

Electric Car

INSIDER

EV BUYERS GUIDE IN-DEPTH REVIEWS

IF YOU WISH TO TRAVEL FAR...



CHEVY
BOLT

GM (RE)INVENTS WHAT COMES AFTER FIRE

Optibike Pioneer Fiber

TRAVEL
LIGHT



Energica Ego

TRAVEL FAST



US: \$5.95 CA: \$6.95



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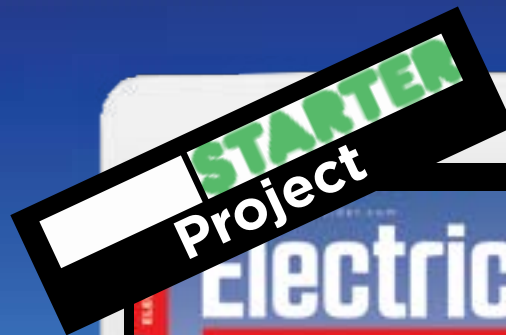
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Our 2nd Kickstarter campaign will fund the development of the 2016 DIGITAL edition of the EV Buyers Guide.

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From the Editors

This is the seventh annual edition of the *Electric Car Insider EV Buyer's Guide*. The first edition, which we began preparing in July 2009, had only eight electric cars. This issue has thirty six plug-in electrics.

The most consequential change in the industry this year is not just the number of cars available, but the capability of those cars. The Nissan Leaf's range increased from a respectable 84 to a class-leading 107 miles, a 27% increase. The Chevrolet Volt saw an all-electric range increase from 38 to 53 miles, a 39% increase and total range of 420 miles including the gas hybrid engine.

But General Motors upped the ante considerably when they unveiled the production model of the 2017 Chevrolet Bolt at the Consumer Electronics Show in Las Vegas, making good on their promise to put into production the Bolt concept they showed at the previous year's North American International Auto Show. The Bolt is an all-electric car whose 60kWh battery will give it a comfortable range of at least 200 miles. That's on par with the previous year's entry level Tesla Model S, whose MSRP started at \$70,000 and could easily escalate to over \$120,000 with the addition of a few option packages. At the NAIAS Bolt reveal, GM's CEO Mary Barra stunned and thrilled the assembled crowd of automotive journalists when she announced an entry-level target price of \$37,500, representing an after-Federal-tax incentive price of \$30,000, which will be several thousand dollars less in states with clean air incentives. Those two metrics – 200 miles and \$30,000 – have long been regarded as pivotal for the mainstream adoption of electric cars. GM's almost certain accomplishment of those targets with the Bolt, which is on schedule to appear in dealer showrooms by the end of the year, is a watershed moment and may later be seen in historical context as one of the most consequential developments in the entire history of the automotive industry. It's time to drive electric.

Christopher Alan
SENIOR EDITOR

“GM's delivery later this year of a \$30k, 200 mile all electric car may be seen in historical context as one of the most consequential developments in automotive history.”

A common misconception about EVs is that they are more expensive than gas cars, but comparing only the MSRP is misleading. Federal and state incentives reduce the price close to parity. Lease deals often make EVs less expensive than their gas siblings. When comparing the monthly total cost of ownership after fuel savings, it's a slam dunk – electric cars are much cheaper to own than gas powered cars.

The income tax credits range from \$2,500 to \$7,500 for battery-electric and plug-in hybrid passenger cars. The amount of the Federal tax credit and net price is listed in the comparison matrix on page 5 and in each vehicle's profile page.

Many states also have rebates or tax incentives. The amounts range from \$1,500 in Utah to \$6,000 in Colorado. Some counties or cities have additional incentives, for example California's San Joaquin Valley Air Pollution Control District offers up to \$3,000. Companies ranging from Bank of America to electric utilities offer employee incentives of several thousand dollars. Many utilities offer special electric rates for EV drivers and some offer rebates for EV charging station purchases. Several states offer HOV lane stickers.

Throughout the year, this magazine will help you take advantage of all the perks offered to people who choose to drive a car that uses clean, domestically produced, renewable energy. It's good for you, and it's good for U.S.

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A Day in the Park

Ten Electric Cars No Sales Pitch

A ride and drive hosted by your neighbors



Electric Car Guest Drive

It's not a car store. It's a movement.

EV Quorum Car Club organizes meetups where you can get up close and personal with the EV of your dreams. View, inspect, sit in and drive. Get everything but a sales pitch. Electric Car Guest Drive events are hosted by EV owners who love to share their experience with other drivers.

Check our web site for a list of locations and meetup dates, or give us a call.



619.559.8613 | ElectricCarGuestDrive.com

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Electric Automobile Matrix

Specification Quick Reference



BATTERY

Make	Model	Yr Intro	Battery kWh	Range (mi)	MPGe	MSRP Base	Fed Tax Cr	Lease	Page
BYD	e6	2010	61	186	62	~ \$50,000	7,500	--	20
Chevrolet	Bolt	2017	60	200	--	\$37,500	7,500	--	38
Chevrolet	Spark EV	2014	19	82	119	\$26,685	7,500	139	44
Fiat	500e	2013	24	87	116	\$32,300	7,500	199	45
Ford	Focus Electric	2012	23	76	105	\$29,190	7,500	249	41
Kia	Soul EV	2014	27	92	102	\$31,950	7,500	249	35
Mercedes-Benz	B250e	2014	36	87-102	84	\$41,450	7,500	299	34
Nissan	Leaf	2011	24-30	84-107	114-124	\$29,010	7,500	199	39
Smart	Fortwo ED	2013	18	68	107	\$20,440	7,500	139	46
Tesla	Model S	2012	60-85	208-265	89	\$69,900	7,500	1,012	10
Tesla	Model X	2015	70-90	220-250	89-92	~ \$80,000	7,500	--	12
Volkswagen	E-Golf	2014	24	83	116	\$28,995	7,500	299	40

