= Nissan Leaf =

The Nissan Leaf (also formatted " LEAF " as a backronym for leading environmentally @-@ friendly affordable family car) is a compact five @-@ door hatchback electric car manufactured by Nissan and introduced in Japan and the United States in December 2010 , followed by various European countries and Canada in 2011 . The U.S. Environmental Protection Agency (EPA) official range for the 2016 model year Leaf with the 30 kWh battery is 172 km (107 miles) on a full battery charge , while the trim with the smaller 24 kWh battery is 135 km (84 miles) , the same as the 2014 / 15 model year . Leaf battery packs can be charged from fully discharged to 80 % capacity in about 30 minutes using DC fast charging .

As of April 2016 , the Nissan Leaf is the world 's all @-@ time best selling highway @-@ capable all @-@ electric car . Almost 220 @,@ 000 Leafs have been sold worldwide by mid @-@ April 2016 . The top markets for Leaf sales , as of April 2016 , are the United States with over 93 @,@ 000 units sold , followed by Japan with almost 65 @,@ 000 units , and Europe with over 55 @,@ 000 Leafs through March 2016 . The European market is led by Norway with over 17 @,@ 000 new units registered through the end of April 2016 , and the U.K. with over 12 @,@ 000 units registered by the end of 2015 .

As an all @-@ electric car , the Nissan Leaf produces no tailpipe pollution or greenhouse gas emissions at the point of operation , and contributes to reduced dependence on petroleum . Among other awards and recognition , the Nissan Leaf won the 2010 Green Car Vision Award , the 2011 European Car of the Year , the 2011 World Car of the Year , and the 2011 ? 2012 Car of the Year Japan .

= = Development history = =

Nissan introduced its first battery electric vehicle , the Nissan Altra at the Los Angeles International Auto Show on 29 December 1997 . The Altra EV was produced between 1998 and 2002 , only about 200 vehicles were ever produced , and it was mainly used as a fleet vehicle for companies such as electric utilities . Nissan also developed the Nissan Hypermini , ran a demonstration program and sold limited numbers for government and corporate fleets in Japan between 1999 and 2001 . A small fleet of Hyperminis was also field tested in several cities in California between 2001 and 2005 .

Unveiled in 2009 , the EV @-@ 11 prototype electric car was based on the Nissan Tiida (Versa in North America) , but with the conventional gasoline engine replaced with an all @-@ electric drivetrain , and included an 80 kW (110 hp) / 280 N · m (210 lb · ft) electric motor , 24 kWh lithium @-@ ion battery pack rated to have a range of 175 km (109 miles) on the United States Environmental Protection Agency 's LA @-@ 4 or " city " driving cycle , navigation system , and remote control and monitoring via a cellphone connection through Nissan 's secure data center to the car . The technology in the EV @-@ 11 was previously developed and tested in the EV @-@ 01 and EV @-@ 02 test cars , built with an all @-@ electric powertrain that used the Nissan Cube (Z11) as a development mule . The EV @-@ 11 prototype was on display July 26 , 2009 . A week later , on August 2 , 2009 , Nissan unveiled its production version at its Yokohama headquarters and committed to begin retail sales in both the North American market and Japan at end of 2010 .

= = Specifications = =

= = = Design = = =

The Leaf 's frontal style is characterized by a sharp V @-@ shape design with large , up slanting light @-@ emitting diode (LED) headlights that create a distinctive blue internal reflective design . The headlights also split and redirect airflow away from the door mirrors , which reduces wind noise and aerodynamic drag . The LED low @-@ beam headlights consume less electricity than halogen

lamps . Nissan sought to make the Leaf appealing to mainstream drivers by giving it a familiar sedan- and hatchback @-@ like design . The bottom of the car has aerodynamic paneling to reduce drag and improve aerodynamics as much as possible . According to Nissan , the 2011 Leaf has a drag coefficient of Cd = 0 @.@ 29 , which was improved to Cd = 0 @.@ 28 in 2012 (for the 2013 model year) .

= = = Powertrain = = =

The Leaf uses an 80 kW (110 hp) and 280 N · m (210 ft · lb) front @-@ mounted synchronous electric motor driving the front axle , powered by a 24 kWh lithium ion battery pack rated to deliver up to 90 kW (120 hp) power .

The pack contains air @-@ cooled , stacked laminated lithium ion manganese oxide batteries .

The 2011 / 12 model Leaf has a top speed of over 150 km / h (93 mph) . Unofficially , 0 to 60 mph (0 to 97 km / h) performance has been tested at 9 @.@ 9 seconds .

= = = Battery = = =

With the 24 kWh electric vehicle battery (total capacity ; usable battery capacity is about 21 @.@ 3 kWh) it consists of 48 modules and each module contains four battery cells , a total of 192 cells , and is assembled by Automotive Energy Supply Corporation (AESC) ? a joint venture between Nissan , NEC and NEC Energy Devices , at Zama , Japan . The battery and control module together weigh 218 kg (480 lb) the specific energy of the cells is 140 W · h / kg .

The Leaf 's design locates the battery , the heaviest part of any EV , below the seats and rear foot space , keeping the center of gravity as low as possible and increasing structural rigidity compared to a conventional five @-@ door hatchback .

The battery pack is expected to retain 70 % to 80 % of its capacity after 10 years but its actual lifespan depends on how often DC fast charging (480 volts DC) is used and also on driving patterns and environmental factors . Nissan said the battery will lose capacity gradually over time but it expects a lifespan of over 10 years under normal use . The 2011 / 12 Leaf 's battery was initially guaranteed by Nissan for eight years or 160 @,@ 000 km (100 @,@ 000 miles) (see Warranty sub @-@ section below under United States for limitations) . Nissan stated in 2015 that until then only 0 @.@ 01 percent of batteries , produced since 2010 , had to be replaced because of failures or problems and then only because of externally inflicted damage . Some vehicles have already covered more than 200 @,@ 000 km (120 @,@ 000 miles) with no battery problems . In April 2016 , Nissan estimated that fewer than 5 batteries are replaced per year worldwide ; about 0 @.@ 012 % of all Leafs since introduction . Nissan recycles 15 @-@ 20 batteries per year ; as of 2016 too few to use for stationary energy storage . Nissan plans to offer recycled batteries as 4 @.@ 2 kWh home storage by fall 2016 , called xStorage .

In addition to the main battery , the Leaf also has an auxiliary 12 @-@ volt lead ? acid battery that provides power to the car computer systems and accessories such as the audio system , supplemental restraint systems , headlights and windshield wipers . The small solar panel on the Leaf rear spoiler helps to charge this accessory battery . (In the United States models , only comes with SL trim .)

For the 2011 model year Leafs , Nissan recommended owners perform the following preventive actions to help maximize the lithium @-@ ion battery ? s useful life and its ability to hold a charge :

Avoid exposing a vehicle to ambient temperatures above 120 ° F (49 ° C) for over 24 hours .

Avoid storing a vehicle in temperatures below ? 13 ° F (? 25 ° C) for over 7 days .

Avoid exceeding 70 % to 80 % state of charge when using frequent (more than once per week) fast or quick charging .

Allow the battery charge to go below 80 % before charging .

Avoid leaving the vehicle for over 14 days where the Li @-@ ion battery available charge gauge reaches a zero or near zero (state of charge) .

As a result of the controversy regarding several U.S. owners reporting premature loss of battery

capacity in places with hot climate , Nissan USA announced in January 2012 , that it will offer an extended battery warranty on the 2013 model year Leaf which includes 2011 and 2012 model years as well . The 2013 Leaf is covered by a " State Of Health " clause which covers gradual capacity loss . This provision allows for the battery pack to either be repaired or replaced if the battery life reduces quicker than anticipated over the eight years warranty period .

Costs

Each battery pack cost Nissan an estimated US $ 18 @,@ 000 at the car 's launch in May 2010 . By 2015 , the battery costs were around US $ 300 / kWh , giving a battery cost of around US $ 5 @,@ 500 for batteries not within the eight year warranty period . Nissan reported that in Europe only 3 of 35 @,@ 000 leaf batteries had failed .

Battery replacement program

In June 2013 , Nissan announced a battery replacement program to go into effect in 2014 . At a cost of about US $ 100 (~ ? 76) per month , Leaf owners can sign up at any time for the program and immediately get a new battery pack with the latest available technology that is compatible with their vehicle . The replacement battery has a full 12 bars (100 %) of capacity . Nissan provides assurance that the replacement pack will maintain at least 9 bars (70 % capacity) or more capacity for the time that they own their car and make monthly payments . The program also provides protection from defects in materials or workmanship for the time they own their Leaf and remain in the battery program . In summary , all batteries installed under this program will have coverage similar to the terms of standard battery coverage under the " Nissan New Electric Vehicle Limited Warranty . "

In June 2014 , Nissan USA announced an updated battery replacement program allowing the outright purchase of a new battery pack for US $ 5 @,@ 499 . The price does not include labor and the trade @-@ in of the old pack is mandatory . Older 2011 ? 12 model year Leafs will require a mounting kit to retrofit the new pack for an additional US $ 225 . The new pack will be the same as the one in the 2015 model year Leaf , with the latest battery chemistry which Nissan claims will be more heat tolerant . Financing for the replacement battery was scheduled to be announced by the end of 2014 .

= = = Range = = =

2011 / 2012 model year

The United States Environmental Protection Agency official range is 117 km (73 miles) , much less than the 160 km (100 miles) quoted by Nissan . The Federal Trade Commission , which is supposed to label all alternative fuel vehicles , disagrees with the EPA rating , and considers that the correct range is between 154 to 177 km (96 to 110 miles) . Although the FTC does not conduct its own tests as EPA does , it relies on a standard set by SAE International and the results reported by automakers . The Leaf has a range of 175 km (109 miles) on the New European Driving Cycle .

Based on third @-@ party test drives carried out in the U.S. , reviewers have found that the range available from a single charge can vary up to 40 % in real @-@ world situations ; reports vary from about 100 km (62 miles) to almost 222 km (138 miles) depending on driving style , load , traffic conditions , weather (i.e. , wind , atmospheric density) , and accessory use . Nissan tested the Leaf under several scenarios to estimate real @-@ world range figures , and obtained a worst @-@ case scenario of 76 km (47 miles) and a best @-@ case scenario of 222 km (138 miles) . The following table summarizes the results under each scenario tested using EPA 's L4 test cycle and presents EPA rating as a reference :

Consumer Reports tested a 2011 / 12 model Leaf loaner under cold @-@ weather driven as a daily commuter . The average range obtained was 105 km (65 miles) per charge with temperatures varying from 20 to 30 ° F (? 7 to ? 1 ° C) . The magazine also reported one trip under a temperature of 10 ° F (? 12 ° C) that began with the range panel indicator showing 32 km (20 miles) remaining . After 13 km (8 miles) the Leaf drastically lost power and dropped its speed and continued to run slower until the last stretch was completed almost at walking speed . Consumer Reports concluded that the Leaf works as designed under cold temperatures but a more accurate

range indicator is desirable .

In June 2011 , Nissan reported , based on data collected through the Leaf 's advanced telematics system , that most Leaf owners in Japan and the United States drive distances less than 100 km (60 miles) per day . Nissan also found that on average owners charge their electric cars for two hours a night , and occasionally some owners drive two days on one charge . In October 2011 , Nissan North America reported that based on a bigger sample of 7 @,@ 500 Leafs on the U.S. roads , the typical driver averages 60 km (37 miles) a day and the average trip length is 11 km (7 miles) , measured as the distance between power on and power off .

In spring 2012 , the Finnish car magazine Tekniikan Maailma tested the Leaf in city driving at temperatures of ? 15 ° C (5 ° F) . They achieved a range of 59 km (37 miles) with cabin and battery heaters on .

2013 model year

According to Nissan , the U.S. 2013 model year Leaf has a more efficient heating system that allows the Leaf to extend its range in cold @-@ weather conditions by 32 to 40 km (20 to 25 miles) . The EPA rating is 121 km (75 miles) from 117 km (73 miles) in the previous models . Nissan explained that actually these ratings are not comparable , because for the 2013 model year the EPA changed the test procedures to calculate range for electric cars . Before 2013 , the agency estimated the range assuming the battery pack was charged to 100 % of its capacity . Nissan estimates that the 2013 Leaf has a 135 km (84 miles) range from a 100 % charge (Long @-@ Distance Mode charging) , while the range drops to 106 km (66 miles) for an 80 % charge (Long @-@ Life Mode charging) . The new EPA testing procedure considers the average of these two ranges . The increased Long @-@ Distance Mode range comes from improvements to the Leaf ? s regenerative braking system , an overall weight reduction and enhanced aerodynamics .

