage beneath the vehicle.[476] The incidents led Tesla to extend its vehicle warranty to cover fire damage and to apply a software update to increase ground clearance when operating at highway speed. [473][477] Another fire incident took place in Toronto, Canada, in early February 2014. The Model S was parked in a garage and was not charging when the fire started. The origin of the fire is undetermined. [478] According to Tesla "in this particular case, we don't yet know the precise cause, but have definitively determined that it did not originate in the battery, the charging system, the adapter or the electrical receptacle, as these components were untouched by the fire". [479] Starting with vehicle bodies manufactured as of 6 March 2014[update], all units were outfitted with a triple underbody shield. Existing cars were retrofitted upon request or as part of a normally scheduled service. [480][481] On January 1, 2016, a 2014 Model S caught fire while supercharging unsupervised in Brokelandsheia, Norway. The vehicle was destroyed but nobody was injured. [482][483][484] The fire was slow, and the owner had time to unplug the car and retrieve possessions. [485] An investigation by the Norwegian Accident Investigation Board (AIBN) indicated that the fire originated in the car, but was otherwise inconclusive. [486] In March 2016, Tesla stated that their own investigation into the incident concluded that the fire was caused by a short circuit in the vehicle's distribution box, but that the amount of damage prevented them from determining the exact cause.[485] Tesla stated that the Supercharger detected the short circuit and deactivated, and a future Model S software update would stop the vehicle from charging if a short circuit is detected.[487] The National Transport Safety Board (NTSB) has stated that the Tesla's electric cars are not more prone to fires than other vehicles on the road today.[488] NHTSA safety ratings, a Tesla press release claimed that the Model S had achieved the best safety rating of any car ever tested. Tesla stated "NHTSA does not publish a star rating above 5, however safety levels better than 5 stars are captured in the overall Vehicle Safety Score (VSS) provided to manufacturers, where the Model S achieved a new combined record of 5.4 stars."[489][492][493] However, a few days later NHTSA rebutted Tesla's claim, explaining that the rating for the Model S was equal to any other car receiving 5-stars, and claiming that the carmaker did not follow its advertising guidelines. [497][498] On June 14, 2013, Tesla issued a recall to all Model S vehicles manufactured between May 10. 2013, and June 8, 2013, due to improper methods for aligning the left hand seat back striker to the bracket, which could weaken the weld between the bracket and frame of the car. [499] On January 13, 2014, Tesla recalled Model S vehicles manufactured in 2013, because the adapter, cord, or wall outlet could overheat during charging. [500] On November 20, 2015, Tesla announced a voluntary worldwide recall of all of its 90,000 Model S vehicles, in order to check for a possible defect in the cars' front seat belt assemblies. The problem was raised in early November by one customer in Europe. Tesla's resulting investigation was unable to identify a root cause for the failure, and the company decided to examine every single car. Tesla reported that there have been no accidents or injuries related to the problem.[501][502] On January 20, 2017, Tesla recalled Model S from 2012 in January 2017 due to defective Takata airbags. Cars manufactured later (until 2017) have smaller risk, and may also be recalled.[503] On April 20, 2017, Tesla issued a worldwide recall of 53,000 (~70%) of the 76,000 Model S cars manufactured before April 2016 were recalled due to excessive corrosion of the bolts which secure the power steering, particularly those cars used in cold countries where roads are salted.[498] Recognition Awards 2013 AutoGuide.com Reader's Choice Car of the Year.[507] Automobile Magazine's 2013 Car of the Year, a unanimous decision.[508] CNET Tech Car of the Year for 2012[509] Consumer Reports gave the Model S a score of 103 out of 100, its highest ever. The Model S broke the rating scale of Consumer Reports' 2013 survey of owner satisfaction produced a score of 99 out of 100, "the highest the magazine has seen in years." [511] In 2014 the Model S topped for the second year in a row Consumer Reports survey of owner satisfaction. This time the Model S had a score of 98 out of 100.[512] Consumer Reports found the Model S to be 'Best Overall' for 2014 across all 10 categories of cars, light trucks and SUVs, chosen from more than 260 vehicles the organization has recently tested. The magazine considers the Model S a "technological tour de force, while pricey, is brimming with innovation."[513] In 2015 they rated the Model S at 103 (breaking the scale).