PLUG IN HYBRID

Make	Model	Yr Intro	Battery kWh	Range (mi)	MPGe	MSRP Base	Fed Tax Cr	Lease	Page
Audi	Q7 e-tron	2016	17.3	33	94.1	~ \$60,000	7,500	--	16
Audi	A3 e-tron	2015	8.8	30	--	\$37,900	6,170	--	33
BMW	i3 / i3 REx	2014	22	81-150	124	\$41,350	7,500	329	32
BMW	i8	2014	7.1	15	76	\$140,700	3,793	1,314	7
BMW	X5 xDrive40e	2015	9	19	116	\$54,850	7,500	199	15
BMW	330e	2016	7.6	22	--	\$44,695	-5,419	--	28
BYD	Tang	--	18.4	38	--	~ \$48,000	--	--	18
Cadillac	CT6	2016	16.5	40	85	~ \$65,000	7,500	854	27
Cadillac	ELR	2014	16.5	40	85	~ \$65,000	7,500	854	24
Chevrolet	Volt	2016	18.4	53	102	\$33,170	7,500	390	36
Chrysler	Pacifica	2016	16	30	80	--	7,500	--	21
Ford	C-Max Energi	2013	7.6	21	100	\$31,770	3,750	254	43
Ford	Fusion Energi	2013	7.6	21	100	\$34,800	4,007	275	37
Hyundai	Sonata PHEV	2016	9.8	22	99	\$34,600	4,919	289	30
Karma	Sport Sedan	2016	--	50	--	--	--	--	8
Kia	Optima PHEV	2017	9.8	27	--	--	4,919	--	31
Mercedes-Benz	C350	2015	6.2	18.6	--	\$39,875	5,085	--	29
Mercedes-Benz	S550 PHEV	2015	8.7	20	84	\$95,325	6,128	12	11
Mercedes-Benz	GLE550e	2015	8.8	18.6	--	--	6,170	--	17
Mitsubishi	Outlander PHEV	2016	12	30 ++	--	~\$42,000	--	--	19
Porsche	Cayenne PHEV	2015	10.8	14	47	\$77,200	5,335	949	14
Porsche	Panamera PHEV	2014	9.4	20	50	\$93,200	4,751	1,703	9
Via	Truck	2015	23	35	100	\$79,000	7,500	752	23
Via	Van	2015	23	35	100	--	7,500	752	22
Volvo	S90 T8	2016	9.2	16	--	--	4,600	--	26
Volvo	XC90 T8	2015	9.2	14	59	\$69,095	4,600	--	13

Vehicles which are announced after the printing deadline will appear in subsequent quarterly editions of ECI magazine. Subscriptions available at the electric-car-insider.com web site. Dashes in the matrix represent specs not available at time of printing. ++NEDC cycle.



ACQUISITION

MSRP	\$140,700
60 Month @ 6% est	\$2,720
Availability	2014
Lease.....	--
U.S. Sales Units	2,265

RANGE

EV Range	15
MPGe	76

PERFORMANCE

0-60 mph	4.2 sec
Top Speed	155 mph

BATTERY

Volts	--
Watts	7.1 kW
Cooling	Liquid

DRIVETRAIN (HYBRID)

HP/Lb-ft	357/420
Drive Type	AWD

CHARGING

Power Rating	3.3 kW
Charge Time L1	3.5 hrs
Charge Time L2	1.5 hrs
Charge Time DC	NA
Connector	J1772

CAPACITY

Passengers	2
Cargo	4.7-6.0 cu ft

DIMENSIONS

Curb Weight	3,285 lbs
Length	184.6 in
Width	76.5 in
Height	50.9 in

2014 - 2016

BMW i8

The i8 has the requisite stop-them-in-their-tracks futuristic supercar looks. The i8's plug-in hybrid drivetrain provides an exhilarating world-class sports car driving experience or, when taking it easy with the accelerator, 32 MPG; more than twice the MPG of a 2016 Porsche 911 Turbo or Corvette Z06. The i8's drive system consists of an electric motor driving the front wheels and a turbo-charged 1.5-liter 3-cylinder gasoline engine driving the rear wheels. The car has selectable driving modes. When in the default Comfort mode, the car switches between the electric motor and gas engine for optimum performance and efficiency. Eco Mode improves fuel economy more. The eDrive mode is all-electric and limits max speed to 75 MPH. To experience the car's full performance, shift into Sport mode. In this mode, the hybrid system coordinates power delivery letting the electric motor provide immediate torque while the turbo-charged engine provides power under full-throttle. The electric motor fills in when there is turbo lag or between gear changes so the output is consistent throughout the torque curve. The i8's LifeDrive architecture, consisting of an aluminum chassis for the powertrain and a CFRP passenger cell, reduces the frame's weight 50% versus steel. BMW's "Layering" design principal integrates function and form: the channels assist cooling and the achievement of a remarkable 0.26 coefficient of drag. The scissor doors, swinging forward and up, give the i8 an extra cool factor and improve ingress ergonomics.



Plug-In
Hybrid



2016 KARMA Sedan

When Fisker Automotive introduced the Karma plug-in luxury sedan in 2010 the flowing design by Henrik Fisker, the noted designer of the Aston Martin DB9 and BMW Z8, had everyone talking. The sinuous looks and sports car performance held such promise. But quality issues and financial difficulties forced the company to cease production in 2012. After Fisker filed bankruptcy in 2013, the Wanxiang Group purchased the assets and announced their intention to restart production. In 2015 Wanxiang changed the the marque from Fisker to Karma, and announced that the as-yet-unnamed sedan will relaunch in 2016. The new sedan will feature 50-mile all electric range, which is more than twice as far as the Porsche Panamera S E-Hybrid. The Karma hybrid's combined range is 350 miles, significantly higher than the 2012 Karma's 32-mile electric range and 240-mile combined range. BMW agreed in November 2015 to supply Karma Automotive with their latest battery charging systems and other hybrid and EV systems. It's unknown if the agreement will extend to a new gasoline engine. Wanxiang, who also owns the high-performance battery manufacturer A123, which supplied the original Karma batteries, has not announced who will supply the new power pack. Although the Wanxiang Group is a China-based automotive component conglomerate the company will produce the cars in a new factory in Moreno Valley, California. Final specifications and pricing have not been announced.

ACQUISITION

MSRP	--
60 Month @ 6% est	--
Lease.....	--
Availability	2016
U.S. Sales Units	--

RANGE

EV Range	~ 50
MPGe	--

PERFORMANCE

0-60 mph	-- sec
Top Speed	-- mph

BATTERY

Volts.....	--
Watts.....	-- kWh
Cooling	--

DRIVETRAIN (HYBRID)

HP/Lb-ft.....	--/--
Drive Type	--

CHARGING

Power Rating.....	-- kW
Charge Time L1.....	-- hrs
Charge Time L2.....	-- hrs
Charge Time DC	--
Connector	--

CAPACITY

Passengers.....	4
Cargo.....	--

DIMENSIONS

Curb Weight.....	-- lbs
Length.....	-- in
Width.....	-- in
Height.....	-- in




ACQUISITION

MSRP	\$93,200
60 Month @ 6% est	\$1,802
Lease.....	\$949
Availability	2014
U.S. Sales Units	391