The 2013 European version has a certified range of 200 km (120 miles) under the New European Driving Cycle (NEDC) , up from 175 km (109 miles) for the 2011 / 12 model .

2014 / 2015 model year

The official EPA range for the 2014 and 2015 model year Leaf , increased from 121 to 135 km (75 to 84 miles) . The difference in range is due to a technicality , as Nissan decided to eliminate the EPA blended range rating , which was an average of the 80 % charge range and the 100 % charge range . For the 2014 model year , only the 100 % charge range figure applies .

2016 model year

Nissan added more battery capacity which increased the range of the car on a full charge . A larger 30 kWh battery is featured on the SL and SV trims , and the S trim kept the smaller 24 kWh battery found in earlier Leafs . The official EPA range for the 2016 Leaf with the 30 kWh battery is 172 km (107 miles) , while the range for Leaf with the smaller 24 kWh is 135 km (84 miles) , the same as the 2014 / 15 model year .

= = = Fuel economy = = =

Under its five @-@ cycle testing , the United States Environmental Protection Agency found the 2011 model Leaf 's energy consumption to be 0 @.@ 212 kWh / km (34 kWh / 100 miles) and rated the Leaf combined fuel economy at 99 miles per gallon gasoline equivalent ? MPGe ? (2 @.@ 4 L / 100 km) , with an equivalent 106 mpg @-@ US (2 @.@ 2 L / 100 km ; 127 mpg @-@ imp) in city driving and 92 mpg @-@ US (2 @.@ 6 L / 100 km ; 110 mpg @-@ imp) on highways .

For the 2013 model year Leaf , Nissan achieved a 15 % improvement of its EPA 's fuel economy combined ratings . According to the EPA , the 2013 Leaf improved its energy consumption to 115 mpg @-@ e (30 kW · h / 100 mi ; 18 @.@ 6 kW · h / 100 km) from 99 mpg @-@ e (35 kW · h / 100 mi ; 22 kW · h / 100 km) , giving 129 mpg @-@ e (27 kW · h / 100 mi ; 16 @.@ 6 kW · h / 100 km) in city driving and 102 mpg @-@ e (34 kW · h / 100 mi ; 21 kW · h / 100 km) on highways .

According to the EPA , the 2014 and 2015 model year Leafs have an energy consumption of 30 kWh / 100 miles , for a combined city / highway rating of 114 mpg @-@ e (30 kW · h / 100 mi ; 18 @.@ 7 kW · h / 100 km) ; 126 MPGe (27 @.@ 3 kW · h / 100 mi ; 17 @.@ 0 kW · h / 100 km) city

and 101 MPGe (34 @.@ 0 kW · h / 100 mi ; 21 @.@ 2 kW · h / 100 km) highway .
The 2016 Leaf with the smaller 24 kWh battery has the same ratings and energy consumption as the 2014 / 15 models , while the trims with the larger 30 kWh has the same energy consumption of 30 kWh / 100 miles , but was rated 112 MPGe (30 @.@ 7 kW · h / 100 mi ; 19 @.@ 1 kW · h / 100 km) for combined city / highway ; 124 MPGe (27 @.@ 7 kW · h / 100 mi ; 17 @.@ 2 kW · h / 100 km) city and 101 MPGe (34 @.@ 0 kW · h / 100 mi ; 21 @.@ 2 kW · h / 100 km) highway .

= = = Operating costs = = =

According to Consumer Reports , as of December 2011 , the Nissan Leaf has an out @-@ of @-@ pocket operating cost of 3 @.@ 5 cents per mile (2 @.@ 19 ¢ per km) while the heavier Chevrolet Volt has a cost in electric mode of 3 @.@ 8 cents per mile (2 @.@ 38 ¢ per km) . These costs are based on the U.S. national average electricity rate of 11 cents per kWh and energy consumption was estimated from their own tests . The consumer magazine also compared the Leaf with the most fuel @-@ efficient hybrid and gasoline @-@ powered cars as tested by Consumer Reports . The results are summarized in the following table , and the analysis found that the Leaf operating cost is much less than half of the gasoline @-@ powered cars for trips up to 110 km (70 miles) , which is close to the Leaf 's maximum range . The Volt while on EV mode has a close cost per mile but as the distance is larger than its electric range of 56 km (35 miles) , the Leaf advantage is similar to the other cars . Consumer Reports also noted that even with a much higher electric rate of 19 cents per kWh , such as rural Connecticut , the Leaf still cost about 20 % less to operate than the Prius and around 50 % less than the Corolla .
According to Nissan , the operating cost of the Leaf in the U.K. is 1 @.@ 75 pence per mile (1.09p per km) when charging at an off @-@ peak electricity rate , while a conventional gasoline @-@ powered car costs more than 10 pence per mile (6.25p per km) . These estimates are based on a national average of British Gas Economy 7 rates as of January 2012 , and assumed 7 hours of charging overnight at the night rate and one hour in the daytime charged at the Tier @-@ 2 daytime rate .
Leaf owners in Japan are liable for yearly annual taxes due to the vehicles exterior dimensions that are not in compliance with Japanese Government dimension regulations for cars in the " compact " classification . This is offset by the tax incentives Japanese consumers receive for a vehicle with no tailpipe emissions .

= = = = Payback time = = = =

According to Edmunds.com , the price premium paid for the Leaf , after discounting the US $ 7 @,@ 500 federal tax credit , may take a long time for consumers to recover in fuel savings . In February 2012 , Edmunds compared the mid @-@ sized Leaf (priced at US $ 28 @,@ 550) with the compact gasoline @-@ powered Nissan Versa (priced at US $ 19 @,@ 656) and found that the payback period for the Leaf is 9 years for gasoline at US $ 3 per gallon , 7 years at US $ 4 per gallon , and drops to 5 years with gasoline prices at US $ 5 per gallon . Considering gasoline prices by early 2012 , the break even period is 7 years . These estimates assume an average of 24 @,@ 000 km (15 @,@ 000 miles) annual driving and vehicle prices correspond to Edmunds.com 's true market value estimates . For the same two vehicles , the U.S. EPA estimates the Leaf 's annual fuel cost at US $ 612 while the Versa 's annual fuel cost is US $ 1 @,@ 860 . EPA estimates are based on 45 % highway and 55 % city driving , over 15 @,@ 000 annual miles ; gasoline price of US $ 3 @.@ 72 per gallon and electricity price of US $ 0 @.@ 12 per kWh .
In a similar comparison carried out in April 2012 , by TrueCar.com for The New York Times , the analysis found that at a gasoline price of US $ 3 @.@ 85 per gallon , the payback period required for the Leaf to compensate the nearly US $ 10 @,@ 000 difference in purchase versus a Nissan Versa , takes 8 @.@ 7 years . The analysis assumes an average of 15 @,@ 000 miles driven a year , a fuel economy of 33 @.@ 6 mpg @-@ US (7 @.@ 0 L / 100 km ; 40 @.@ 4 mpg @-@ imp) for the Versa , priced at US $ 18 @,@ 640 , and a Leaf price of US $ 28 @,@ 421 , after

discounting the US $ 7 @,@ 500 federal tax . The payoff time drops to 6 years if gasoline is priced at US $ 5 per gallon . The newspaper also reported that according to the March 2012 Lundberg Survey , gasoline prices would need to reach US $ 8 @.@ 53 a gallon for the Leaf to be competitive with a similar gasoline @-@ powered car in the 6 years an average person owns a car , while the Chevrolet Volt plug @-@ in hybrid requires a gasoline price of US $ 12 @.@ 50 a gallon to break even .

= = = = Total cost of ownership = = = =

According to a study published in June 2013 , by the Electric Power Research Institute , the total cost of ownership of the 2013 Nissan Leaf SV is substantially lower than that of comparable conventional and hybrid vehicles . For comparison , the study constructed average hybrid and conventional vehicles and assumed an average US distance per trip distribution . The study took into account the manufacturer 's suggested retail price , taxes , credits , destination charge , electric charging station , fuel cost , maintenance cost , and additional cost due to the use of a gasoline vehicle for trips beyond the range of the Leaf .

= = = Environmental footprint = = =

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 found that among advanced automotive technologies , the Nissan Leaf holds the smallest life @-@ cycle environmental footprint of any model year 2014 automobile available in the North American market with minimum four @-@ person occupancy . The study concluded that the increased environmental impacts of manufacturing the battery electric technology is more than offset with increased environmental performance during operational life . For the assessment , the study used the average electricity mix of the U.S. grid in 2014 .

= = = Recharging = = =

Recharging receptacles vary between models . The Leaf , with the SL option , has two charging receptacles : a standard SAE J1772 @-@ 2009 connector for level 1 and 2 charging (120 / 220 volts AC) and a JARI high @-@ voltage DC connector designed by TEPCO for DC fast charging (500 volts DC 125 amps) using the CHAdeMO protocol .

Models with an on @-@ board 3 @.@ 6 kW charger can be fully recharged from empty in 8 hours from a 220 / 240 @-@ volt 30 amp supply (5 @.@ 2 kW allowable draw) that can provide the on @-@ board charger its full 3 @.@ 6 kW of usable power . Models with an on @-@ board 6 @.@ 6 kW charger can be fully recharged from empty in 4 hours from a 220 / 240 @-@ volt 40 amp supply (7 @.@ 7 kW allowable draw) that can provide the on @-@ board charger its full 6 @.@ 6 kW of usable power . A third option is to use the supplied EVSE cable from a standard 220 / 240V AC outlet , taking around 12 hours for a full recharge drawing 10A .

In North America and Japan using a standard household outlet (120 @-@ volt , 15 amp breaker , 12 amp maximum allowable draw , 1 @.@ 4 kW) and the 7 @.@ 5 @-@ meter (25 ft) cable included by Nissan , the Leaf will regain approximately 5 miles of range per hour . This type of charging is ideal for the commuter that can plug into standard outlets at home and at work during the typical 21 hours a day that the typical North American car is parked . It is also useful for emergency charging from any ubiquitous 120 @-@ volt outlet just about anywhere in North America .

United States electrical regulations require a 240 @-@ volt charging station to be permanently wired unless proper interlock mechanisms are available to ensure the charging current can be safely turned on and off . Nissan selected AeroVironment to supply its charging dock and installation services in North America (see the United States section below for more details) .

For models with DC fast charging , a battery pack can be charged from fully discharged to 80 %

capacity in about 30 minutes . Nissan developed its own 500 @-@ volt DC fast charger that went on sale in Japan for ¥ 1 @,@ 470 @,@ 000 (around US $ 16 @,@ 800) in May 2010 . Nissan warns that if fast charging is the primary way of recharging , then the normal and gradual battery capacity loss is about 10 % more than regular 220 @-@ volt charging over a 10 @-@ year period . Other companies make compatible charging stations , and companies and local government have various initiatives to create networks of public charging stations (see electric vehicle network) .

= = = Technology = = =

The Nissan Leaf employs an advanced telematics system called CarWings which originally was only available in Japan . The system sends and receives data via a built @-@ in GPRS radio similar to the connectivity of mobile phones . Carwings is connected any time the car is in range of a cell tower and it makes possible several user functionalities , such as position and possible range on a map and which charging stations are available within range . The system also tracks and compiles statistics about distance traveled and energy consumption and produces daily , monthly and annual reports of these and several other operational parameters . All information is available in the Leaf 's digital screens . Through a smart phone application or secure web page , owners can remotely turn on the air @-@ conditioner or heater as well as reset charging functions even when the vehicle is powered down . This remote functionality can be used to pre @-@ heat or pre @-@ cool the car prior to use while it is still charging so that less energy from the battery is used for climate control . An on @-@ board timer can also be pre @-@ programmed to recharge batteries at a set time such as during off @-@ peak rates . The Leaf 's SL trim has a small solar panel at the rear of the roof / spoiler that can trickle charge the auxiliary battery .

= = = Safety = = =

NHTSA rates the 2011 and 2012 model years , as 5 stars overall . The 2013 and 2014 model years rating , is 4 stars overall due to lower scores for passengers in front and side tests .

