



A Quiet Giant- The New Wrangler 4xe Hybrid Electric Jeep - Rick Péwé

Finally, the Jeep Wrangler receives a hybrid powertrain, but retains its solid axle heritage unlike other Jeep models. We view the new Wrangler 4xe is a quiet giant, as it combines the true Jeep heritage of being the most capable off-road production vehicle, with the technological advancement of pure electric power. While the 4xe is a hybrid system with the 2.0L turbocharged four-cylinder engine powering two electric motors, it's capable of operating for 25 miles in strictly a quiet electric mode from its 400-volt batteries. Dubbed an eco-friendly vehicle, FCA touts it as being "the most efficient, responsible, and capable that the brand has created". Decked out in electric blue accents, the new Wrangler 4xe in all trim levels should appear on dealer lots early next year.

While we haven't had a chance to drive or scrutinize the Wrangler JL4xe, we are told that the Jeep has a high-voltage liquid-cooled motor generator mounted on the front of the engine where the alternator normally goes. This is coupled to the crank pulley and is used for starting the engine as well as the start-stop function and charging the batteries. A second motor generator is mounted in the front of the 8-speed automatic, replacing the torque converter. With an on-off clutch between the engine and motor, the engine can be completely separated from the transmission for pure electric drive through the transmission. Of course, power comes from the batteries during electric mode. Battery power is still 12 volts for accessories, but everything else is powered by a 17kWh, 400-volt lithium-ion battery pack under the second-row seats. The 96-cell pack even has a chiller and heater to keep the batteries at peak performance, and a host of controls for regeneration. All units are sealed and waterproof, since the Wrangler 4xe retains its 30-inch water fording capability.

With three modes of operation, the driver can select the best mode for the situation by using eSelect. In Hybrid, which is the default mode, the engine and batteries blend together for normal driving by using mostly electrical power until the batteries reach their minimum power level, and then the engine kicks in. In Electric mode, full battery power is used until the batteries are depleted, or when the driver wants more torque such as wide-open-throttle. Finally, there is eSave, which prioritizes the four-cylinder engine usage to save battery power for later use. Of course the eSelect is controlled by the Uconnect touchscreen while accessing the Eco Coaching pages. We couldn't have made that up if we tried.

An important part of the electrical system is the regenerative braking system which helps in recharging the batteries. When the brake pedal is depressed, the powertrain control engages the electric motor to slow the vehicle and charge the batteries. Of course, the standard brake friction surfaces still operate, but not as hard as before. There is also a Max Regen setting that makes for more aggressive regenerative braking, which eliminates simply coasting to a stop.

Off road driving use should show an amazing difference. Electric motors put out massive amounts of torque from the start, so waiting for turbos to spin and tires to rotate could be a thing of the past. Depending on how the Jeep engineers have programmed the parameters, the Wrangler 4xe could start a whole 'nother kind of wheeling, which may lead to quieter times and more enjoyment on the trails. While throttle-jockey wheelers may lament the lack of noise and bluster- there will always be vehicles available for that style of wheeling. We see this as a positive aspect of electric wheeling.



New Jeep® Wrangler 4xe Joins Renegade and Compass 4xe Models in Brand's Global Electric Vehicle Lineup

Advanced, eco-friendly premium technology delivers absolute and quiet open-air freedom, an even more fun-to-drive on-road experience and a new level of benchmark Jeep off-road capability



- 4xe electric vehicle technology is the natural evolution of nearly 80 years of Jeep® capability leadership
- Jeep 4xe vehicles provide new levels of efficiency, environmental responsibility, and performance and capability on- and off-road
- Jeep Wrangler 4xe available in Europe, China and the United States by early 2021; Jeep Renegade 4xe and Compass 4xe models arrive in Europe this summer
- Wrangler 4xe boasts an estimated 350 horsepower and delivers up to 25 miles of pure electric operation for daily commutes while providing nearly silent, zero-emission open-air freedom without range anxiety
- Torque-on-demand electric power enhances Wrangler's on-road performance, delivering crisp launches from a standing start and plenty of low-speed thrust
- Low-speed, peak torque-on-demand raises Wrangler's legendary off-road benchmark to master off-road environments
- Wrangler 4xe is first and foremost a Jeep Wrangler with Trail Rated running gear: solid front and rear axles, full-time 4x4 two-speed transfer case, fully articulating suspension and 30 inches of water fording capability
- Wrangler 4xe's advanced turbocharged 2.0-liter four-cylinder engine, two electric motors and robust TorqueFlite 8-speed automatic transmission combine to deliver more than 50 MPGe
- 400-volt, 17 kWh, 96-cell battery pack mounts beneath second-row seat, protecting it from outside elements and preserves interior space
- Wrangler 4xe features exclusive exterior design cues to signify efficient, environmentally-friendly electrification technology
- available for order in Europe, Jeep Renegade 4xe and Compass 4xe deliver up to 240 horsepower and approximately 50 km