RANGE

EV Range	20
MPGe	50

PERFORMANCE

0-60 mph	5.2 sec
Top Speed	167 mph

BATTERY

Volts	--
Watts	9.4 kWh
Cooling	-

DRIVETRAIN (HYBRID)

HP/Lb-ft	416/435
Drive Type	RWD

CHARGING

Power Rating	3.76 kW
Charge Time L1	6.5 hrs
Charge Time L2	2.5 hrs
Charge Time DC	NA
Connector	J1772

CAPACITY

Passengers	4
Cargo	11.8-40 cu ft

DIMENSIONS

Curb Weight	4,619 lbs
Length	197.44 in
Width	76.02 in
Height	55.8 in

2014 - 2016

PORSCHE Panamera S E-Hybrid

Combining the Stuttgart brand's racing DNA with executive-level interior appointments, the Panamera was designed to give enthusiasts of the brand a four-door option. The legendary front end of a 911 smoothly transitions to the long, gently sloping roofline. The extended roof gives rear seat passengers ample room. Few flourishes separate the plug-in Panamera from its gas-only siblings. The only indication that emissions-free driving is available are subtle badging and its green brake calipers.

Porsche opted for a modest 20 miles electric-only range. When the supercharger kicks in, the Panamera S E-Hybrid tops out at 167 MPH, although you'll only be able to take advantage of this terrestrial flight responsibly on a race track. Porsche has long been a leader in the technologies leading up to autonomous driving. Marketing the technology as Active Safe, it featured adaptive cruise control, lane keeping, and increased braking pressure in an emergency braking situation.

Although the Panamera S E-Hybrid was intended to appeal to drivers looking for sports car performance while preserving environmental integrity, sales have been low. The S E-Hybrid's rather unimpressive 20 mile all-electric range meant the car was unable to garner the kind of attention and accolades that its closest competitor the Tesla Model S earned. The Panamera S E-Hybrid is an attractive performer that offers respectable fuel economy primarily when compared to other luxury performance gasoline cars.





2012 - 2016

TESLA Model S

The Tesla Model S sedan is the most revolutionary vehicle on the market. Owner and editorial reports deliver glowing praise: Silky smooth in a way that seems almost unearthly. So quiet it's eerie. Comfortable without encouraging the relaxation of driving vigilance. Simple straightforward controls. Enough power that Voltaire's dictum "with great power comes great responsibility" comes to mind unbidden. The company's entry level 70D is rated at 328 hp. The 85D model uses a higher capacity battery and is able to produce higher output resulting in 417 hp. The P85D incorporates a higher performance rear motor resulting in a 463 hp rating. P85D models enhanced with Ludicrous mode are rated at 532 hp, a staggering amount for a 4-door sedan that can haul 5 adults. The top-of-the-line P90D hp ratings are not listed on the Tesla website, but in tests by *Motor Trend*, it was the fastest sedan they had ever tested and faster than all other street cars except for the Porsche 918 and Ferrari LaFerrari hypercars. In 2013 *Motor Trend* named the Model S Car of the Year. Most recently, the all-wheel-drive Tesla Model S P85D sedan performed better in *Consumer Reports* tests than any other car ever has, breaking the magazine's ratings system. Cargo space, with front and back trunks, ranges from 31 to 63 cubic feet with the rear seats folded down. Tesla Model S' ground breaking technology, standard setting performance, and its sexy, luxury sport car look have put the entire automobile industry on notice: complacency is not an option.

ACQUISITION

MSRP	\$69,900
60 Month @ 6% est	\$1,351
Lease	--
Availability	2012
U.S. Sales Units	--

RANGE

EV Range	248-279
MPGe	89

PERFORMANCE

0-60 mph	3.2-5.9 sec
Top Speed	120-155 mph

BATTERY

Volts	375
Watts	60-85 kWh
Cooling	Liquid

DRIVETRAIN (ELECTRIC)

HP/Lb-ft	328-532/387-713
Drive Type	RWD/AWD

CHARGING

Power Rating	10-20 kW
Charge Time L1	27 hrs
Charge Time L2	4 hrs
Charge Time DC	0.75 hrs
Connector	UMC

CAPACITY

Passengers	5
Cargo	31.6-63.3 cu. ft

DIMENSIONS

Curb Weight	4,647 lbs
Length	196 in
Width	77.3 in
Height	56.5 in





ACQUISITION

MSRP	\$95,650
60 Month @ 6% est	\$1,825
Lease	--
Availability	2015
U.S. Sales Units	118

RANGE

EV Range	20
MPGe	--

PERFORMANCE

0-60 mph	5.2 sec
Top Speed	130 mph

BATTERY

Volts	395
Watts	8.7 kWh
Cooling	Liquid

DRIVETRAIN (HYBRID)

HP/Lb-ft	329/479
Drive Type	RWD

CHARGING

Power Rating	3.6 kW
Charge Time L1	4 hrs
Charge Time L2	2.75 hrs
Charge Time DC	NA
Connector	J1772

CAPACITY

Passengers	5
Cargo	12.2 cu ft

DIMENSIONS

Curb Weight	5,093 lbs
Length	206.5 in
Width	74.8 in
Height	58.8 in

2015 - 2016

MERCEDES-BENZ S550 PHEV

For six decades, the S-Class has been associated with the height of class and sophistication. For the first time in the S-Class' history, it is available with a plug-in hybrid drivetrain. The S550 PHEV now gives CEOs and dignitaries with a desire to travel emissions free the ability to do so in the zenith of luxury and technology.

The S550's electric motor produces 114 hp at peak, silently pushing the car to a maximum electric-only speed of 68 mph. The 8.7 kWh lithium-ion battery pack will sustain zero-emission electric travel for about 20 miles. After that, the S550's gasoline 3.0-liter twin-turbo V6 engine and seven-speed automatic transmission smoothly take over.

One of the S-Class' distinguishing features is the DISTRONIC self-driving feature, which at low speeds will maintain speed and following distance with adaptive cruise control, hold a lane, and brake when necessary. It will also park itself.

As to be expected from a \$100k sedan, the S550's interior is filled with soft stitched leather, cushioned armrests, and Alcantara lining on the ceiling. With enough back seat room to be comfortably chauffeured between board meeting and the airport, the S550 is a fully functioning office and comes with 3G Internet access, a wireless hotspot, and fold-out table. Rear seat "hot stone" massage function is optional. Exterior styling is conventional, appearing staid by comparison to the CT6, Model S or Panamera S E-Hybrid that it might be cross-shopped with.





2016 TESLA Model X

Unsatisfied with simply taking the game-changing Model S performance sedan and sticking an SUV body on it, Tesla pushed the envelope. Applying cutting-edge and never-before-seen features to the first all-electric SUV, resulted in a vehicle that will excite consumers with an appreciation of and budget for fine art, disruptive technology and adrenaline-inducing performance.