The Nissan Leaf won the " Top Safety Pick " awarded by the Insurance Institute for Highway Safety in 2011 . The Leaf received top ratings of " Good " for front , side , and rear impact crash tests , and also on rollover protection . All injury measurements except one were rated good , indicating a low risk of significant injuries in crashes according to the scale of severity employed in the IIHS ? s testing . The European New Car Assessment Programme (Euro NCAP) awarded the Leaf the highest five star car safety rating , earning the following ratings for each criteria :

Accident and rescue handling

In December 2010 , Nissan published a guide for first responders that details procedures for handling a damaged 2011 Leaf at the scene of an accident . The steps include a manual high @-@ voltage system shutdown , subsequent to the assumed automatic disconnects , built into the car 's safety systems . Rescue personnel are instructed by Nissan to disconnect both the high voltage and 12 V systems before performing any first response actions .

The Nissan Leaf 's battery pack is shielded from crash damage by structural steel reinforcement . To prevent shock and fire hazards , the Leaf has a battery safety system that is activated in a crash that involves the airbags . The airbag control unit sends a signal which mechanically disconnects the high voltage from the vehicle .

In December 2011 , Nissan reported , as an indication of the Leaf safety performance , that none of the around two dozen Leafs that were destroyed during the March 2011 tsunami caught fire and their batteries remained intact . As of December 2011 , no fires after a crash have been reported in the U.S. associated with the Leaf or other plug @-@ in electric cars available in the market .

Warning sounds

Due to significant noise reduction typical of electric vehicles that travel at low speeds , the 2011 Leaf includes digital warning sounds , one for forward motion and another for reverse , to alert pedestrians , the blind , and others of its presence . For this purpose Nissan created the Vehicle Sound for Pedestrians (VSP) system , which was also used in Nissan Fuga hybrid . The system

developed makes a noise easy to hear for those outside in order to be aware of the vehicle approaching , but the warning sounds do not distract the car occupants inside . Nissan explained that during the development of the sound , they studied behavioral research of the visually impaired and worked with cognitive and acoustic psychologists . The sine @-@ wave sound system sweeps from 2 @.@ 5 kHz at the high end to a low of 600 Hz , an easily audible range across age groups . Depending on the speed and if the Leaf is accelerating or decelerating , the sound system makes sweeping , high @-@ low sounds . The sound system ceases operation when the Nissan Leaf reaches 30 km / h (18 @.@ 6 mph) and engages again as car slows to under 25 km / h (15 @.@ 5 mph) . For the 2011 model , the driver could turn off sounds temporarily through a switch inside the vehicle , but the system automatically reset to " On " at the next ignition cycle . The system is controlled through a computer and synthesizer in the dash panel , and the sound is delivered through a speaker in the front driver ? s side wheel well . Nissan removed the ability to disable the pedestrian alert between model year 2011 and 2012 in anticipation of the U.S. ruling to be issued by the National Highway Traffic Safety Administration .

After the new sounds were publicized , the U.S. National Federation of the Blind commented that " while it was pleased that the alert existed , it was unhappy that the driver could turn it off . " The Leaf 's electric warning sound had to be removed for cars delivered in the U.K. , as the country 's law mandates that any hazard warning sound must be capable of being disabled between 11 : 00 pm and 6 : 00 am , and the Leaf 's audible warning system does not allow for such temporary deactivation .

= = = 2013 model = = =

Japanese market

In November 2012 , Nissan announced the specifications of the updated 2013 model Leaf destined for the Japanese market . The improved version delivers a range increase of 14 % on the Japanese cycle , allowing the travel distance on a full charge to go from 200 to 228 km (124 to 142 miles) . Besides adjusting the regenerative braking to improve power generation , Nissan reduced the Leaf weight by integrating the electric motor , inverter , and AC / DC converter , achieving a combined weight reduction for those parts of 10 % . Also , lighter parts were used throughout , and an improved battery module and more integrated electronic units have together reduced the car mass by over 77 kg (170 lb) , 5 % of the previous version .

The 2013 Leaf has a larger trunk , with its volume increased from 330 to 370 litres (11 @.@ 6 to 13 cu ft) . The extra space was freed by moving a downsized charger from the back of the car to the front . Other improvements include a new gauge that tells the driver how much battery capacity is remaining by percentage , and a long @-@ life battery mode is now available in any charging mode , which charges the battery to 80 % to improve pack life . Also , Nissan will introduce in the Japanese market a lower price entry @-@ level model with less equipment , called the S trim . This model will be priced at just under ¥ 2 @.@ 5 million (around US $ 29 @,@ 700) , almost half a million yen (approximately US $ 5 @,@ 950) cheaper than the previous year ? s entry price .

American market

The 2013 model year Leaf destined for the U.S. market has several key improvements similar to the Japanese version , better range , faster charging capabilities , a more efficient cabin heater , and a lower starting price . According to Nissan USA , several of the changes seek to address shortcomings of previous versions of the Leaf , and feedback from Leaf owners was taken into consideration . The 2013 model year Leaf delivers a higher range than the 2012 model with the same 24 kWh battery pack . The efficiency gains come from a combination of improvements to aerodynamics through tweaks to the front fascia that allowed a reduction of the drag coefficient ; a more efficient heater ; the addition of a driver @-@ selected B @-@ mode that increases regenerative braking ; and energy / range management .

The 2013 model year offers a dashboard display of the battery ? s state of charge on a percentage basis , as has been demanded by Leaf owners . A 6 @.@ 6 @-@ kW onboard charger , available as an extra @-@ cost option on the base model , reduces charging times using 240 @-@ volt

power . This improvement means adding about 32 km (20 miles) in an hour of charging , rather than about 19 km (12 miles) that took with the 3 @.@ 6 @-@ kW charger on 2012 models . A complete charge from empty to full takes about four hours , instead of seven hours .

The charge port area now comes with a light not provided on earlier models , and the ability to open the port door from inside the car or by using the key fob . The onboard charger in all 2013 Leafs has also been reduced in size and relocated to a new position under the hood , which increases cargo volume . The new base trim level is called the Leaf S model , and is the result of a strategy for affordability . The S trim replaces the LED headlights with less expensive projector beams , and uses 16 @-@ inch steel wheels with plastic covers rather than alloy wheels . The base trim does not include the navigation system and the remote connectivity that allows drivers to turn on the climate control and monitor battery charging remotely using a smartphone . New features , including LED headlamps , fog lights , 17 @-@ inch alloy wheels and leather seating , are reserved for the higher @-@ end SL trim . Additional premium upgrades to the SL trim include a Bose seven @-@ speaker audio system and around view monitor , which puts cameras in front , in back and on the side mirrors for parking assistance .

The new base @-@ level 2013 Nissan Leaf S starts at US $ 28 @,@ 800 , the mid @-@ level Leaf SV at US $ 31 @,@ 820 , and the high @-@ end Leaf SL trim starts at US $ 34 @,@ 840 . All prices have a mandatory US $ 850 destination fee added .

European market

The 2013 European version has many of the same improvements of the Japanese and U.S. versions , including an extended range , greater recyclability , more interior space , better charging performance , and more equipment . Also three versions will be available : Visia , Acenta and Tekna . The Visia version has a lower starting price than the previous model , and the Tekna model features even more standard equipment than the 2011 / 12 Leaf . The European version was unveiled at the 2013 Geneva Motor Show , and production of the 2013 model began in March 2013 at the Sunderland plant in the U.K. , and sales started in June 2013 . The price of the 2013 Leaf produced in Sunderland is lower than the one built in Japan , and to further reduce the purchase price by GB £ 5 @,@ 000 , Nissan offered a battery leasing option for all trims produced at Sunderland . The leasing option is also available in several European countries , reducing the purchase price by ? 5 @,@ 900 . This measure , among others , helped to reduce the sales price in Germany , for instance , from roughly ? 37 @,@ 000 in April 2012 (with battery) to roughly ? 24 @,@ 000 in July 2013 (excluding battery lease of ? 79 per month) .

= = = 2014 model = = =

American market

The 2014 model year Leaf went on sale in December 2013 , in the United States . The 2014 Leaf is largely the same as the 2013 model year , except :

RearView Monitor will now be standard on all trims

Updated EV @-@ IT functionality with voice destination entry and SMS readout

= = Production = =

As of March 2013 , Nissan has an installed capacity to produce 250 @,@ 000 Leafs per year , 150 @,@ 000 at Smyrna , U.S. , 50 @,@ 000 at Oppama , Japan , and 50 @,@ 000 at Sunderland , England .

= = = Oppama , Japan = = =

The first vehicles sold in the U.S. were produced at Nissan ? s plant in Oppama , Japan , which started production on October 22 , 2010 . The plant has an annual production capacity of 50 @,@ 000 vehicles . Production of the electric car was disrupted for several months beginning in March 2011 due to the earthquake and tsunami in Japan , and as a result , Nissan announced it was not

able to reach its 2011 production target of 50 @,@ 000 Leafs . Nissan expected to increase sales in 2012 to 40 @,@ 000 units from 20 @,@ 000 in 2011 , as production returned to normal output and the Leaf became available in more European countries and more regional markets in the U.S.

With cumulative sales of more than 49 @,@ 000 Leafs through December 2012 , Nissan achieved only a 22 % increase in sales during 2012 , which according with Nissan CEO Carlos Ghosn " was a disappointment for us . " Mr Ghosn cited the adverse dollar @-@ yen exchange rate as one of the factors affecting the Leaf price . He also said that they realized the price of the original Leaf models was a problem , and the decision to drop the price on the 2013 model year Leaf by 18 % is possible due to the start of U.S. production of the battery car on the new assembly line in Smyrna , Tennessee , which will reduce production costs . Nissan has also taken other steps to improve production efficiency and lower component costs ? especially for the battery pack , the single @-@ costliest part of an electric vehicle .

= = = Smyrna , U.S. = = =

Commercial U.S. production began in January 2013 , at Nissan 's manufacturing facility in Smyrna , Tennessee . This plant was modified with a US $ 1 @.@ 4 billion loan granted by the US Department of Energy to allow the manufacturing plant to produce the Nissan Leaf and its advanced batteries . The Smyrna plant is expected to produce up to 150 @,@ 000 vehicles and 200 @,@ 000 battery packs annually . Nissan planned to unveil the upgraded 2013 model year version Nissan Leaf for the North American market in December 2012 , once production of the electric car had begun in the Smyrna plant , but rescheduled the introduction of the 2013 model to January 2013 , during the North American International Auto Show . The Smyrna plant began producing lithium @-@ ion cells in December 2012 . These cells are used in the battery pack of the 2013 model year Leaf built at the adjacent assembly plant . The cell fabrication factory in Smyrna is the largest plant in the U.S. that builds automotive @-@ scale lithium @-@ ion batteries , and it can produce batteries for up to 200 @,@ 000 electric vehicles a year . Leaf production in the Smyrna plant began in January 2013 , sharing the production line with the Altima mid @-@ size sedan and Maxima full @-@ size sedan .

= = = Sunderland , United Kingdom = = =

Production of the Leaf at Nissan 's plant in Sunderland , England , began in March 2013 . Nissan benefited from a GB £ 20 @.@ 7 million grant from the British government and up to GB £ 220 million from the European Investment Bank . The plant has the capacity to produce 60 @,@ 000 lithium @-@ ion batteries and 50 @,@ 000 Leafs a year . The U.K. produced Leaf is destined for the European market . In January 2013 Nissan announced an immediate price reduction of GB £ 2 @,@ 500 or ? 3 @,@ 000 for the Japanese @-@ made Leaf model sold in the U.K. and other European markets . The price of the 2013 Leaf produced in Sunderland is lower than the model built in Japan , and Nissan is offering a battery leasing option for the three trims produced at Sunderland , which further reduces the purchase price by GB £ 5 @,@ 000 in the U.K. , and ? 5 @,@ 900 in the other European countries where the leasing option is available . The first retail delivery of a 2013 Leaf built in the Sunderland plant took place in the U.K. in late May 2013 .

= = = Guangdong , China = = =

In March 2013 , the Chinese government announced that a partnership between Nissan and Dongfeng Motor to build Leafs is being planned . The initial production line will be able to produce 10 @,@ 000 units per year until it is upgraded to 50 @,@ 000 units by 2015 .