[514][515] Green Car Reports' Best Car To Buy 2013[516] Hagerty Greatest Car of the Decade (2010s)[517] Motor Trend 2013 Car of the Year, also a unanimous decision and the first winner in the award's history to not be powered by an internal combustion engine.[518] In 2019, Motor Trend selected it as the ultimate car of the year over the last 70 years.[35] Natural Resources Canada 2013 EcoENERGY for Vehicles Awards in the full-size category[519] Popular Science's Auto Grand Award Winner Best of What's New list 2012 [520] The Telegraph included the Model S in its list of the top 10 cars that changed the world published in December 2014, and also named the electric sedan the most important car of the last 20 years [521][522] Time Magazine Best 25 Inventions of the Year 2012 award [523] In 2019, the model S was included in the Time Magazine list of best gadgets of the 2010s.[524] Yahoo! Autos 2013 Car of the Year.[525] American Automobile Association Green Car Guide 2015, top spot (P85D).[526] The Model S also won the 2014 AAA Green Car Guide.[527] 2019 Green Car Reports Car of the Decade.[528] Distance records A distance record of 670 mi (1,080 km) in a P100D was set on August 5, 2017, by Italian drivers, making the Model S the first production electric car to exceed 620 mi (1,000 km) on a single charge. [529] Previously the record of 560 miles (901.2 km) in a P100D was set on June 20, 2017, by Belgian drivers. [530] Before that the distance record was 452.8 miles (728.7 km) in a Model S. It was made by Norwegian Bjørn Nyland and Morgan Tørvolt on a flat stretch with low traffic around the supercharger in Rødekro, Denmark. All of these records used hypermiling techniques such as front motor only, low speed 24 mph (39 km/h), no air conditioning and minimal use of the brakes. [531][532] The first record of 423.5 miles (681.6 km) was set during November 2012 by David and Adam Metcalf. [533] [534] These attempts were inspired by a blog written by Elon Musk about the planned range and efficiency of the Tesla Model S, offering a prize for anyone exceeding 400 miles (643.7 km) on a single charge, where it was estimated the 85 kWh model could do it by driving at a constant 36 mph (58 km/h) under ideal conditions.[535] Lap records In early September 2019, a prototype ("plaid" tri motor) Tesla Model S went faster than the official record for the fastest "four-door electric sports car" at the Laguna Seca Raceway, beating a previous time held by the Tesla Model 3 Performance.[536][537] Shortly after the release of the Porsche Taycan Turbo S, Tesla had booked exclusive testing time at the Nürburgring
Nordschleife on September 18, 21, and 25, 2019.[538][539] Controversies Range limitation On February 8, 2013, The New York Times published a review by John M. Broder about a trip between Washington, D.C., and Boston using Tesla's Supercharger network. At the time it included only two stations on the East Coast. Broder made a variety of critical claims about the battery's performance in cold weather and the distance between charging stations. The trip ended with the Model S carried by a flatbed truck to the Milford, Connecticut, station.[540] Tesla responded by publishing logs of the vehicle's charge levels and driving speed that contradicted Broder's behavior forced the car to fail. Broder replied to the criticism in a blog post and suggested that the speed discrepancies may have been because the car had been equipped with 19-inch wheels rather than the specified 21-inch wheels.[542] In the midst of the controversy, a CNN reporter recreated Broder's trip without exhausting the battery. However, two key differences distinguished the two journeys. The weather was about 10 °F (6 °C) warmer and CNN did the trip in one day; the Times let the car sit overnight without being plugged in.[543] A reporter from CNBC also recreated the trip in one day without problems. One owner was delayed because his car failed to charge and required two firmware updates.[544] [546] On February 18, 2013, The New York Times Public Editor Margaret Sullivan published an editorial stating that Broder took "casual and imprecise notes" of his test drive and did not use good judgment, but she maintained that the article was written in good faith. She also admitted that Broder's vehicle logs were "sometimes quite misleading."[547][548][549] In July and September 2014 tests performed by an independent German car magazine in cooperation with the TÜV (German Association for Technical Inspection) and Tesla owners seemed to reveal issues with the battery's performance. According to the magazine, Tesla did not take up the invitation to repeat the test, and also seemed to refuse to offer vehicles for a second test.[550][551] A test performed by another German publication ("Die Welt") supported the findings.[552] Production delay In 2007, Tesla announced plans to build Model S sedans starting in 2009.[553] Production was delayed, and Tesla's website later stated that deliveries would start in 2011.