The Silicon Valley automaker first showcased the prototype Model X in 2012, and with a fitting rockstar product launch in September 2015, showed what a \$130,000 electric SUV can be. It can go 250 miles on a single charge. It can carry seven adults in comfort and style. It can tow 5,000 pounds. Tesla says that the Model X will be the safest SUV ever made and the first SUV to earn five stars on every test.

The first thing most people notice on the Model X are the rear Falcon Wing doors, a feature traditionally reserved for exotic sports cars. When the doors are open, it looks like nothing else. But it's not just a superfluous flourish to show off engineering prowess and outside-the-box thinking. The door design allows for easy access to the rear seats. Getting the kids buckled into their safety seats can be accomplished without risk of bonking your head on the door frame. Cargo space is 77 cubic feet with seats down.

Model X deliveries began in Fall 2015. If a premium all-electric SUV is on your wish list, plunk down a deposit soon; 25,000 people have already placed reservations for a car whose 2016 production run is expected to be 30,000 units.

ACQUISITION

MSRP	~\$80,000
60 Month @ 6% est	\$1,547
Lease.....	--
Availability	2016
U.S. Sales Units	214

RANGE

EV Range	220-250
MPGe	89-92

PERFORMANCE

0-60 mph	6.0-3.2 sec
Top Speed	140-155 mph

BATTERY

Volts.....	375
Watts.....	70-90 kWh
Cooling	Liquid

DRIVETRAIN (ELECTRIC)

HP/Lb-ft.....	328-532/387-713
Drive Type	AWD

CHARGING

Power Rating.....	10-20 kW
Charge Time L1.....	27 hrs
Charge Time L2.....	4 hrs
Charge Time DC	0.75 hrs
Connector	UMC

CAPACITY

Passengers.....	7
Cargo.....	77 cu ft

DIMENSIONS

Curb Weight.....	5,441 lbs
Length.....	197 in
Width.....	82 in
Height.....	62 in



Plug-In
Hybrid



ACQUISITION

MSRP	\$69,095
60 Month @ 6% est	\$1,336
Lease.....	--
Availability	2016
U.S. Sales Units	12

RANGE

EV Range	14
MPGe	--

PERFORMANCE

0-60 mph	5.7 sec
Top Speed	-- mph

BATTERY

Volts	400
Watts	9.2 kWh
Cooling	Liquid

DRIVETRAIN (HYBRID)

HP/Lb-ft	400/472
Drive Type	AWD

CHARGING

Power Rating	7.7 kW
Charge Time L1	8 hrs
Charge Time L2	2.5 hrs
Charge Time DC	NA
Connector	J1772

CAPACITY

Passengers	7
Cargo	15.8-85.7 cu ft

DIMENSIONS

Curb Weight	4,393 lbs
Length	189.3 in
Width	76.2 in
Height	70.2 in

2016 VOLVO XC90 T8

The Volvo XC90 is a radical departure from the square Volvo you may have known in younger days. In fact, toss everything you know about Volvo out the window before looking at the XC90 T8 except that they are still practical and safe. But start adding words like “exciting” and “powerful” to your description of Volvo. Powerful isn’t actually sufficient to describe the T8 variant of the XC90 lineup. Volvo uses of the term “twin engine” to describe the combination of gas engine that drives the front wheels and electric motor which drives the rear wheels. That helps a little but words aren’t really sufficient to convey the metamorphosis of this once mild mannered Swedish automaker into a Porsche challenger. Maybe numbers will help: 400 hp. 472 lb.-ft. Zero to 62 MPH in 5.7 seconds.

The brawn is paired with an entirely new level of beauty too. The XC90’s interior is Volvo’s most luxurious to date. Natural grain wood and Nappa leather accent truly beautiful interior panels and bezels. A large Sensus touchscreen fills the center console, and provides navigation and Apple CarPlay. Hands-free controls are provided by Apple’s Siri who will read text messages aloud and provide voice control for the phone and music system. An optional 19-speaker, 1,400-watt Bowers & Wilkins sound system provides inspiring high fidelity.

Volvo has a significant contender with its luxury full-size 7-passenger XC90 T8. Read the feature-length drive review in the 2015 Q3 edition of *Electric Car Insider*.



Plug-In
Hybrid



2015 - 2016

PORSCHE Cayenne S E-Hybrid

Porsche built its brand by delivering high performance as standard. The Cayenne SUV plug-in lives up to its sporting heritage. With a total of 416 hp and its 435 lb.-ft. of torque instantly available, S E-Hybrid doesn't disappoint. The Utility hasn't been neglected either. The vehicle's 7,716-pound tow rating is sufficient to tow a watercraft or camper. Push the "e-power" button and the Cayenne S E-Hybrid's all electric silent running mode extends up to 78 MPH, making it capable of all driving regimes except the kind you bought a Porsche for. Push the accelerator and the 3.0 liter supercharged V6 will spur the Cayenne from zero to 62 MPH in 5.4 seconds and a top speed of 151 MPH. To deliver sports car performance in an SUV package, Porsche borrowed the Panamera E-Hybrid's 95 hp motor/inverter, Aisin eight-speed automatic transmission and supercharged 3.0-liter V-6.

Like the other plug-in hybrids in the luxury German automaker's stable, the Cayenne S E-Hybrid maintains the line's sleek looks and premium interior appointments. The bright green brake calipers and minimal badging are the only indications of the SUV's eco cred. When introduced, the Cayenne S E-Hybrid's 14 mile all-electric range didn't break any new ground and falls short of the new entries into the segment including the Volvo XC90 T8 and the upcoming Audi Q7 and Mercedes-Benz GLE550e. The Cayenne S E-Hybrid remains a stylish SUV for buyers who put a premium on performance.