= = Markets and sales = =

Nissan officially introduced the Leaf in a ceremony held at its global headquarters in Yokohama on

December 3 , 2010 . The first US customer delivery took place in Northern California on December 11 , 2010 and the first delivery in Japan took place at the Kanagawa Prefecture on December 22 . Deliveries to individual customers began in Ireland in February 2011 , in the U.K. in March 2011 , and in France in August 2011 . Deliveries to corporate customers began in Portugal in December 2010 , in the Netherlands in March 2011 , and in Canada in July 2011 . Retail deliveries began in Spain and Norway in September 2011 in Switzerland in November 2011 , and in Germany in January 2012 . As of June 2015 , the Leaf is available in 46 countries in four continents .

Since December 2010 , Nissan sold 49 @,@ 117 Leafs worldwide during its first two years in the market , making the Leaf the world 's best @-@ selling highway @-@ capable electric car ever . With global sales of more than 22 @,@ 000 units in 2011 , the Leaf surpassed the Mitsubishi i MiEV as the best selling all @-@ electric car in history . Global sales during 2012 reached 26 @,@ 973 Leafs , a rise of 22 % over 2011 sales , led by Japan with 11 @,@ 115 units , an 8 % increase over 2011 sales ; followed by the United States with 9 @,@ 819 units representing a 1 @.@ 5 % rise over 2011 sales . During the first half of 2012 , the Leaf had a market share of 49 % of global sales of all @-@ electric cars . The sales milestone of 50 @,@ 000 units delivered worldwide was reached by mid February 2013 . A total of 47 @,@ 716 Leafs were sold during 2013 , up 77 % from 2012 .

As of mid January 2014 , and just after three years in the market , global sales totalled 100 @,@ 000 units , capturing a 45 % market share of worldwide pure electric vehicles sold since 2010 . During 2014 a total of 61 @,@ 507 Leafs were sold worldwide . Global sales totaled over 158 @,@ 000 units at the end of 2014 . Global Leaf sales passed the 200 @,@ 000 unit milestone in December 2015 . Total sales totaled 43 @,@ 651 units worldwide in 2015 , down 29 % from 2014 . The leading market in 2015 was the United States with 17 @,@ 269 units sold , down 42 @.@ 8 % from 2014 , followed by the European market with 15 @,@ 630 units .

Almost 220 @,@ 000 Leafs have been sold worldwide by mid @-@ April 2016 , making the Nissan Leaf the world 's all @-@ time best @-@ selling highway @-@ capable electric car in history . As of April 2016 , the United States continued to rank as the top selling market with 93 @,@ 309 units sold , followed by Japan with 64 @,@ 635 units through March 2016 , the European market with 55 @,@ 408 through March 2016 , and Canada with 3 @,@ 571 units sold through April 2016 . The European market is led by Norway with 17 @,@ 199 new units registered up until April 2016 , followed by the U.K. with 12 @,@ 433 units registered through December 2015 .

Battery leasing option

Initially the Leaf was sold in all markets including the battery pack and is not compatible with the QuickDrop battery swapping feature developed by its alliance partner Renault . In April 2013 , Nissan announced that sales of the 2013 Leaf will begin in the U.K. in June 2013 , and it will offer a battery leasing option for the three available trims . Pricing for the battery leasing in the U.K. starts at GB £ 70 (US $ 108) a month for a 36 @-@ month lease limited no more than 12 @,@ 100 km (7 @,@ 500 miles) a year , with a maximum of GB £ 129 (US $ 198) a month for a 12 @-@ month lease with no more than 24 @,@ 000 km (15 @,@ 000 miles) driven . The battery leasing option lowers the price of the level entry model to GB £ 20 @,@ 990 (US $ 32 @,@ 230) before applying the Plug @-@ in Car Grant .

In several European countries , except Norway , Finland , Iceland , Ireland and the Baltic markets , the leasing option will also be offered , resulting in a purchase price reduction of ? 5 @,@ 900 . The battery monthly charge starts at ? 79 (US $ 103) for a 36 @-@ month lease limited no more than 12 @,@ 500 km (7 @,@ 800 miles) a year , with a maximum of ? 142 (US $ 186) a month for a 12 @-@ month lease with no more than 25 @,@ 000 km (16 @,@ 000 miles) driven .

= = = Australia = = =

In July 2011 , Nissan Australia provided 16 Leafs for an electric vehicle trial in Victoria to be used by both personal and commercial users . The trial also includes 14 Mitsubishi i MiEVs and 3 Toyota Prius PHEVs .

Leaf retail sales in Australia began in June 2012 via 14 initial qualified dealerships in Brisbane , the

Gold Coast , Sydney , Canberra , Melbourne and Perth . The electric car initially sold for A $ 51 @,@ 500 (excluding delivery fees , stamp duty and registration) without public subsidies as the Australian government does not provide any . In December 2012 the Leaf price was reduced to A $ 46 @,@ 990 , and again in May 2013 to A $ 39 @,@ 990 . A total of 19 Leafs were registered in 2011 , and 77 during 2012 . Sales during the first nine months of 2013 totaled 118 units . Sales for the first six months of 2014 totaled 68 units , reaching approximately 320 Leafs registered in the country since 2011 .

= = = Canada = = =

The 2011 Leaf price was set at CA $ 38 @,@ 395 , and the initial roll @-@ out was limited to selected markets and in limited quantities . The 2011 Canadian Leaf came with additional equipment useful for colder weather , such as heated front and rear seats , steering wheel , and outside mirrors . Other modifications included a battery heater system and an HVAC duct to the rear seating area .

Fleet deliveries in Canada began on July 29 , 2011 , and deliveries to individuals began in late September 2011 . The order process for individuals began on August 27 , 2011 , and the only 40 model year 2011 Leafs were allocated in two hours . For the 2012 model , Nissan expects to release initially only around 600 Leafs in the country . The Leaf is sold only through 27 Leaf @-@ certified dealers for the entire country , and sales are limited to customers who live within a 65 km (40 miles) radius of one of those dealers . Cumulative sales through April 2016 reached 3 @,@ 571 units .

Ontario residents are eligible for a rebate of CA $ 8 @,@ 500 . The rebate is available for purchasing or leasing a plug @-@ in electric vehicles to the first 10 @,@ 000 applicants who qualify . Residents of the Province of Quebec were eligible for a CA $ 8 @,@ 000 refundable tax credit that was replaced with a purchase or lease rebate program on January 1 , 2012 . Since January 2012 , Communauto , the oldest carsharing service in North America , has 25 Leaf in operation , with 25 more to be added later . The Vancouver @-@ based car co @-@ op Modo has two Nissan Leaf on its fleet , a first for Western Canada .

= = = China = = =

In September 2011 , Nissan announced it has received government 's approval to begin selling the Leaf in China by October 2011 . The Leaf was expected to be sold at around CN ¥ 200 @,@ 000 (US $ 32 @,@ 600) . Initially Nissan planned to release the Leaf in limited quantities to government customers . In November 2011 Nissan delivered the first 15 Leafs out of 25 allocated to the municipal government of Wuhan as part of a pilot outreach program . Another objective of the program was to provide feedback for planning the full @-@ fledged rollout of electric cars in the Chinese market .

As part of a pilot program , a total of 300 rebadged Leafs were deployed in Guangzhou , Xiangyang and Dalian between December 2013 and June 2014 . These units were marketed as Venucia Morning Wind since local production of the Venucia e30 had not begun at the time . Together , the pilot fleet run 5 @,@ 000 @,@ 000 km (3 @,@ 100 @,@ 000 miles) without any failure . Retail sales of the Chinese manufactured version of the Leaf , the Venucia e30 , began in September 2014 . Initially the e30 is available in nine cities : Beijing , Dalian , Guangzhou , Hangzhou , Shanghai , Shenzhen , Tianjin , Wuhan and Zhengzhou . Nationwide availability is expected for 2015 . The Venucia e30 starts at CN ¥ 267 @,@ 800 (~ US $ 43 @,@ 705) . The e30 is eligible for a purchase tax exemption and other government incentives available for new energy vehicles manufactured in China . Cumulative sales of the rebadged Leaf manufactured by Venucia totaled 1 @,@ 776 units through November 2015 .

= = = Europe = = =

The Leaf was launched in Europe in early 2011 . European prices , which include the cost of the

battery , are almost ? 10 @,@ 000 more than the U.S. price . Most countries , except the Netherlands , have government incentives at the point of sale . Nissan also said that " the Leaf would allow owners to save ? 600 a year in fuel costs compared with an equivalent internal combustion model . " Nissan explained that its decision to launch initially only in four countries was due to the existing government incentives for electric cars and the ongoing efforts to deploy charging infrastructure . According to Nissan , 12 @,@ 000 European customers signed up to receive regular updates , and the company began taking orders in Portugal and Ireland on July 30 , 2010 . The process started in the U.K. in September 2010 . By April 2012 , deliveries of the Leaf had taken place in Denmark , Estonia , France , Germany , Ireland , the Netherlands , Norway , Portugal , Spain , Switzerland , Sweden , and the U.K ..

Leaf sales climbed from 1 @,@ 728 units in 2011 to 5 @,@ 211 in 2012 , and to 11 @,@ 097 in 2013 . Sales totaled 14 @,@ 658 units in 2014 , capturing 26 % of the segment sales that year , and allowing the Leaf to rank as the best selling all @-@ electric car in Europe for a fourth year @-@ in @-@ a @-@ row . As of December 2014 , and accounting for cumulative sales since 2010 , the Leaf ranked as the all @-@ time top selling plug @-@ in electric car in the region with 33 @,@ 481 new units delivered . However , the Mitsubishi Outlander P @-@ HEV ranked in 2014 as the top selling plug @-@ in electric vehicle in Europe , ahead of the Nissan Leaf by more than 5 @,@ 000 units .

During the first ten months of 2015 , the Leaf continued to rank as the top selling all @-@ electric car in Europe , with 13 @,@ 801 units sold , but again ranked second to the Outlander P @-@ HEV in the overall plug @-@ in electric car category . The Nissan Leaf was overtaken during 2015 by the Outlander plug @-@ in hybrid as the all @-@ time top selling plug @-@ in passenger car in Europe with over 50 @,@ 000 units sold through October 2015 . A total of 15 @,@ 630 Leafs were sold in Europe in 2015 . As of December 2015 , a total of 49 @,@ 111 Leafs had been sold in Europe since its introduction .

Belgium

Leaf retail deliveries in the Belgian market began in the third quarter of 2011 at a price of ? 36 @,@ 990 including VAT and before a federal income tax credit of up to ? 9 @,@ 190 is applied . The Wallonia regional government provides an additional ? 4 @,@ 500 eco @-@ bonus for cars registered before December 31 , 2011 . The reservation process started in late June 2011 and Nissan charged a fully refundable ? 300 reservation fee . A total of 174 Leafs were sold in the country and Luxembourg through October 2012 .

Denmark

Retail customer deliveries in Denmark began in early 2012 , at a price of 290 @,@ 690 Danish kroner (kr) including VAT . Even though the government does not have any purchase rebates , as an all @-@ electric vehicle weighing under 2 @,@ 000 kg , the Leaf is exempted from the new car registration tax , which can amount to more than 130 @,@ 000 kr on a vehicle the size of a Leaf , and is also exempt from public parking fees and toll payments . Since 2011 a total of 512 Leafs have been registered in Denmark through June 2014 . The world 's largest single private order for the Leaf came in April 2014 when Avis Rent a Car System ordered 400 cars , with support from the Danish government .

France

Leaf deliveries in the French market began in August 2011 , at a price of ? 35 @,@ 990 before a ? 5 @,@ 000 government subsidy is applied . A total of 4 @,@ 847 Leafs have been registered through May 2015 .

Germany

Due to the lack of government purchase subsidies , Germany is one of the last European countries where the Leaf was deployed . The only incentive available is an exemption from the annual circulation tax for a period of ten years from the date of first registration . Retail deliveries began in January 2012 and a total of 2 @,@ 871 Leafs have been sold through June 2015 . As part of a marketing campaign to promote Leaf sales , Nissan introduced an " electric bonus " of ? 5 @,@ 200 between July and September 2015 , which represented a discount of 22 % of the list price .