The Jeep® brand has introduced its new Wrangler 4xe, marking the arrival of the most capable, technically advanced and eco-friendly Wrangler ever. Jeep Wrangler 4xe models will be available in Europe, China and the United States by early 2021. The Jeep Renegade 4xe and Compass 4xe models – introduced last year in Geneva – began arriving in Europe this summer.

The Wrangler 4xe's plug-in hybrid powertrain is capable of up to 25 miles of nearly silent, zero-emission electric-only propulsion, making it commuter friendly as an all-electric daily driver without range anxiety and the most-capable and eco-friendly Jeep vehicle off-road – combined with the open-air freedom that only Jeep Wrangler offers.

Jeep will offer electrification options on each nameplate in the next few years as it strives to become the leader in eco-friendly premium technology. Electrified Jeep vehicles will carry the 4xe badge. Jeep electric vehicles will be the most efficient and responsible Jeep vehicles ever, taking performance, 4x4 capability and driver confidence to the next level.

“Our Jeep 4xe vehicles will be the most efficient, responsible and capable that the brand has ever created,” said Christian Meunier, Global President of Jeep Brand - FCA. “We are committed to make Jeep the greenest SUV brand. The electrification of the Jeep lineup will allow commuters to travel solely on electric power, delivering an efficient and fun on-road experience and offering an ability to enjoy even more Jeep capability off-road in nearly complete silence.”

The Wrangler 4xe's advanced powertrain provides a unique on- and off-road experience through the combination of two electric motors, a high-voltage battery pack, a high-tech 2.0-liter turbocharged I-4 engine and robust TorqueFlite 8-speed automatic transmission. The most advanced powertrain ever developed for a Jeep Wrangler maximizes efficiency with more than 50 MPGe while eliminating range anxiety, delivering pure-electric operation for most daily commutes.

Torque from the electric motors in the Wrangler 4xe's hybrid powertrain arrives instantly on demand from the driver. The powertrain also delivers fuel-saving seamless start-stop operation of the engine.

Jeep has demonstrated 4x4 capability leadership for nearly 80 years. Jeep vehicles were the first to feature an automatic full-time four-wheel-drive system, first 4:1 transfer case and first electronic front sway-bar disconnect system. Merging electrification into the product lineup is a natural evolution.

The Jeep Wrangler 4xe will be sold globally, with EV charge port plugs tailored to specific regions. It is assembled at FCA's Toledo Assembly Complex in Toledo, Ohio.

Wrangler 4xe Advanced Powertrain Combines Electric Motors, Turbo Engine

The Jeep Wrangler 4xe powertrain integrates two electric motors and a 400-volt battery pack with a fuel-efficient, turbocharged, four-cylinder engine and TorqueFlite 8-speed automatic transmission. This configuration maximizes the efficiency of the hybrid propulsion components and mates them with the Wrangler's world-renown and proven driveline.

Key elements of the Wrangler 4xe powertrain:

- Estimated total 350 hp (261 kW), estimated 442 lb.-ft. (599 Nm) of torque and more than 50 MPGe, from the following components:
 - 2.0-liter turbocharged I-4
 - Engine-mounted motor generator unit
 - Transmission-mounted motor generator unit integrated into 8-speed automatic transmission (ZF 8P75PH)
 - 400-volt, 17-kWh, 96-cell lithium-ion, nickel manganese cobalt battery pack

The 2.0-liter turbocharged I-4 engine is part of FCA's Global Medium Engine family. The high-tech, direct-injection engine uses a twin-scroll, low-inertia turbocharger mounted directly to the cylinder head, along with a dedicated cooling circuit for the turbocharger, intake air and throttle body for exceptional responsiveness, performance and fuel efficiency.