ACQUISITION

MSRP	\$77,200
60 Month @ 6% est	\$1,492
Lease	\$799
Availability	2015
U.S. Sales Units	966

RANGE

EV Range	14
MPGe	47

PERFORMANCE

0-60 mph	5.4 sec
Top Speed	151 mph

BATTERY

Volts	--
Watts	10.8 kWh
Cooling	Liquid

DRIVETRAIN (HYBRID)

HP/Lb.-ft.	416/435
Drive Type	AWD

CHARGING

Power Rating	7.2 kW
Charge Time L1	11 hrs
Charge Time L2	1.3 hrs
Charge Time DC	NA
Connector	J1772

CAPACITY

Passengers	5
Cargo	20.5-59.68 cu ft

DIMENSIONS

Curb Weight	5,181 lbs
Length	191.14 in
Width	78.7 in
Height	67.4 in



Plug-In
Hybrid



ACQUISITION

MSRP	\$54,895
60 Month @ 6% est	\$1,061
Lease	\$659
Availability	2015
U.S. Sales Units	285

RANGE

EV Range	19
MPGe	59

PERFORMANCE

0-60 mph	6.8 sec
Top Speed	130 mph

BATTERY

Volts	--
Watts	9 kWh
Cooling	Liquid

DRIVETRAIN (HYBRID)

HP/Lb.-ft.	309/332
Drive Type	AWD

CHARGING

Power Rating	3.5 kW
Charge Time L1	6 hrs
Charge Time L2	2.75 hrs
Charge Time DC	NA
Connector	J1772

CAPACITY

Passengers	5
Cargo	17.7-72.5 cu ft

DIMENSIONS

Curb Weight	5,080 lbs
Length	191.9 in
Width	76.1 in
Height	68.5 in

2015

BMW X5 xDrive40e

The X5 was designed to deliver the kind of sporty road handling the German manufacturer is known for. Featuring a specially tuned suspension, the X5 gives drivers a sports sedan feel with the higher ride height and cargo space of an SUV. The xDrive40e plug-in gives the already successful midsize SUV an earth-friendly side with 22 all-electric miles and a combined fuel efficiency of up to 86 MPG.

The X5 eDrive adds a 9kWh battery and 113 HP electric motor to the standard X5 to provide a total of 309 hp and 332 lb.-ft. of torque. Performance is a respectable 0-62 mph in 6.8 seconds, with a top speed that is electronically limited to 130 MPH. The electric motor provides instant torque at low revs improving responsiveness. The BMW xDrive intelligent all-wheel-drive provides superb traction in all road conditions. The electronically controlled multi-plate clutch provides fully variable distribution of drive torque between the front and rear wheels. Linked to the DSC (Dynamic Stability Control), the xDrive system counters understeer or oversteer by distributing torque to each wheel for best handling.

The plug-in X5 costs approximately \$20,000 less than the Porsche plug-in SUV and approximately \$5,000 less than the plug-in Audi Q7. The BMW X5 eDrive40e is a great option for drivers who want the sportiness the Bavarian manufacturer has built its brand around while at the same time enjoying the added fuel efficiency of a plug-in hybrid.



Plug-In
Hybrid



2016 AUDI Q7 e-tron

Audi introduces the 33-mile all-electric range Q7 e-tron SUV for 2016. The seven passenger SUV delivers 13 additional fossil fuel free miles compared to the Volvo XC90 T8. The plug-in Audi features new sculpted body lines give it a flowing, athletic look.

The redesigned SUV achieves its class-leading all-electric range by using aluminum and other weigh saving technology making the new Q7 660-pounds lighter than the previous model and the lightest SUV in the class.

Outfitted with a turbo-charged 2.0L 4-cylinder gas powered motor mated to the 94kW electric motor, the combined system output is 362 hp and 516 lb.-ft. of torque. The SUV uses Audi's proven Quattro all-wheel drive system to transfer power to the road. This system propels the SUV from 0-60 in approximately 6 seconds. The 17.3 kWh battery pack can be charged in as little as 2.5 hours. Another new feature of the redesigned Q7 is a heat pump climate control system, which adds to the vehicle's overall efficiency. By using this new heat pump, Audi says range was extended by 20%. With the PHEV drive train, the Q7 can travel 634 miles with a full charge and a full tank of gas. The Q7 E-Tron Quattro comes with the standard equipment of the top model in the line. The Q7 E-Tron PHEV is worth a close look and a thorough test drive if you want useable all-electric range, all-wheel drive and room for seven.

ACQUISITION

MSRP	~\$60,000
36 Month lease	\$1,160
Lease	--
Availability	2016
U.S. Sales Units	--

RANGE

EV Range	33
MPGe	94.1

PERFORMANCE

0-60 mph	6.1 sec
Top Speed	137 mph

BATTERY

Volts	--
Watts	17.3 kWh
Cooling	Liquid

DRIVETRAIN (HYBRID)

HP/Lb.-ft.	362/516
Drive Type	AWD

CHARGING

Power Rating	7.2 kW
Charge Time L1	12 hrs
Charge Time L2	2.4 hrs
Charge Time DC	NA
Connector	J1772

CAPACITY

Passengers	7
Cargo	14.8-71.6 cu ft

DIMENSIONS

Curb Weight	4,500 lbs
Length	198.9 in
Width	77.5 in
Height	68.5 in





ACQUISITION

MSRP	--
36 Month lease	--
Lease	--
Availability	2016
U.S. Sales Units	--

RANGE

EV Range	18.6
MPGe	--

PERFORMANCE

0-60 mph	5.9 sec
Top Speed	152 mph

BATTERY

Volts	--
Watts	8.8 kWh
Cooling	--

DRIVETRAIN (HYBRID)

HP/Lb-ft	436/479
Drive Type	AWD

CHARGING

Power Rating	8.8 kW
Charge Time L1	2 hrs
Charge Time L2	-- hrs
Charge Time DC	NA
Connector	J1772

CAPACITY

Passengers	5
Cargo	-- cu ft

DIMENSIONS

Curb Weight	5,522 lbs
Length	190 in
Width	76 in
Height	72 in

2016

MERCEDES-BENZ GLE550e 4Matic

The GLE-Class SUV is Mercedes-Benz direct competitor for the BMW X5. The plug-in GLE550e 4Matic gives the five-passenger SUV 18.6 all-electric miles. The fossil-fuel free range is on par with the BMW X5 xDrive40e but ²/₃ of the range of the plug-in Audi Q7.

Mercedes has the upper hand when comparing HP numbers between its closest competitors. The GLE550e's 3.0L direct-injection twin-turbo V6 gas engine produces a combined system output of 436 hp and 479 lbs-ft of torque. This power is transferred to the pavement via the 7-speed 4Matic all-wheel drive system. Estimated 0-60 MPH time is between 5 and 6 seconds. The all-electric top speed is a credible 81 MPH. Mercedes-Benz offers 4 driving modes: hybrid drive, which auto selects the best power source option based on driving conditions; E-mode, which is all-electric; E-save, which saves stored energy to be used later as when driving in a zero emission district; and Charge, which uses gas power and charges the electric system.

Muscular and angular, the plug-in GLE delivers power, luxury and AWD in a fuel-efficient package. The new SUV adds another solid option to the growing luxury SUV market. Although pricing for the plug-in Mercedes SUV hasn't been released, it will probably be close to the BMW.