In March 2016 , Nissan Europe announced its support to the green car incentive and its

commintment to double the government 's E @-@ premium incentive when buying a Nissan electric car , with a reduction of the purchase price of the same amount of the subsidy . Nissan Center Europe CEO said " we remain convinced that the goal of one million electric cars by 2020 is still achievable . " The purchase incentive scheme to promote plug @-@ in electric vehicle adoption was approved in April 2016 and is scheduled to start as early as May 2016 . The cost of the purchase incentive will be shared equally between the government and automakers . Electric car buyers will get a ? 4 @,@ 000 (US $ 4 @,@ 520) discount while buyers of plug @-@ in hybrid vehicles will get a discount of ? 3 @,@ 000 (US $ 3 @,@ 390) . In May 2016 , Nissan confirmed the company will raise the bonus with an additional ? 1 @,@ 000 (US $ 1 @,@ 130) to ? 5 @,@ 000 (US $ 5 @,@ 650) for customers of its all @-@ electric Leaf car and e @-@ NV200 utility van .

Hungary

The Leaf launch was scheduled for July 2013 , with pre @-@ orders starting in the middle of June . The price was announced to start at 8 @,@ 774 @,@ 500 ft .

Ireland

The Leaf was launched in Ireland in February 2011 , at a price of ? 29 @,@ 995 after a ? 5 @,@ 000 government incentive is applied . Buyers are exempted from the vehicle registration tax . The first Leaf was delivered on February 21 , 2011 , and cumulative sales reached 111 units through October 2012 . In May 2015 cumulative registrations exceeded 800 units .

Italy

Deliveries began in September 2011 . Sales increased from five units in 2011 to 146 in 2012 and more than double to 323 in 2013 , for a total of 474 sold through December 2013 .

Netherlands

According to Nissan , the Leaf roll @-@ out in the Netherlands was rescheduled from December 2010 to June 2011 , due to the high demand . The price is ? 34 @,@ 990 . Existing incentives include total exemption of the registration fee and road taxes , which result in savings of approximately ? 5 @,@ 324 for private car owners over four years and ? 19 @,@ 000 for corporate owners over five years . Leaf buyers also have access to parking spaces in Amsterdam reserved for battery electric vehicles , so Leaf buyers avoid the current wait for a parking place in Amsterdam , which can reach up to 10 years in some parts of the city .

Deliveries to fleet customers began in March 2011 , and the first Leafs were delivered to LeasePlan , the City of Amsterdam and BAM Building Contractors . These first units are part of a pilot program that Nissan had agreed on with the City of Amsterdam . Sales went up from 265 units in 2012 to 462 in 2013 , and a total of 1 @,@ 021 Leafs have been sold in the Netherlands through December 2013 .

Norway

Official sales of the Leaf in the Norwegian market began in September 2011 , at a price of 255 @,@ 000 kroner . There are no direct government subsidies to the purchase price , but the Leaf , as all other electric cars , is exempt from all non @-@ recurring vehicle fees , including sales tax (VAT) , the annual road tax , all public parking fees , and toll payments , as well as being able to use bus lanes .

A total of 600 Leafs were sold in the first three days and deliveries for these customers were fulfilled in early 2012 . Since September 2011 , a total of 7 @,@ 275 new Leaf cars had been sold through December 2013 . Accounting for used Leaf imported from neighboring countries , of which , 1 @,@ 608 units were registered during 2013 , a total of 9 @,@ 080 Leafs have been registered in Norway through December 2013 , representing 9 @.@ 4 % of the 96 @,@ 847 Leafs delivered globally through December 2013 .

In February 2012 , Leaf sales represented a 2 % market share of all new car sales that month , and by October 2012 increased to 2 @.@ 2 % , with the Leaf ranking for the first time ever among the country 's top 10 best selling new cars , making Norway the first country in the world where an electric car ranked among the top 10 best selling new cars . For 2012 total new car sales , the Leaf ended in the 13th place , representing a market share of 1 @.@ 7 % of all new car sales in the country in 2012 , up from 0 @.@ 3 % in 2011 . In April 2013 , the Leaf climbed to become the second top selling new car in the country , and in October 2013 , the Nissan Leaf was the best

selling new car in the country . The Leaf sold 716 units , representing a 5 @.@ 6 % of new car sales that month . The Nissan Leaf , with 4 @,@ 604 units sold , ranked as the third best selling new car in Norway during 2013 .

In January 2014 , the Leaf topped for a second time the list of top selling new cars in Norway , with 650 units sold , representing a 5 @.@ 7 % of new car sales that month . Nissan Leaf registrations passed the 10 @,@ 000 unit milestone in February 2014 . The Leaf ranked as the third top selling new car in Norway in 2014 with 4 @,@ 781 units delivered , capturing a 3 @.@ 3 % market share of total new car sales in the country . As of November 2015 , there were over 20 @,@ 000 Leafs registered in Norway , including a significant number of used imported Leafs from neighboring countries , meaning that more than 10 % of Leafs sold in the world were on Norwegian roads by November 2015 . Leaf registrations during the first quarter of 2016 totaled 1 @,@ 413 units , representing 22 @.@ 0 % of the all @-@ electric segment registrations that quarter . A total of 17 @,@ 199 new Leafs have been registered in the country up until April 2016 .

The following table presents first time registrations of the Nissan Leaf since 2011 through December 2015 with the breakdown between new and used imports from neighboring countries .

Portugal

Leaf retail deliveries in Portugal began in January 2011 , at a price of ? 30 @,@ 250 after a ? 5 @,@ 000 government subsidy . Some consumers could benefit from an additional ? 1 @,@ 500 incentive if they turned in their used car as part of the down payment for the new electric car . These incentives were discontinued at the beginning of 2012 due to the financial crisis of the country . As of May 2010 , there are only about a dozen recharging stations in the country , but the government expected to deploy 320 before the end of 2010 and 1 @,@ 300 by the end of 2011 . On December 22 , 2010 in Lisbon Nissan delivered the first nine Leafs to its commercial customer the MOBI.E consortium , and another unit to the Portuguese government as a loan for trial purposes . Deliveries for individual customers began in early 2011 . A total of 121 Leafs have been sold through October 2012 .

Spain

The reservation process began in May 2011 , and Nissan asked for a fully refundable ? 300 reservation fee . Pricing starts at a price of ? 35 @,@ 950 before a ? 6 @,@ 000 government subsidy is applied . Deliveries began in Barcelona in September 2011 , followed by Madrid in October 2011 . A total of 732 Leafs have been sold through December 2014 .

Sweden

Leaf deliveries in the Swedish market began in February 2012 at a price of 369 @,@ 900 kr including VAT and before a 40 @,@ 000 kr government subsidy is applied . All Leafs are equipped with the cold @-@ weather package . A total of 884 Leafs have been sold through December 2014 .

Switzerland

The Leaf was launched in November 2011 , at a price of SFr 49 @,@ 950 . The Swiss government does not have any subsidies or incentives for purchasing plug @-@ in electric vehicles . A total of 542 Leafs have been registered in the country through December 2015 . This figure includes registrations in Liechtenstein .

United Kingdom

The Leaf went on sale in the United Kingdom at a price of GB £ 28 @,@ 990 which includes the new 20 % VAT and before discounting the Plug @-@ in Car Grant of GB £ 5 @,@ 000 that came into effect in January 2011 . Despite the government incentive , at that price the Leaf is still around GB £ 4 @,@ 000 more expensive than the price of a basic Toyota Prius . On February 24 , 2011 , Nissan announced that on March 1 , 2011 the price of Leaf would increase by GB £ 2 @,@ 000 (about US $ 3 @,@ 238) . Orders and pre @-@ orders placed before that date received the old price . Pricing of the 2013 model built in the UK starts at GB £ 25 @,@ 990 with the battery included , and at GB £ 20 @,@ 990 with the battery leasing option , which varies from GB £ 70 to GB £ 129 per month depending on the miles driven per year and length of the lease .

Nissan had to delay the beginning of deliveries in order to remove the Leaf 's electric warning sound for pedestrians , as U.K. law mandates that any hazard warning sound must be capable of

being disabled between 11 : 00 pm and 6 : 00 am , and at that time the Leaf 's audible warning system did not allow for such temporary deactivation . Deliveries to individual customers began on March 21 , 2011 . The first retail delivery of a 2013 Leaf produced in the Sunderland plant took place on 31 May 2013 , and Nissan chose the same retail customer who was the first person in the UK to take delivery of a Nissan Leaf in March 2011 . Sales of the three trims of the 2013 model began in June 2013 .

Leaf sales in September 2014 , achieved a record of 851 units , up from 332 units in September 2013 , representing not only the best monthly sales ever in the U.K. , but also the largest volume of Nissan Leafs ever sold in one month in a European country . The previous European record was achieved by Norway in March 2013 with 703 Leafs sold in that month . During 2014 Leaf sales totaled 4 @,@ 051 units , up from 1 @,@ 812 in 2013 . By December 2014 , the Leaf continued to rank as the all @-@ time top selling plug @-@ in electric car in the U.K. , with 7 @,@ 197 units sold since its introduction .

In March 2015 , with over 10 @,@ 000 units sold , the Mitsubishi Outlander P @-@ HEV passed the Nissan Leaf to become the all @-@ time top selling plug @-@ in electric vehicle in the U.K. Leaf sales passed the 10 @,@ 000 mark in June 2015 . With 5 @,@ 236 new registrations in 2015 , up 29 % from 2014 , the Leaf retained its position as the top selling all @-@ electric car in the UK for fourth year running , and also ranked as the second top selling plug @-@ in electric car after the Outlander P @-@ HEV (11 @,@ 681) . Cumulative Leaf registrations totaled 12 @,@ 433 units at the end of December 2015 .

= = = Japan = = =

The price of the Leaf in Japan starts at ¥ 3 @.@ 76 million (approximately US $ 44 @,@ 600) before any current tax breaks . The Leaf is eligible for a ¥ 770 @,@ 000 government tax credit if current incentives continue through fiscal year 2010 , which reduce the net price to ¥ 2 @.@ 99 million (US $ 35 @,@ 500) . The Leaf is also exempted from the car @-@ weight and car @-@ acquisition taxes .

Nissan offers customers various purchasing methods , including a financing program that allows consumers to pay ¥ 2 @.@ 4 million (US $ 28 @,@ 500) and then a monthly fee of ¥ 10 @,@ 000 (US $ 119) , which includes electricity costs . Other services that are available include assistance from Nissan dealers to customers in the installation of charging facilities in their homes . Nissan committed to install 200 @-@ volt regular chargers at 2 @,@ 200 Nissan dealers nationwide before December 2010 ; about 200 dealers would also have quick @-@ charging facilities that provide 80 % of battery capacity in less than 30 minutes . Nissan guarantees the availability of at least one quick @-@ charge unit within a 40 km (25 miles) radius throughout the country . The 220 V quick charger went on sale on May 2010 for ¥ 1 @,@ 470 @,@ 000 (around US $ 17 @,@ 800) excluding taxes and installation . The quick chargers were developed by Nissan but they also work with electric cars from other automakers . Nissan offers variants built for hot and cold climate for ¥ 1 @,@ 732 @,@ 500 (US $ 20 @,@ 964) and ¥ 1 @,@ 543 @,@ 500 (US $ 18 @,@ 677) respectively .

The Leaf pre @-@ order process began on April 1 , 2010 through Nissan dealers across Japan . During the first three weeks , individuals accounted for 64 % of the pre @-@ orders , and fleet orders represented the remaining 36 % . Among individuals , older consumers (age 50 and higher) accounted for 61 % of the orders . As of late May 2010 , Nissan claimed it had already received 6 @,@ 000 pre @-@ orders , which allowed it to reach its Japan sales target for FY2010 . The first Leaf delivery took place at the Kanagawa Prefecture on December 22 , 2010 . Ten units were delivered to the Kanagawa Prefecture Government , which decided to assign six Leafs for official use and the other four will be available for the car rental service run by the local government . Since December 2010 , Nissan has sold 65 @,@ 783 units by the end of May 2016 .

Nissan Zero Emission Fund

In June 2012 , Nissan launched a new fund for individual Nissan electric vehicle owners in Japan called the Nissan Zero Emission Fund . Through participation in this program , Leaf owners are able

to generate CO2 emissions credits certified by the Ministry of Economy , Trade and Industry (METI) based on the amount of CO2 emissions that are offset by driving the Nissan Leaf to generate credits . Measurement and certification of the amount of CO2 emissions that are avoided by driving the electric cars is calculated based on the total annual distance traveled as automatically collected by Nissan 's advanced telematics " Carwings " system . These credits are sold to an organization that promotes investment in low carbon emissions , the Green Investment Promotion Organization . All profits earned by the sale of the credits will be invested by the fund to support forest conservation activities of thinning forests in Japan and the installation of quick charging facilities in appropriate locations in the country .