A high-voltage, liquid-cooled motor generator unit mounts at the front of the engine, replacing the conventional alternator. A robust belt connects the motor generator to the engine crankshaft pulley. The motor generator spins the engine for nearly seamless, fuel-



4xe

Jeep®

saving start stop operation and generates electricity for the battery pack. The Wrangler 4xe does not use a conventional 12-volt starter motor. The Wrangler 4xe is equipped with a 12-volt battery to run accessories.

The second high-voltage motor generator is mounted at the front of the transmission case, replacing the conventional torque converter of an automatic transmission.

Two clutches work to manage power and torque from the e-motor and engine. A binary clutch (on/off) is mounted between the engine and the motor. When this clutch is open there is no mechanical linkage between the engine and the e-motor, which enables it to propel the Wrangler 4xe in electric-only mode.

When the binary clutch is closed, torque from the 2.0-liter engine and the e-motor flow combined through the automatic transmission. A variable clutch mounted behind the e-motor manages engagement with the transmission to improve drivability and efficiency.

Battery Pack Preserves Interior Room

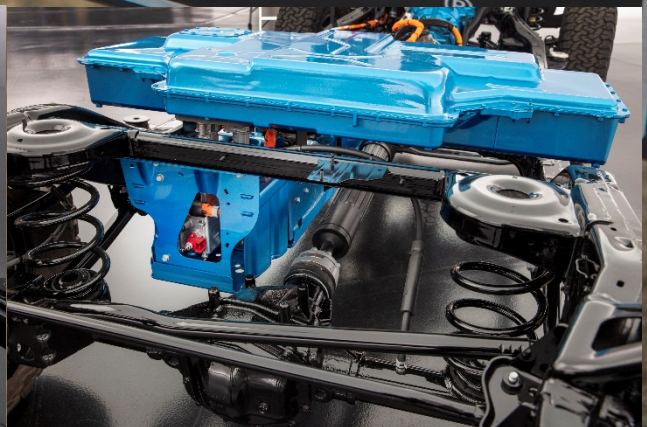
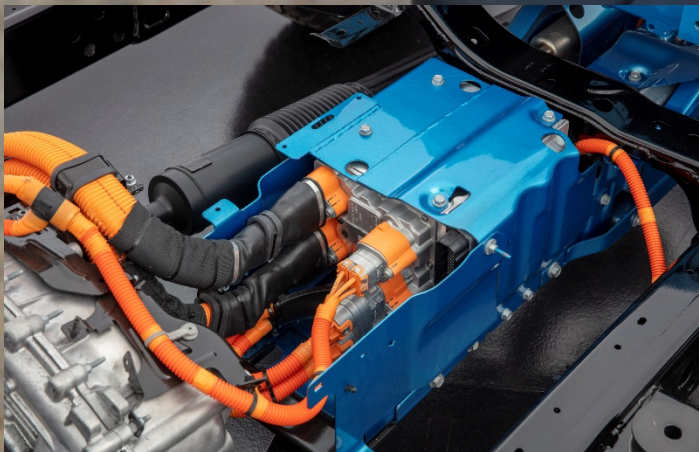
The Jeep Wrangler 4xe's 400-volt, 17-kWh, 96-cell lithium-ion battery pack uses nickel manganese cobalt (NMC) graphite chemistry. The pack and controls mount underneath the second row seat, where it is protected from outside elements. The Wrangler 4xe's second-row seat is redesigned, allowing the bottom cushion to flip forward for access to the battery.

Encased in an aluminum housing, the pack is fitted with a dedicated heating and cooling circuit to keep the battery at its optimum temperature for best performance. The temperature control circuit includes a dedicated heater unit and a chiller that uses the Wrangler air conditioning refrigerant to reduce coolant temperature when needed.

The Wrangler 4xe hybrid system includes an Integrated Dual Charging Module (ICDM), which combines a battery charger and a DC/DC converter in a single unit that is more compact than two separate components, and a next-generation Power Inverter Module (PIM) that is reduced in size. These components are housed and protected from damage in a steel structure mounted below the battery pack.

All high-voltage electronics, including the wiring between the battery pack and the electric motors, are sealed and waterproof. Like all Trail Rated Jeep Wranglers, the Wrangler 4xe is capable of water fording up to 30 inches (76 cm).

The electric charge port features a push-open/push-close cover and is located on left front cowl of the Wrangler 4xe for convenient nose-in parking at charging locations. The charge port includes LED indicators of charging status. An LED battery level monitor is mounted on top of the instrument panel, making it easy to check battery state of charge at a glance during charging.