Plug-In
Hybrid



2014 - 2016

BYD Tang

Tang is an all wheel drive SUV with a similar size and configuration as the Lexus RX350, but with a plug-in hybrid drivetrain. The DM - for dual mode - has a total range of 308 miles; 38 miles on electric power from a 18.5 kWh lithium-iron phosphate battery. It will travel another 270 on gasoline from a 14 gallon tank. A 2.0 liter 2.0Ti direct injection turbocharged gasoline engine paired with a 147 hp electric motor drives the front wheels through a 6-speed dual-clutch transmission. A second 147 hp electric motor powers the rear wheels. Performance is impressive; the S6DM will accelerate from 0-62 in 4.9 seconds and can achieve a top speed of 112 MPH.

Although not yet on sale in US markets, the Tang, also known as S6DM, was first seen at the 2011 North American International Auto Show in Detroit. A fleet of earlier generation F3DM plug-in electric sedans was evaluated by the Housing Authority of Los Angeles.

ACQUISITION

MSRP	~\$48,000
60 Month @ 6% est	\$928
Lease	--
Availability	2014
U.S. Sales Units	--

RANGE

EV Range	38
MPGe	--

PERFORMANCE

0-60 mph	4.9 sec
Top Speed	-- mph

BATTERY

Volts	--
Watts	18.4 kWh
Cooling	Air

DRIVETRAIN (HYBRID)

HP/Lb-ft	505/530
Drive Type	AWD

CHARGING

Power Rating	-- kW
Charge Time L1	-- hrs
Charge Time L2	-- hrs
Charge Time DC	--
Connector	--

CAPACITY

Passengers	5
Cargo	-- cu ft

DIMENSIONS

Curb Weight	4,674 lbs
Length	189.4 in
Width	73 in
Height	67.7 in





ACQUISITION

MSRP	~\$42,000
60 Month @ 6% est	\$812
Lease.....	--
Availability	2016
U.S. Sales Units	~75,000

RANGE

EV Range	30
MPGe	--

PERFORMANCE

0-60 mph	11 sec
Top Speed	106 mph

BATTERY

Volts	300
Watts	12 kWh
Cooling	Fan, AC

DRIVETRAIN (HYBRID)

HP/Lb-ft	200/249
Drive Type	AWD

CHARGING

Power Rating	-- kW
Charge Time L1	4 hrs
Charge Time L2	5 hrs
Charge Time DC ..	30 min to 80%
Connector	--

CAPACITY

Passengers	5
Cargo	10.3-63.3 cu ft

DIMENSIONS

Curb Weight	3,990 lbs
Length	118.25 in
Width	71 in
Height	66 in

2017

MITSUBISHI Outlander PHEV

Americans will finally get to enjoy Europe's best selling EV when US deliveries of the Outlander plug-in start in 2016. The retuned 2017 Mitsubishi Outlander PHEV will hit these shores with sophisticated new styling as well as featuring a more powerful hybrid drivetrain. The attractive new front fascia with dramatically redesigned bumper give the 5-passenger crossover SUV visual appeal.

Equipped with dual 80 hp electric motors and a 2.0L 4-cylinder 115 hp gasoline engine, the system's total output is projected to be 200HP producing 249 lb.-ft. of torque. The Outlander can operate in either all-electric, series or parallel hybrid modes. In series mode, the engine spins a generator that sends electricity to the front and rear traction motors and can put energy back into the battery. In parallel mode, the engine drives the front wheels through the transmission and the front and rear electric motors drive the wheels. The electric motor assisting the gas engine achieves improved fuel efficiency, which is expected to be over 80 MPGe.

This good looking crossover has proven itself capable in other world markets and should appeal to American consumers looking for a crossover SUV with great fuel efficiency, is all-wheel drive and can haul 5 adults plus their cargo. Competition is fierce in the premium SUV EV market, but the Outlander's MSRP is at least \$20,00 less than options from Audi, BMW, Mercedes-Benz, Tesla and Volvo, making it affordable for many more families.





2010 - 2016

BYD e6

E6 is a long-range all-electric designed for high-utility fleet applications like taxis and airport limos. A cross between a sedan and an SUV, the e6 boasts 88.3 cu.-ft. of passenger space and 15.9 cu.-ft. of cargo space. There are currently over 650 operating as taxis world-wide. The e6 has been used in taxi fleets in BYD's hometown of Shenzhen, China since 2010. The e6 is available to fleet purchasers in the United States. The Chicago car-sharing service E-RIVE has 20 BYD e6 sedans in their fleet, and is planning to expand to five more cities within the next few years.

The e6's EPA range is rated at 122 miles, but BYD says that the nominal range is closer to 186 miles. An e6 can be used for two shifts per day with one mid-day recharge from industrial 3 phase 400v mains. The e6's powertrain consists of a 121hp / 331 ft.-lbs. electric motor and controller supplied by a BYD 61.4 kWh Lithium Iron Phosphate battery. Performance is 0-60 MPH in 7.69 sec.

The interior is solid if not luxurious. It features leather upholstery and plenty of room - much more than the Leaf or Focus Electric. A large digital display with backup camera is standard. The BYD's proprietary charging station is capable of bi-directional charging and discharging, for those looking for car to grid solutions. BYD is working on incorporating SAE standard charging hardware in the e6.

ACQUISITION

MSRP	~\$50,000
60 Month @ 6% est	\$967
Lease.....	--
Availability	2010
U.S. Sales Units	7,258

RANGE

EV Range	186
MPGe	62

PERFORMANCE

0-60 mph	7.7 sec
Top Speed	87 mph

BATTERY

Volts.....	--
Watts.....	61.4 kWh
Cooling	Air

DRIVETRAIN (ELECTRIC)

HP/Lb.-ft.....	122/332
Drive Type	FWD

CHARGING

Power Rating.....	30 kW
Charge Time L1.....	NA hrs
Charge Time L2.....	2 hrs
Charge Time DC	NA
Connector	GB/J1772

CAPACITY

Passengers.....	5
Cargo.....	--

DIMENSIONS

Curb Weight.....	5,247 lbs
Length.....	179.5 in
Width.....	71.7 in
Height.....	64.8 in





ACQUISITION

MSRP	--
60 Month @ 6% est	--
Lease	--
Availability	2017
U.S. Sales Units	

RANGE

EV Range	30
MPGe	80

PERFORMANCE

0-60 mph	--
Top Speed	--

BATTERY

Volts	--
Watts	16 kWh
Cooling	Liquid

DRIVETRAIN (HYBRID)

HP/Lb-ft	--
Drive Type	--

CHARGING

Power Rating	6.6 kW
Charge Time L1	14 hrs
Charge Time L2	2 hrs
Charge Time DC	NA
Connector	J1772

CAPACITY

Passengers	8
Cargo	-- cu ft

DIMENSIONS

Curb Weight	-- lbs
Length	-- in
Width	-- in
Height	-- in

2017

CHRYSLER Pacifica Hybrid

The Pacifica Hybrid is the first minivan to offer a plug-in powertrain and features 30-mile all-electric range. As part of a ground-up redesign of Chrysler's class-leading minivan, the 2017 model features a more sculpted, contemporary body. The Pacifica Hybrid is differentiated from the internal combustion models with a unique grill pattern, wheels and badging.