= = = United States = = =

Nissan offered the 2011 model year Leaf in SV and SL trim levels . The SV trim level included an advanced navigation system and Internet / smart phone connectivity to the vehicle . The SL trim level added features , including rearview monitor , solar panel spoiler , fog lights , and automatic headlights for an additional US $ 940 . An optional CHAdeMO fast charge receptacle was available for US $ 700 , but only as a factory installed option on the SL model . This second charge port is likely to differ from the SAE International standard for electric vehicle fast @-@ charging equipment that is under development , and expected to be published by mid @-@ 2012 . A cold weather package was available , standard in some states , optional in others . The package included a temperature management system for the lithium ion battery , heated front and rear seats , heated steering wheel , rear seat heat duct and heated outside mirrors .

Minor upgrades for the 2012 model year Leaf included a quick charge port that is standard on the SL trim , and also the cold weather package is standard on all Leafs ; but pricing for both trims of the 2012 model year Leaf was increased . Nissan explained that these changes reflect customer preferences in the US based on actual orders of the 2011 model in the seven initial launch market states , as the SL trim was chosen by 95 % of the buyers , and of those Leaf SLs , 90 % had the DC quick charge .

Charging options

Leaf customers have the option to buy a home charging station through Nissan at cost of around US $ 2 @,@ 200 including installation , which was eligible for a 50 % federal tax credit up to US $ 2 @,@ 000 until December 31 , 2010 , and afterwards the credit was reduced to 30 % up to US $ 1 @,@ 000 for individuals and US $ 30 @,@ 000 for commercial buyers . The charging stations operate on a 240 @-@ volt supply and are built and installed by AeroVironment . This one @-@ stop @-@ shop process includes a home assessment by a certified technician to ensure that the buyer 's garage is plug @-@ in ready . The AeroVironment charging dock is also available as a cash and carry purchase , with installation by any electrical contractor arranged separately . It was originally available for US $ 751 , but the price was increased in April , 2011 to US $ 995 .

Other options for level 2 charging of the Leaf include the Blink charging dock from ECOtality (also available through the EV Project) , the Schneider Electric Square @-@ D , and the Evr @-@ Green unit from Leviton . A complete list of charging stations is available at Plug In America . It is also possible to have the level 1 charging dock which comes with the Leaf modified to support both 120 V and 240 V charging , the latter at either 12 amps (US $ 239) or 16 amps (US $ 287) . The 16 amp modification provides the maximum current draw the Leaf can use , and thus charges at the same rate as the AeroVironment charging dock . Various adapters allow using the modified unit with a wide range of 240 V sockets . The modified unit provides the cheapest charging solution for those with a 240 volt socket available and is portable for use at other locations . Possible disadvantages include the lack of UL certification and the potential for theft since the unit is not hardwired . The modification of the 120V charger could also void various warranties associated with the charging cable , EV system , and battery .

EV Project

The US Department of Energy initially granted US $ 99 @.@ 8 million , and later awarded an additional US $ 15 million , to Electric Transportation Engineering Corporation (eTec) for the EV

Project , that involves the installation of up to 11 @,@ 210 charging stations in strategic markets in Phoenix and Tucson , Arizona ; San Diego , California ; Portland , Eugene , Salem and Corvallis , Oregon , Seattle , Washington ; Nashville , Knoxville , and Chattanooga ; Washington D.C. ; Dallas , Fort Worth , and Houston , Texas . Nissan has partnered with eTec on this project and will supply 4 @,@ 700 vehicles to individual and fleet customers in these areas .

The EV Project will collect and analyze data regarding vehicle use under different geographic and climatic conditions , for both commercial and public installations . The effectiveness of the deployed charge infrastructure will also be evaluated as part of the project and the lessons learned will be applied to improve the deployment of the full production number of Leafs and other EVs .

Price and government incentives

The base retail price for the 2011 model year Leaf in the U.S. was US $ 32 @,@ 780 before any applicable tax incentives (federal tax credit) . Nissan also had a 36 @-@ month lease option for US $ 349 a month for the SV trim and US $ 379 a month for the SL trim , plus an initial payment of US $ 1 @,@ 999 in both cases . For eligible customers there is an electric vehicle federal tax credit for up to a US $ 7 @,@ 500 established by the American Clean Energy and Security Act of 2009 . The federal tax credit shrinks by automaker after it has sold at least 200 @,@ 000 vehicles in the U.S. , and then it phases out over a year . Nissan explained that it priced the Leaf lower in the U.S. than in Japan because it wants to achieve higher sales in that market . Other state and local incentives are available and may further decrease the cost . California initially had a US $ 5 @,@ 000 statewide rebate for FY 2010 @-@ 2011 available through the Clean Vehicle Rebate Project (CVRP) , and it was decreased to US $ 2 @,@ 500 for FY 2011 @-@ 2012 . Georgia has a US $ 5 @,@ 000 tax credit , and Oregon has a US $ 1 @,@ 500 tax credit .

The base retail price for the 2012 model year Leaf SV was increased to US $ 36 @,@ 020 including a US $ 820 destination charge , and the 2012 Nissan SL is also priced higher , at US $ 37 @,@ 250 . Both 2012 model trims include more standard equipment than the 2011 model . These prices do not include any federal or local government incentives or tax credits . The three @-@ year lease for the 2012 Leaf SV was increased to US $ 369 , a US $ 20 increased over the lease rate for a 2011 model . Kelly Blue Book (KBB) estimates the 2012 Nissan Leaf 's resale value at 39 @.@ 0 % of its original price after 3 years and 25 @.@ 5 % after 5 years . KBB explained that the residual value for a plug @-@ in electric car is lower than the market 35 @.@ 5 % average due to the US $ 7 @,@ 500 federal tax credit , which lowers the transaction price and pushes the residual value lower . For the 2013 model year Nissan introduced a new stripped @-@ down base @-@ level Leaf S trim , with pricing starting at US $ 28 @,@ 800 . The mid @-@ level Leaf SV starts at US $ 31 @,@ 820 , and the high @-@ end Leaf SL trim starts at US $ 34 @,@ 840 . All prices have a mandatory US $ 850 destination fee added .

Sales and regional launches

Nissan began the online @-@ only reservation process on April 20 , 2010 , charging a fully refundable US $ 99 reservation fee that allowed customers to secure a place on the list to purchase or lease a Leaf . It limited reservations to one per household and by July 2010 it had received approximately 17 @,@ 000 reservations . The carmaker reported that more than 55 % of the reservations were from what Nissan calls its primary launch markets in California , Washington , Oregon , Arizona , and Tennessee , where the carmaker has its US headquarters and an auto factory . By September 2010 Nissan announced it had reached 20 @,@ 000 reservations , and it did not accept any more reservations for the remainder of 2010 . In July 2011 , Nissan stated that only 48 % of Leaf reservations from the initial 2010 process materialized into firm orders . The US $ 99 reservation fee was ended in mid April 2012 , and customers are since allowed to buy the Leaf directly from dealers , keeping the online reservation as optional .

Firm orders started in August , and deliveries began in select markets and limited quantities in December 2010 . Nissan initially limited Leaf sales among states that are home to the EV Project , which was awarded a grant from the United States Department of Energy and is the largest electric vehicle and infrastructure deployment in the US . The first Leaf customer delivery took place in a Nissan dealership in Petaluma , California on December 11 , 2010 to the first person to place an on @-@ line order in the United States . Nissan reopened online reservations for the 2011 model year

Leaf on May 1 , 2011 in the seven initial launch states of Arizona , California , Hawaii , Oregon , Tennessee , Texas and Washington . Starting on July 27 , 2011 , Nissan opened up the 2012 model year Leaf ordering process to consumers with existing reservations the second group of launch markets , which included Alabama , Florida , Georgia , Illinois , Maryland , Mississippi , North Carolina , South Carolina , Virginia , and Washington , D.C. Then , on August 4 , Nissan reopened the reservation process to the general public in the first and second launch markets . By October 2011 Nissan had also opened orders for the 2012 Leaf to residents of Colorado , Connecticut , Massachusetts , New Hampshire , New Jersey , New York . Deliveries of the first batch of 2012 model year Leafs began in November 2011 . On December 6 , 2011 , Nissan began taking order in Delaware , Indiana , Louisiana , Nevada , Ohio , Pennsylvania , and Rhode Island . Since March 2012 the Leaf is available nationwide . Sales of the 2013 model year Leaf began in February 2013 .

A total of 19 units were delivered in December 2010 . On June 1 , 2011 , Nissan stated that it expected the total number of U.S. deliveries to be between 10 @,@ 000 and 12 @,@ 000 by the end of 2011 , a drop from its original forecast of 20 @,@ 000 sales . In 2011 , a total of 9 @,@ 674 Leafs were sold . Over 60 % of the Leafs sold in the U.S. were bought in California up to November 2011 . In May 2012 , Nissan announced a sales goal of 20 @,@ 000 Leafs for the year and the company expected to increase sales to meet such target once production starts in the U.S. , however , only 9 @,@ 819 units were sold in 2012 . During 2013 , sales increased to 22 @,@ 610 units , and the Leaf was the top selling Nissan model in Atlanta , Seattle , and San Francisco . Also , the Leaf ranked within the top @-@ three Nissan models in Honolulu and Portland , Oregon . As of August 2013 , Nissan noted that the Leaf is among the ten top selling vehicles in San Francisco regardless of powertrain . Between August 2013 and May 2014 , Atlanta was the Leaf top U.S. metropolitan market for eight out of 10 months . Leaf sales reached a 4 @.@ 4 % share of Nissan passenger car sales in the American market in December 2013 , and the share climbed to a record 5 @.@ 1 % in September 2014 .

In March 2015 Leaf sales passed the 75 @,@ 000 unit milestone , and , by the end of March cumulative sales reached 76 @,@ 407 units since its introduction , surpassing Chevrolet Volt sales (75 @,@ 231) to become the all @-@ time top selling plug @-@ in electric car in the United States since . A total of 17 @,@ 269 Leafs were sold in 2015 , down from 30 @,@ 200 units in 2014 . Cumulative Volt sales passed Leaf sales in March 2016 , and the plug @-@ in hybrid became once again the best selling plug @-@ in car in the American market . As of June 2016 , a total of 95 @,@ 384 Leafs had been sold in the United States .

Use patterns and owners profile

Based on the aggregate information compiled until late April 2011 through the telematics systems included in all Leafs and reflecting the patterns of early adopters , Nissan found that the average trip length is 7 miles (11 km) and the average charging time is 2 hours and 11 minutes , with most owners charging on a Level 2 , 220 @-@ volt charger at their homes . Nissan also found that early adopters are a combination of conscientious environmentalists and tech @-@ savvy individuals . According to additional information compiled until mid July 2011 and based on the owners profile from more than 4 @,@ 000 Leaf delivered in the U.S. market the Leaf was the primary vehicle for most owners ; 60 % of Leaf sales in the country took place in California , led by Los Angeles and San Francisco ; Leaf owners drive less than 97 km (60 miles) a day ; and the Toyota Prius is the number one vehicle also owned by Leaf buyers , with 19 % . The information compiled allowed Nissan to build a profile of the first owners , finding that Leaf buyers are college educated ; have excellent credit , with an average credit score of 750 , and have a combined household income of US $ 140 @,@ 000 a year .

Car rental availability

The Nissan Leaf will also be available through two car rental companies and carsharing services in selected markets . Enterprise Rent @-@ A @-@ Car initially plans to offer about 500 vehicles at dealerships in Los Angeles , San Diego , Portland , and Seattle beginning in January 2011 . The Leaf became available for rental at their Santa Monica , California location in late March 2011 . Hertz Rent @-@ a @-@ Car plans to offer the Leaf and other electric cars at select locations in the US and Europe , including New York City ; Washington , D.C. ; and San Francisco in 2011 . The

Leaf will also be available at some Hertz on Demand carsharing locations , a service with operations in London , Paris , Madrid , Berlin , and 150 locations in the United States . The carsharing rental by the hour of the Leaf began in New York City in March 2011 .

Warranty

The 2011 / 12 Leaf 's battery warranty is for eight years or 160 @,@ 000 km (100 @,@ 000 miles) . The warranty covers defects in materials and workmanship , but initially did not cover gradual loss of battery capacity , nor does it cover damage or failure resulting from not following the preventive actions recommended in the Leaf Owner 's Manual for the lithium @-@ ion battery , such as exposing the car to ambient temperatures above 120 ° F (49 ° C) for over 24 hours , or storing the Leaf in temperatures below ? 13 ° F (? 25 ° C) for over 7 days .