Wrangler 4xe E Selec Modes

The Jeep Wrangler 4xe driver can tailor the hybrid powertrain to best suit each trip, whether it be filling the needs of most daily commuters in pure-electric operation, a night on the town or quietly exploring nature off-road.

The Wrangler 4xe hybrid powertrain has three modes of operation, known as E Selec. The driver can select the desired powertrain mode via buttons mounted on the instrument panel, to the left of the steering wheel. Regardless of the mode selected the Wrangler 4xe operates as hybrid once the battery nears its minimum state of charge.

- Hybrid: The default mode, blends torque from the 2.0-liter engine and electric motor. In this mode the powertrain will use battery power first, then add in propulsion from the 2.0-liter turbocharged I-4 when the battery reaches minimum state of charge
- Electric: The powertrain operates on zero-emission electric power only until the battery reaches the minimum charge or the driver requests more torque (such as wide-open throttle), which engages the 2.0-liter engine
- eSave: Prioritizes propulsion from the 2.0-liter engine, saving the battery charge for later use such as EV off-roading or urban areas where internal combustion propulsion is restricted. The driver can also choose between Battery Save and Battery Charge during eSave via the Hybrid Electric Pages in the Uconnect monitor

To help optimize the benefit of the E Selec modes, the Wrangler 4xe driver information display and the Uconnect touchscreen feature Eco Coaching pages. The Eco Coaching pages let owners monitor power flow and see the impact of regenerative braking, schedule charging times to take advantage of lower electric rates, and view their driving history with a detail of electric and gasoline usage.

Regenerative braking is a key part of the Wrangler 4xe eco-friendly equation. When the driver steps on the brake pedal, the powertrain control engages the maximum available regenerative braking, up to 0.25 g, from the electric motors to slow the vehicle, augmented with the Wrangler's traditional friction brakes. The regenerative braking feature also extends the replacement period for brake pads.

With 4x4 engaged, all four wheels feed torque for regenerative braking, maximizing the energy recovery. Electricity due to regenerative braking is fed to the battery pack to maintain or increase the state of charge.

The Wrangler 4xe also features the ability to maximize regenerative energy production via a driver-selectable Max Regen feature.

When Max Regen is engaged, a more assertive regenerative braking calibration occurs when the vehicle sees zero throttle input from the driver (coasting). Max Regen can slow the Wrangler 4xe faster than standard regen braking and generate more electricity for the battery pack. Once selected, the Max Regen feature remains engaged until driver deselects it.

Off-road Legend


Jeep Wrangler's heritage is defined by its legendary off-road capability. All Wrangler 4xe power modes are available when the drivetrain is shifted to 4Lo. The seamless integration of electric power into the 4x4 drivetrain elevates the Wrangler 4xe to new levels of performance off-road.

Enthusiasts will find that the instant availability of torque from the Wrangler 4xe's electric motor delivers a more precise and controlled driving experience for climbing and crawling – there's no need to build up engine rpm to get the tires to move, minimizing driveline shock loading and maximizing control/speed.

In EV mode, the Wrangler 4xe treads lightly and silently, conserving fuel, allowing occupants focus solely on the sights and full sounds of nature.

The new Jeep Wrangler 4xe is available in three models: 4xe, Sahara 4xe and Rubicon 4xe. Wrangler 4xe and Wrangler Sahara 4xe models are equipped with full-time 4x4 systems, front and rear next-generation Dana 44 axles and are fitted with the Selec-Trac two-speed transfer case with a 2.72:1 low-range gear ratio. The intuitive system allows the driver to set it and forget it in any environment.

An available Trac-Lok limited-slip rear differential provides extra grip and capability in low-traction situations, such as driving over sand, gravel, snow or ice.



Wrangler Rubicon 4xe models carry the Rock-Trac 4x4 system that includes a two-speed transfer case with a 4:1 low-range gear ratio, full-time 4x4, front and rear next-generation Dana 44 axles, Tru-Lok electric front- and rear-axle lockers. The Wrangler Rubicon 4xe has an impressive crawl ratio of 77.2:1, which makes scaling any obstacle easy. Wrangler Rubicon models also offer improved articulation and total suspension travel with help from a front axle, electronic sway-bar disconnect. Together, these components contribute to the maximum off-road prowess Wrangler Rubicon is known for.

The Wrangler 4xe includes Selec-Speed Control with Hill-ascent and Hill-descent Control. This allows drivers to control vehicle speed up and down steep, rugged grades with the transmission shift lever.