There is no direct competition for the Pacifica Hybrid, it might be cross shopped by families considering the Volvo XC90 T8 or Audi Q7 E-Tron. With similar all-electric range, the Pacifica is capable of hauling 8 adults in comfort and has the ability to haul more cargo. Although Chrysler hasn't specified the exact cargo space, they have noted sheets of 4'x8' plywood can be transported.

Power for the plug-in Pacifica is stored in a 16 kWh battery beneath the middle seats. Total system output has not been announced, but the minivan uses the same engine as the non-hybrid Pacifica. Detuned for the plug-in application, the V6 is mated to an all-new electrically variable transmission (EVT). The system uses two electric motors – both of which are capable of driving the vehicle's wheels – to deliver power.

Although pricing for the Pacifica Hybrid has not been announced, the cost savings from the 80 MPGe fuel efficiency should make this van cheaper on a total-cost-of-ownership basis compared to any other minivans on the market. Chrysler expects to have the plug-in minivan in showrooms by mid-2016.



Plug-In
Hybrid



2015 - 2016

VIA Van

Designed to deliver 40 miles of all-electric range, the Via Van can save fleets up to \$5,000 per year in fuel savings, and up to double that if the vehicle can be recharged mid-day and has a duty cycle of 70 or more miles. Based on Chevy's $\frac{3}{4}$ ton van chassis, the vehicle has a payload capacity of 2,800 lbs. for cargo or 2,000 lbs. in passenger van configuration. The VIA van is a series hybrid, with no conventional transmission. The 4.3L EcoTec 3 Gen V engine drives a VR100 100kW electrical generator directly, which provides power for the traction motor. Combined electric and gas range is 400 miles on a 15 gallon tank.

The battery and genset can provide work site or emergency power of 120-240v @ 50 amps up to 14.4 kW. Although the acquisition cost of about \$80k is quite a premium over the \$28k gasoline powered Chevy van it's based on, California and five other states have clean air incentives starting at \$10,500 plus \$7,500 on the federal level. Some areas of California have up to \$18,000 in state incentives. Depending on the daily mileage, the van could start paying \$5,000-\$10,000 annual dividends within six years of purchase.

ACQUISITION

MSRP	~\$79,000
60 Month @ 6% est	\$1,527
Lease.....	--
Availability	2015
U.S. Sales Units	--

RANGE

EV Range	40
MPGe	--

PERFORMANCE

0-60 mph	-- sec
Top Speed	-- mph

BATTERY

Volts.....	350
Watts.....	23 kWh
Cooling	Liquid

DRIVETRAIN (HYBRID)

HP/Lb-ft.....	255/306
Drive Type	RWD

CHARGING

Power Rating.....	3.3 kW
Charge Time L1.....	10 hrs
Charge Time L2.....	3 hrs
Charge Time DC	NA
Connector	J1772

CAPACITY

Passengers.....	2-12
Cargo.....	--

DIMENSIONS

Curb Weight.....	7,250 lbs
Length.....	224.1 in
Width.....	-- in
Height.....	-- in





ACQUISITION

MSRP	~\$79,000
60 Month @ 6% est	\$1,527
Lease	--
Availability	2015
U.S. Sales Units	--

RANGE

EV Range	40
MPGe	--

PERFORMANCE

0-60 mph	-- sec
Top Speed	-- mph

BATTERY

Volts	350
Watts	23 kWh
Cooling	Liquid

DRIVETRAIN (HYBRID)

HP/Lb-ft	255/306
Drive Type	RWD/AWD

CHARGING

Power Rating	3.3 kW
Charge Time L1	10 hrs
Charge Time L2	3 hrs
Charge Time DC	NA
Connector	J1772

CAPACITY

Passengers	2-4
Cargo	--

DIMENSIONS

Curb Weight	7,250 lbs
Length	224.1 in
Width	-- in
Height	-- in

2015 - 2016 VIA Truck

Like the VIA Van to the left, the VIA Truck can travel the first 40 miles of a work day on it's electric motor, saving the operator about \$14 per day, up to \$5,000 per year in fuel savings. Based on Chevy's 1/2 ton chassis the truck has a 1,000 lb. payload capacity with 7,200 GVW. The VR190 traction motor produces 415 Nm peak, 210 Nm continuous. The generator produces 150 kW peak, 100 kW continuous power. The VTrux has no conventional transmission, the 4.3 liter v6 gasoline engine gasoline only drives the generator. A 550 watt SolTRUX Solar bed cover option provides up to 10 miles additional electric range per day. Via Motors will launch this product by building the biggest, heaviest version of the VTrux, a four-wheel-drive crew cab. Two-wheel-drive and standard cab versions will follow later. Like the van, the truck has a power export capability for work site power. A utility grade output module is planned for the future and will be designed to provide 50 kW of mobile emergency power to keep critical facilities on-line.



Plug-In
Hybrid



2014 - 2016

CADILLAC ELR

Using the EV technology that powers the best-selling Chevrolet Volt plug-in, Cadillac brought the Volt architecture to the luxury market with the ELR. The coupe is sleek and angular and has the kind of interior appointments one would expect in a Cadillac. The ELR was priced out of its league and missed its market. At \$4,900 less than an entry-level Tesla Model S, the ELR may be attractive to luxury electric vehicle drivers requiring a gasoline range extender.

ELR features a retuned suspension and revised electric drive system that produces more power. A Sport mode has also been added boosting maximum power of the electric powertrain, which is 233 hp and 373 lb.-ft. of torque versus 214 hp in Normal mode. The electric-only range has also been increased from 37 to 40 miles. A Performance Package adds 20-inch summer-only performance tires, Brembo brakes, retuned electric power steering along with a sport steering wheel. Continuous Damping Control provides real-time active suspension, managing body roll and pitch variation with an actuator that raises and lowers the chassis independently at each wheel. The two-door plug-in hybrid may not be a direct competitor with the four door all-electric Tesla Model S, but its MSRP places it at the deep end of the pool with the Model S and other premium European sedans. Bargains can be had, however. Due to sluggish sales, dealer discounts have dropped as much as \$12k-\$20k off the original ELR MSRP.