Before the Leaf 's market launch , Nissan conducted an e @-@ mail survey in July 2010 among the 16 @,@ 000 individuals that made a reservation in the US and a sample of other potential customers regarding the terms of the battery pack guarantee . The survey was sent two days after General Motors announced that the Chevrolet Volt 's battery was guaranteed for eight years or 160 @,@ 000 km (100 @,@ 000 miles) . The multiple @-@ choice survey had a batch of battery warranty related questions focused on the responder 's preference between a five @-@ year or 97 @,@ 000 km (60 @,@ 000 miles) warranty or an eight @-@ year or 160 @,@ 000 km (100 @,@ 000 miles) warranty . A Nissan spokeswoman commented that the company wanted to hear from future Leaf drivers to ensure Nissan was meeting the expectations of the marketplace before making a decision on its warranty policy .

The 2013 model year Leaf battery warranty covers a gradual loss of charge for five years or 97 @,@ 000 km (60 @,@ 000 miles) . In Europe the battery warranty is for five years or 100 @,@ 000 km (62 @,@ 000 miles) . Under the new warranty , Nissan will repair or replace the battery over the warranty period if it loses more than 30 % of its charge capacity (below nine bars) . This warranty is in addition of the original Leaf 's batteries that covers defects and flaws for up to eight years or 160 @,@ 000 km (100 @,@ 000 miles) . But even with the new warranty , Nissan says the fix may only restore a diminished battery 's capacity to nine bars out the twelve of a new car , as Nissan clarified that batteries aren 't designed to last forever , and some loss of capacity is to be expected . According to Nissan , " the intent of this warranty is to provide consumers with confidence that despite this normal battery capacity loss , they will be assured of a minimum level of capacity throughout the warranty period . " The new loss of charge warranty also benefits owners of the 2011 / 12 model year Leaf .

Marketing

In November 2009 , Nissan launched the Zero Emission Tour , with stops in 22 North American cities . At each stop on the tour , visitors were able to view the car and learn about the benefits of zero @-@ emission driving . The first stop of the tour was in Los Angeles on November 13 , 2009 , a event that marked the unveiling of the Leaf in North America . Other stops on the tour included San Francisco ; Seattle ; Vancouver ; Las Vegas , Nevada ; Houston ; Washington , D.C. ; and Orlando , Florida . The tour ended in February 2010 in New York City after visiting 24 cities , including two (Atlanta and Boston) that were added to the original itinerary due to requests . Nissan estimates that 100 @,@ 000 people saw the company ? s lithium @-@ ion battery car .

Nissan conducted a test drive tour ? dubbed the Drive Electric Tour ? in several cities in the initial U.S. launch markets . The tour began on October 1 , 2010 , at the AltCar Expo in Santa Monica , California , and continued in Anaheim , San Diego , Los Angeles , and San Jose . In November , the tour moved to Hillsboro , Oregon ; Seattle , Washington ; and San Francisco . The following month the tour continued in Tucson and Tempe , Arizona ; and Austin , Texas .

As winner of the Taxi of Tomorrow competition , Nissan is sponsoring a pilot program in New York City with six Leafs and their charging stations to study the use of zero @-@ emission electric vehicles as taxis . The program was launched in April 2013 , and by June 2013 , four Leafs are providing cab service in the city .

= = = Other countries = = =

Barbados

In July 2013 , Megapower Limited commenced sale of Nissan Leaf in Barbados and deployment of publicly accessible solar photovoltaic and grid @-@ tied charging points . Nineteen existing locations to charge are available . As of 2014 , there were over 40 Nissan Leafs on the road , making Barbados one of the fastest growing markets for the Nissan Leaf in per capita terms . It is notable that this has been private sector driven and not from government subsidies or direct Nissan backing .

Brazil

In April 2010 , Nissan signed an agreement with the municipal government of São Paulo to deploy 50 Leafs for use in the city 's Traffic Engineering Agency fleet . In exchange , the municipality had to conduct feasibility studies regarding the use of the electric car in the city , including the deployment of the charging infrastructure required , and how it will help to reduce air pollution . Deliveries were scheduled to begin during the first semester of 2011 and the demonstration project would end on December 2012 . In another agreement between São Paulo 's Municipality , the Renault @-@ Nissan Alliance , AES Eletropaulo and the Association of Taxi Fleet of São Paulo , ten Leafs were deployed for taxi service on pre @-@ defined routes in the city . The first two units began service in June 2012 , and the remaining eight were deployed in December 2012 . A total of 15 dedicated charging stations were installed around the city designed to offer recharging , of which Eletropaulo provided five to allow rapid charging .

In March 2013 , the first two Leafs out of a fleet of 15 , were deployed in Rio de Janeiro to operate as taxis . This program is a partnership between the government of Rio de Janeiro City , Nissan do Brasil (NBA) and Petrobras Distribuidora . The first two electric taxis are available at the Santos Dumont airport stand , and charging is provided in two Petrobras service stations at the Lagoa Rodrigo de Freitas and in the Barra da Tijuca neighborhood . The program is part of the city 's goal to reduce the emission of greenhouse gases by 16 % by 2016 compared to emission levels of 2005 .

According to Nissan , a timeline for retail sales has not been set because of the high prices of electric cars in Brazil . The car maker is pursuing an exemption from the 35 % import tax and the enactment of other federal government incentives to make the car affordable and competitive within the Brazilian market . In June 2013 , Nissan and the government of the State of Rio de Janeiro signed a memorandum of understanding to study the possibility of manufacturing the Nissan Leaf in the state , and the entire infrastructure necessary for running electric cars . The state government would provide fiscal incentives during the investment phase , and the electric car will be exempted from import taxes .

Cayman Islands

The first Leaf was delivered in George Town , Cayman Islands in June 2014 .

Costa Rica

In February 2012 , Nissan signed an agreement with the Costa Rican government to implement a pilot program as part of the introduction of the Nissan Leaf in the country . A task force was created through the agreement to assess the infrastructure requirements for the deployment of electric cars and the identification of necessary government incentives for consumers to purchase electric cars . Retail sales were scheduled to begin by late 2013 .

Hong Kong

In March 2011 , an EV Pilot Program was launched in Hong Kong as a collaboration between the government of Hong Kong special administrative region and Nissan . The program began with a four @-@ day test drive event open to the public . Nissan scheduled to deliver 200 Leafs to be used by the government , power companies and other private companies . During 2012 a total of 89 Leafs were delivered .

Malaysia

A pilot program began in May 2012 , with 10 Leafs . The pilot will be conducted mainly in the Klang Valley , where the general public will have the opportunity to test drive the Nissan Leaf . Also some volunteers will be selected to keep the electric car for daily use for an extended period of up to two months .

Mexico

In October 2009 , Nissan reached an agreement with the local government of Mexico City , by which 500 units of the Leaf would be delivered by 2011 for use of government and corporate fleets . In exchange , recharging infrastructure will be deployed by the city government , and an exemption from the ownership tax is being pursued . The city government of Mexico D.F. also reached an agreement with Nissan in November 2010 in order for the first 100 Leafs to be introduced in the country to operate as part of the capital 's taxi fleet . The first Leafs destined for the taxi fleet were delivered by late September 2011 , allowing the country to become the first Latin American market where the Leaf is available . As of February 2013 , there were in the country about 70 Leafs deployed as taxis , 20 in Mexico City and 50 in Aguascalientes . Carrot Mexico , a carsharing company operating in Mexico City , acquired 3 Leafs which are available to their 1 @,@ 600 customers .

Retail sales began in June 2014 , with sales initially limited to Mexico City . Only one version is available with , among other features , " B Mode driving " that allows power renewal almost immediately after the throttle is removed ; a fast @-@ charging port that allows a recharge of 80 % of the battery in 30 minutes ; " Around View Monitor " that allows a panoramic view around the car ; leather seats ; and a 7 @-@ inch touch screen . Pricing starts at Mexican pesos 545 @,@ 400 (~ US $ 42 @,@ 000) . Deliveries to retail customers began in August 2014 .

New Zealand

Leaf sales began in July 2012 , at a price starting at NZ $ 69 @,@ 600 (~ US $ 52 @,@ 630) . In 2014 Nissan NZ reduced this price to NZ $ 39 @,@ 900 . As of February 2016 , a total of 414 Nissan Leafs have been registered in the country , of which , 86 were new units and 328 used imports , mainly from Japan . Nissan stopped sales in November 2015 .

Puerto Rico

Retail deliveries began in late August 2014 . The island 's government enacted a 100 % excise tax reimbursement for the purchase of electric vehicles up to US $ 8 @,@ 000 .

South Africa

Sales of the Nissan Leaf began in October 2013 , starting at a price of R446,000 (~ US $ 45 @,@ 500) . There are no government incentives or subsidies to promote electric cars .

Sri Lanka

Sales of the Nissan Leaf began in 2013 . As of September 2015 , the Nissan Leaf is the top selling electric car , out of 2 @,@ 072 electric cars registered in the country . There are no government incentives or subsidies to promote electric cars in Sri Lanka . The electric vehicle tax increased from 5 % to 50 % through the new Government ? s Interim Budget .

Thailand

In August 2013 , Nissan Motor Thailand and the Metropolitan Electricity Authority signed an agreement to deploy a one @-@ year field trial program to test the Leaf in the country . Nissan wants to study the possibilities of introducing and selling electric vehicles in Thailand in the future . The electricity agency , which is already testing electric vehicles in Thailand , will be responsible to deploy the necessary charging infrastructure .

= = = Global sales = = =

The Nissan Leaf is available for retail customers in 46 countries . Almost 220 @,@ 000 Leafs have been sold worldwide by mid @-@ April 2016 , making the Nissan Leaf the world 's all @-@ time best @-@ selling highway @-@ capable electric car in history . As of April 2016 , the United States continued to rank as the top selling market with 93 @,@ 309 units sold , followed by Japan with 64 @,@ 978 units through April 2016 , and the European market with 55 @,@ 408 through March 2016 . The European market is led by Norway with 17 @,@ 199 new units registered up until April 2016 .

The following table presents retail sales by year since deliveries of the Leaf began in December 2010 , for the national markets with cumulative sales of more than 500 units through the end of 2015 .

= = Reported issues = =

Initial issues

In April 2011 , Nissan announced that customers in the United States and Japan reported problems in restarting their Leaf vehicles after switching the motor off . Nissan said the problem does not pose any accident risk . On April 15 . Nissan announced that the problem only affected a small proportion of Leafs . Nissan engineers identified a programming error in an air conditioning system sensor that sometimes triggers an erroneous high voltage alert when the air conditioning unit is switched on , due to the increased demand for power . The system issues an Inhibit Restart command , which does not prevent driving the vehicle , but does prevent it restarting after it is turned off . The solution requires reprogramming of the Vehicle Control Module by a Nissan dealer . Nissan announced a " service campaign " to apply the software fix to all 5 @,@ 300 Nissan Leafs in operation around the world , but it was not an official recall because it was not a safety issue . The applied software update also improves the car ? s on @-@ board range calculation system , which several Leaf owners reported was overestimating the number of miles left . In addition , the update changes the state @-@ of @-@ charge bars display to provide a true reserve capacity ; the driver now has up to five miles to find a charging spot after the car reaches the zero miles remaining mark .

A number of early models had air conditioning failures due to a faulty hose .

A number of customers have reported safety problems with the antilock brakes : after an emergency braking event , and once the driver has released the brake pedal , the brakes remain in full force for some amount of time , increasing the risk of rear collisions .

Battery capacity loss

In May 2012 , several U.S. owners reported seeing only 11 of 12 battery capacity bars on the in @-@ car display which led them to believe they had lost some battery capacity . As time went on , more people reported seeing the issue , and some had lost two , three , and even in rare cases , four battery capacity bars . The battery capacity loss problem seems to be concentrated in regions with hot climate , and Phoenix , Arizona and the state of Texas in particular . In July 2012 , Nissan responded by saying they were investigating the issue , and a carmaker spokesman also said that " the problem is isolated to maybe 0 @.@ 3 percent of the 13 @,@ 000 Leafs on U.S. roads , and the company reportedly has loaned cars to some Leaf owners in Arizona as it researches the issue . " This is equivalent to around 40 vehicles have experienced a loss of any battery capacity bars .