Like every Jeep Wrangler, the Jeep Wrangler 4xe models wear a Trail Rated badge that signifies legendary 4x4 capability with equipment that includes:

- Skid plates and front and rear tow hooks
- Wrangler Rubicon 4xe approach angle of 44 degrees, breakover angle of 22.5 degrees, departure angle of 35.6 degrees and ground clearance of 10.8 inches (27.4 cm)
- Aggressive available 17-inch off-road wheels and 33-inch tires standard on Rubicon 4xe; 20-inch wheels standard on Wrangler 4xe and Sahara 4xe
- Up to 30 inches (76 cm) of water fording

All 4xe models maintain Wrangler's renowned ease of customization, with a host of Jeep Performance Parts from Mopar available when the vehicle arrives in showrooms.

'Electric Blue' Design Cues Mark Wrangler 4xe

The 2021 Jeep Wrangler 4xe maintains a sculptural design aesthetic that's bold and functional, with a wide stance and trapezoidal wheel flares.

Exclusive content identifies the Jeep Wrangler 4xe as the most technologically advanced Wrangler ever. New Electric Blue coloring on the front and rear Rubicon tow hooks stands out against the black bumpers. The unique blue coloring also traces the Rubicon name on the hood, Jeep badge and the Trail Rated badge. Select Easter egg design cues also receive the Electric Blue shade. The black hood decal is outlined in the special color with "4xe" that lets the body color show through.

Inside, the Wrangler 4xe Rubicon includes unique Electric Blue stitching on the seats and trim.

The 2021 Jeep Wrangler 4xe is available in 10 exterior colors: Black, Bright White, Firecracker Red, Granite Crystal Metallic, Hella Yella, Hydro Blue (late availability), Sting-Gray, Snazzberry, Sarge and Billet Silver Metallic. Two Wrangler interior options (black and Heritage Tan cloth/ Black and Dark Saddle leather) are available in the 4xe version.

Jeep Renegade 4xe and Jeep Compass 4xe

Presented globally at the 2019 Geneva Motor Show, the new Jeep Renegade 4xe and Compass 4xe are the first Jeep models with plug-in hybrid electric technology available in Europe, arriving in the market this summer. Their arrival was celebrated in January with the exclusive First Edition – a special launch edition made available for customer previews and pre-booking on a dedicated website opened in selected European markets. Both Renegade 4xe and Compass 4xe models feature a no-compromise hybrid solution that integrates the unmatched technical layout of each Jeep SUV, and takes their capability to the next level through some of the most advanced technology, which combines enhanced performance (up to 240 hp), improved safety (four-wheel drive is always available) and low environmental impact (less than 50 g/km of CO₂ in the hybrid mode).

The combination of a 1.3-liter turbocharged gasoline engine and the electric unit guarantees performance and extraordinary driving pleasure: acceleration from 0 to 100 km/h in less than 7.5 seconds and full electric top speed is 130 km/h, which reaches 200 km/h in the hybrid mode.

With the new hybrid technology, Jeep Renegade 4xe and Compass 4xe further improve their benchmark off-road capability courtesy of the greater torque offered by the combination between the two power sources. Thanks to the new Jeep 4xe technology, traction



to the rear axle is not provided by a prop shaft but through the dedicated electric motor. This allows the two axles to be separated and control the torque independently in a more effective way than a mechanical system, giving instant electric boost to the rear wheels when needed.

The new Jeep Renegade 4xe and Jeep Compass 4xe began arriving in Jeep dealerships across Europe this summer with a full line-up to include Limited, S and Trailhawk trims, all with four-wheel-drive configuration.

Jeep Brand

Built on nearly 80 years of legendary heritage, Jeep is the authentic SUV with class-leading capability, craftsmanship and versatility for people who seek extraordinary journeys. The Jeep brand delivers an open invitation to live life to the fullest by offering a full line of vehicles that continue to provide owners with a sense of security to handle any journey with confidence.

The Jeep vehicle lineup consists of the Cherokee, Compass, Gladiator, Grand Cherokee, Renegade and Wrangler. To meet consumer demand around the world, all Jeep models sold outside North America are available in both left- and right-hand drive configurations and with gasoline and diesel powertrain options. Jeep is part of the portfolio of brands offered by global automaker Fiat Chrysler Automobiles. For more information regarding FCA (NYSE: FCAU/ MTA: FCA), please visit www.fcagroup.com.