[554] However, in January 2010. Musk stated that he expected to launch the Model S sedan "within two and a half vears", translating to O3 2012.[555] Power dissipation when not in use Older versions of the system software suffered from power drain issues when the car wasn't being used, with the batteries losing 4.5 kWh overnight (known commonly as "vampire drain").[556] System software v5.8 (v1.49.30), released December 12, 2013, reduced overnight, or around 3 miles.[134] Consumer Reports' recommendation In October 2015, two months after naming the Tesla 'the best car ever tested,' Consumer Reports declined to give the Tesla Model S a "recommended" designation, citing too many complaints from owners. Complaints ranged from minor, such as misaligned doors and squeaky body, to severe - things like total drive train replacement and inoperable door handles. Tesla's shares dropped 15%, both because of the magazine's cut and because of concerns over the Tesla Model X luxury SUV. [49][557] Similarly, Edmunds.com found guality and safety issues in their long-term road test and "amassed guite the repair résumé during the last 17 months." [558] Both Edmunds and Consumer Reports reported issues, including the vehicle stalling while driving.[559] In their 2016 Annual Auto Reliability Survey, Consumer Reports improved the Model S rating to average reliability, while reporting that the Model X has had significant malfunction issues. The magazine also raised "serious concerns about how some automakers, including Tesla, have designed, deployed, and marketed semiautonomous technology."[50] By 2017, in the Consumer Reports Car Reliability Survey. Tesla's position on the list had moved up four spots; the predicted reliability rating for Model S reached "above average" for the first time.[111] In 2018 the annual consumer reports reliability survey found Tesla cars amongst the worst with the brand falling 6 spots from 2017 and third worst amongst the brands surveyed. [560] [561] The Model S dropped "below average" in reliability with suspension problems and other issues that included the extending door handle. [561] In 2019 the model S was given a Consumer Reports "recommended" designation [562] due to improved reliability, with the Model S being the second-most reliable out of four ultra-luxury cars tested. Power discrepancy The P85D "insane mode" was widely reported to have 691 horsepower, [563][564][565] but some owners reported 20% less power on the dynamometer in various circumstances. [566][567] Manufacturers are required by EU law to display power "at full setting of the power controller" (from an external DC source when performing laboratory vehicle approval), but not necessarily to show power limited by battery. Other equipment must be removed, or their power added to the measurement.[104][568] Actual power available depends on circumstances,[104] as it does for piston cars[569] which until 1972 could be 25-30% less than given.[570][571] As of November 2015[update], Tesla website showed battery-limited combined 345 kilowatts (463 hp) for P85D (397 kilowatts (532 hp) for "Ludicrous").[572][566] A lawsuit by 126 owners in Norway[573] was settled in December 2016.[574] Power consumption In early March 2016, a report by Stuff magazine revealed that test performed by VICOM, Ltd on behalf of Singapore's Land Transport Authority had found a 2014 Tesla Model S to be consuming 444 Wh/km (0.715 kW·h/mi),[575][576] which was greater than the 240 Wh/km (0.38 kW·h/mi) reported by the US Environmental Protection Agency (EPA)[577] and the 181 Wh/km (0.291 kW·h/mi) reported by Tesla.[578] As a result, a carbon surcharge was imposed on the Model S, making Singapore the only country in the world to impose an environmental surcharge on a fully electric car.[579] The Land Transport Authority justified this by stating that it had to "account for CO2 emissions during the electricity generation process" and therefore "a grid emission factor of 0.5 g/watt-hour was also applied to the electric energy used to extract, refine, and distribute gasoline was taken into account, the Model S produces approximately one-third the CO2 of an equivalent gasoline-powered vehicle.[578] Later that month, the Land Transport Authority released a statement stating that they and the VICOM Emission Test Laboratory will be working with Tesla engineers to determine if there was a flaw in the test,[581] and a Tesla statement indicated that the discussions were "positive" and that they were confident of a guick resolution [578] See also Electric car use by country Government incentives for plug-in electric cars currently available List of fastest production cars by acceleration List of production cars by power output List of modern production plug-in electric vehicles List of production battery electric vehicles List of Easter eggs in Tesla products References ^ a b Lam, Brian (February 19, 2007). 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