Crowd sourced reports of Nissan Leafs with premature battery degradation have been collected at the MyNissanLeaf.com forum and have been tracked on the website 's wiki page .

By early September 2012 , Nissan Executive Vice President said that there is " no problem " with the LEAF battery , and that the any customer complaints were merely the result of instrument problems . " As a response , a group of 12 Phoenix Leaf owners participated in an independent test in controlled conditions organized by Leaf driver and EV advocate Tony Williams that took place on September 15 , 2012 . The test confirmed that the Leaf has poor instruments , but the test also found significant loss of range in some cars reflecting battery capacity loss . The worst affected Leaf showed around 60 to 65 % of its original battery capacity remaining , and was only capable of driving 95 km (59 miles) before running out of charge .

Based on a complete evaluation that Nissan Americas conducted with seven different Leafs in its Arizona Testing Center , the carmaker found that the common link among the seven Leafs from Arizona was that all of them had covered much higher mileage than the 20 @,@ 100 km (12 @,@ 500 miles) Nissan used to estimate the rate of battery capacity loss over time . All of them had covered at least 50 % more than Nissan estimated average , with 31 @,@ 500 km (19 @,@ 600 miles) as the average mileage for the cars evaluated . According to Nissan , that average is " more than double the average Phoenix customer mileage of 7 @,@ 500 miles per year . " Nissan concluded that " the cars and the battery packs are behaving as we expected . " As a result of this assessment , Nissan published an open letter to Leaf owners explaining the results of the assessment and the details of normal battery capacity loss expected over time . The company also decided to set up an independent advisory board to study how the company may improve its

communication with customers about the performance of the Leaf . The group will be led by Chelsea Sexton , known for its prominent role on the marketing of the GM EV @-@ 1 electric car . She will select the members of the advisory board that would make recommendations to Nissan . By late September Nissan reported that around 450 Leafs have been sold in Arizona , and in the interest of customer satisfaction , two units with battery loss problems were repurchased using the buyback formula modeled on Arizona 's lemon law . One of the owners that had their Nissan Leaf repurchased established a blog in order to persuade other potential Nissan Leaf buyers in hot climates to reconsider buying this particular vehicle . By mid September , Nissan 's CEO Carlos Ghosn announced that there is an improved second generation battery coming online that will cost less than the previous one .

On September 17 , 2012 , a federal class action lawsuit was filed by California Leaf lessee Humberto Daniel Klee and Arizona Leaf owner David Wallak , accusing Nissan of concealing in its advertising that its Leaf vehicles have a design defect that causes them to prematurely lose battery life and driving range . The class action suit says that " before purchase or lease , Nissan failed to disclose its own recommendations that owners avoid charging the battery beyond 80 % in order to mitigate battery damage and failed to disclose that Nissan ? s estimated 100 mile range was based on a full charge battery , which is contrary to Nissan ? s own recommendation for battery charging . "

In January 2013 , Nissan USA announced that it will offer an extended battery warranty on the 2013 model year Leaf and will include 2011 and 2012 model years as well .

A 2015 report by insurance company Warranty Direct , stated that of 35 @,@ 000 Leafs sold in Europe , three had a battery failure . That is 0 @.@ 01 % immobilized compared to 0 @.@ 255 % for internal combustion engined cars .

On July 7 , 2015 , U.S. Circuit Judge A. Wallace Tashima of the 9th Circuit U.S. approved the class action settlement in the U.S. District Court for the Central District of California , valued at $ 24 million .

Airbag failure

In March 2014 , Nissan is recalling nearly one million vehicles for a problem with the airbags . The occupant classification system (OCS) may incorrectly think that the passenger seat is empty when it is occupied by an adult , failing to activate the airbag in a collision . Cars affected include the 2013 @-@ 14 model year Leaf , Altima , Pathfinder and Sentra , as well as the 2013 NV200 , 2013 JX35 , 2014 QX60 and the 2014 Q50 . Recall documents say that due to the sensitivity of the OCS software calibration , the system may not sense a passenger . That combined with high @-@ engine vibration at idle when the seat is empty and then becomes occupied , or unusual occupant seating postures , can cause the system to fail . If the car crashes during this time , the airbag won 't deploy . Nissan will notify owners , and dealerships will fix the OCS software free of charge .

= = Related cars = =

Leaf Aero Style

Nissan unveiled the Nissan Leaf Aero Style concept car at the 2011 Tokyo Auto Salon . The Leaf Aero Style exterior features a new front bumper , extended side skirts , restyled mirrors , LED daytime driving lights , and special wheels .

Leaf Nismo

Nissan unveiled the Leaf Nismo RC (Racing Competition) demonstration car at the 2011 New York International Auto Show . This electric car has the same battery pack and motor as the Leaf but is designed and constructed as a racing car with a full carbon fiber monocoque body which makes it about 40 % lighter than the production Leaf . Leaf Nismo RC is projected to have a running time of around 20 minutes under racing conditions , and in preliminary testing it accelerated from 0 to 62 mph (0 to 100 km / h) in 6 @.@ 85 seconds and has a top speed of 93 mph (150 km / h) . Nissan built eight of these rear @-@ wheel drive cars .

Another concept from Nismo was unveiled at the 2011 Tokyo Motor Show , the Leaf Nismo Concept . It was designed as normal highway @-@ capable automobile and uses the same 80 kW

electric motor as the Leaf . In January 2013 , Nissan announced that the Leaf Nismo will be produced in low volumes by mid @-@ 2013 , and sold in Japan only . The Leaf Nismo uses the Leaf 's all @-@ electric drive train with no extra power or performance improvements , but has an aerodynamic body kit with styling influenced by the electric Leaf RC demonstrator , new alloy wheels , and interior improvements .

Infiniti LE

The Nissan Infiniti LE concept all @-@ electric car was unveiled at the 2012 New York International Auto Show . It is based on the same platform as the Leaf , but it is expected to become Nissan 's luxury electric car . It was expected to go into production in 2014 . In May 2013 the company said that it was waiting for inductive charging industry standards before launching the vehicle .

Venucia e30

Nissan and its joint venture partner Dongfeng Motor unveiled a production version of the Venucia e30 electric car at the 2012 Auto Guangzhou . An earlier version , the Venucia E @-@ Concept , was unveiled at the 2012 Beijing Auto Show . The car was initially scheduled for production in China by 2015 . The Venucia e30 shares the bodywork , dimensions , electric @-@ drive specifications and several other features of the Leaf . Dongfeng Nissan started pilot projects in 15 Chinese cities to promote the Venucia e30 with local governments . A total of 216 units were delivered in December 2013 . These units were marketed as Venucia Morning Wind and they were badged Leafs since local production had not begun at the time . In April 2014 Dongfeng Nissan announced that retail sales of the Venucia e30 were going to begin ahead of schedule .

The Venucia e30 was launched in the Chinese market in September 2014 . The e30 has the same 24 kWh lithium ion battery as the Nissan Leaf , with an energy consumption of 14 @.@ 6 kWh / 100 km and a range of 160 km (99 miles) .

Autonomous car

In August 2013 , Nissan announced its plans to launch several driverless cars by 2020 . The company is building in Japan a dedicated autonomous driving proving ground , to be completed in 2014 . Nissan installed its autonomous car technology in a Nissan Leaf for demonstration purposes . The car was demonstrated at Nissan 360 test drive event held in California in August 2013 . In September 2013 , the Leaf fitted the prototype Advanced Driver Assistance System was granted a license plate that allows to drive it on Japanese public roads . The testing car will be used by Nissan engineers to evaluate how its in @-@ house autonomous driving software performs in the real @-@ world . Time spent on public roads will help refine the car ? s software for fully automated driving . The autonomous Leaf was demonstrated on public roads for the first time at a media event held in Japan in November 2013 . The Leaf drove on the Sagami Expressway in Kanagawa prefecture , near Tokyo . Nissan vice chairman Toshiyuki Shiga and the prefecture ? s Governor , Yuji Kuroiwa , rode in the car during the test .

= = Motorsport = =

An Electric Production Class was formed for the 2011 Pikes Peak International Hill Climb and Chad Hord raced a Leaf in the event . The off @-@ road racing driver ascended the 19 @.@ 99 km (12 @.@ 42 miles) course in 14 minutes and 33 seconds to win the class . The interior of the car was removed and replaced with mandatory racing seats , safety harness , and a roll cage .

= = Reception = =

The Leaf was enthusiastically received by consumers . There were 20 @,@ 000 pre @-@ orders in the United States for the vehicle 's debut . After hitting this milestone in September 2010 , Nissan stopped taking reservations in the United States until many of the initial orders had been delivered in early 2011 .

The Leaf has received awards from multiple organizations . Notable awards include the inclusion by Time magazine as one of the 50 best inventions of 2009 . At the 2010 Washington Auto Show , the Leaf was given the 2010 Green Car Vision Award by the Green Car Journal (GCJ) , who noted that

the Leaf " will provide the features , the styling , and the driving experience that will meet the needs of a sophisticated and demanding market , while producing zero localized emissions and requiring no petroleum fuels . " Popular Mechanics , upon awarding the Leaf its 2010 Breakthrough Award , explained that the Nissan Leaf is " not the first pure EV , but [...] hits the mainstream like none of its predecessors . " Popular Mechanics also alluded to the Leaf 's 160 km (100 miles) range , which is said to be " enough for most commuters for the price of an average vehicle ? and with a much lower operating cost than gasoline @-@ powered vehicles . "

Other awards received by the Leaf include the 2011 European Car of the Year , EV.com ? s 2011 EV of the Year , 2011 Eco @-@ Friendly Car of the Year by Cars.com , 2011 Green Fleet Electric Vehicle of the Year , it was listed among the 2011 Greenest Vehicles of the Year by the American Council for an Energy @-@ Efficient Economy , also listed by Mother Earth News among its " Best Green Cars " of 2011 , and also was ranked first in Kelley Blue Book Top 10 Green Cars for 2011 . The Leaf won the 2011 World Car of the Year , and was a finalist for the 2011 World Green Car . Ward 's Auto listed the Leaf 's 80 kW electric motor in Ward 's 10 Best Engines for 2011 . Until October 2011 the Leaf was ranked as the most efficient EPA certified vehicle for all fuels ever . In December 2011 , the Leaf was awarded with the 2011 ? 2012 Car of the Year Japan at the Tokyo Motor Show .

= = = Criticism = = =

In 2009 , a former Tesla Motors marketing manager criticized Nissan about the cooling system chosen for thermal management in lithium @-@ ion battery packs . He also claimed there may also be an overestimation of the 160 km (100 @-@ mile) range that was computed using LA @-@ 4 or " city " mode , which may underestimate the energy draw during highway driving conditions .

The American magazine Consumer Reports noted that while charger costs vary between US $ 700 and US $ 1 @,@ 200 , an at @-@ home charger and its installation cost more than US $ 2 @,@ 000 even for simple installations . Nissan estimates a typical charger installation costs US $ 2 @,@ 200 . The article did not mention that home charger installations are eligible for a 50 % federal tax credit up to US $ 2 @,@ 000 . Consumer Reports noted that the first 5 @,@ 700 Leaf buyers will get free chargers with federal support in 13 cities . The consumer group also reminded that many older houses with only a 60 ? 100 amp supply may need a panel upgrade to install a 240 @-@ volt circuit , which can cost several thousand dollars . The additional 220 ? 240 @-@ volt charger is only required for countries (mainly the North / South American continent) that do not have a 220 ? 240 @-@ volt domestic grid and want faster charging than under 110 ? 120 @-@ volt .

There are a variety of EVSE manufacturers for the Nissan Leaf including SPX , Schneider , Leviton , Aerovironment , Blink and GE . Some are priced at less than $ 850 . Since the on @-@ board charger in the Leaf only draws 16 amps , many home installations can be as simple as adding a dedicated 20 amp circuit and receptacle in the garage .

Consumer Reports also called buyers ' attention to the fact that the Leaf 's total out @-@ of @-@ pocket costs include a US $ 595 acquisition fee and a US $ 395 disposition fee . The consumer group also emphasized that the lease price of US $ 349 @-@ a @-@ month applies only to buyers with good credit (Tier 1 , or a FICO score of 700 or above) ; for those with less than optimum credit , the monthly rate would increase . They reminded buyers that the lease comes with a 23 @,@ 000 km / year (15 @,@ 000 @-@ mile @-@ per @-@ year) allowance , but additional miles will cost extra .