ACQUISITION

MSRP	\$65,000
60 Month @ 6% est	\$1,257
Lease	\$499
Availability	2014
U.S. Sales Units	1,204

RANGE

EV Range	40
MPGe/MPG	85/31

PERFORMANCE

0-60 mph	8 sec
Top Speed	100 mph

BATTERY

Volts	360
Watts	16.5 kWh
Cooling	Liquid

DRIVETRAIN (HYBRID)

HP/Lb.-ft.	233/373
Drive Type	--

CHARGING

Power Rating	3.3 kW
Charge Time L1	12.5 hrs
Charge Time L2	5 hrs
Charge Time DC	NA
Connector	J1772

CAPACITY

Passengers	4
Cargo	10.5 cu ft

DIMENSIONS

Curb Weight	4,070 lbs
Length	186 in
Width	72.7 in
Height	55.9 in



Utilities



Utilities Plug In

Plan to Add 58,500 Charging Stations

BY CHRISTOPHER ALAN AND STEVEN THOMAS

Three major California utilities plan huge EV charger deployments.

Utilities in California are planning to install 58,500 public electric vehicle charging stations throughout the state. The move follows action by the California Public Utilities Commission that modified the rule that had previously barred utilities from owning public EV charging stations. The

restriction had been put in place because of concerns that utilities would have an unfair advantage in the nascent EV charge station market. A more mature market has allayed those fears.

SOUTHERN CALIFORNIA EDISON

Southern California Edison (SCE) will begin implementing its \$22 million "Charge Ready" program. The program will fund the deployment of approximately 1,500 public electric vehicle charging stations in public locations including workplaces, campuses, recreational areas and apartment and condominium complexes.

SAN DIEGO GAS & ELECTRIC

The CPUC has also approved San Diego Gas & Electric's (SDG&E) plan to install 3,500 electric vehicle charging stations in 350 locations throughout the San Diego and south Orange County areas. SDG&E's "Vehicle Grid Integration" program is designed to

encourage EV drivers to charge their cars when electricity supply, including renewable energy, is plentiful and energy prices are low. By offering special off-peak rates, vehicles can be more efficiently integrated onto the grid, helping to avoid on-peak charging that drives the need to build more power plants and other electric infrastructure.

PACIFIC GAS & ELECTRIC

Pacific Gas & Electric (PG&E) has also submitted a plan to the CPUC asking state regulators for permission to build an estimated 25,000 Level 2 chargers at sites across its service area in Northern and Central California.

ONE MILLION ELECTRIC CARS

The SDG&E, SCE and PG&E programs to increase the number of public charge stations will help achieve Governor Jerry Brown's goal of deploying infrastructure to support 1 million EVs in California by 2020. 🚗



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Plug-In
Hybrid



2016 VOLVO S90 T8

Volvo enters the luxury sedan market with their all new flagship four door, the S90. The prominent mid body line and classic shape reinforce the brand's heritage while still looking fresh and contemporary. The S90 sedan's T8 variant uses the same plug-in drivetrain from the company's XC90 T8 SUV. Although EPA range is not yet known, it is expected the S90 T8 will run on smooth, silent electric power for about 16 miles.

The "twin engine" drivetrain mates its electric motor to a 2.0L 4-cylinder that is both supercharged and turbocharged, which improves fuel efficiency while giving the engine plenty of power throughout its RPM range. The gas engine drives the front wheels while the rear wheels are driven by the electric motor. Adding to the overall efficiency and power of the system is Volvo's crankshaft integrated starter generator (C-ISG). In addition to starting and charging the car, the C-ISG makes the transition from the gas engine to electric motor seamless. It also provides additional power so there is no lag as the supercharger or turbocharger kicks in.

The interior's Scandinavian style is uncluttered and sophisticated. Volvo's soft Nappa leather seats conceal industry leading safety features designed to prevent spine injury in severe crashes. A central 9-inch center touchscreen display provides easy and intuitive access to all of the car's infotainment and climate control features. Vertical air blades on the vents, Orrefors crystal in the shift lever, and diamond cut metal on the knobs are subtle flourishes in an otherwise serene cocoon.



ACQUISITION

MSRP	\$--
60 Month @ 6% est	\$--
Lease	--
Availability	2016
U.S. Sales Units	--

RANGE

EV Range	~ 16
MPGe	--

PERFORMANCE

0-60 mph	-- sec
Top Speed	-- mph

BATTERY

Volts	400
Watts	9.2 kWh
Cooling	Liquid

DRIVETRAIN (HYBRID)

HP/Lb-ft	400/472
Drive Type	AWD

CHARGING

Power Rating	7.7 kW
Charge Time L1	8 hrs
Charge Time L2	2.5 hrs
Charge Time DC	NA
Connector	J1772

CAPACITY

Passengers	5
Cargo	17.66 cu ft

DIMENSIONS

Curb Weight	4,470 lbs
Length	195.5 in
Width	74 in
Height	57 in

Plug-In
Hybrid



ACQUISITION

MSRP	\$70,000
60 Month @ 6% est	\$1,353
Lease.....	--
Availability	2017
U.S. Sales Units	--

RANGE

EV Range	30
MPGe	65

PERFORMANCE

0-60 mph	5.3 sec
Top Speed	150

BATTERY

Volts	360
Watts	18.4 kWh
Cooling	Liquid

DRIVETRAIN (HYBRID)

HP/Lb-ft	335/432
Drive Type	RWD

CHARGING

Power Rating	18.4 kW
Charge Time L1	-- hrs
Charge Time L2	5 hrs
Charge Time DC	NA
Connector	J1772

CAPACITY

Passengers	5
Cargo	--

DIMENSIONS

Curb Weight	-- lbs
Length	204 in
Width	74 in
Height	57.9 in

2017 CADILLAC CT6 PHEV

Cadillac's new flagship sedan is a no-compromise luxury 4-door with room for five. Designed to compete with prestige automakers while providing unprecedented fuel efficiency. The new CT6 plug-in provides 30-miles of all-electric range, which is 10 miles more than the Mercedes-Benz S550 PHEV. The CT6 PHEV delivers twice the MPG of the gas powered CT6.

The battery pack is the same 18.4kWh battery pack used in the 2016 Chevy Volt. An all-new Electric Variable Transmission (EVT) was designed specifically for the hybrid drivetrain. The iBooster provides maximum kinetic energy recovery to decrease stopping distance and improve fuel efficiency. The regen-on-demand system features steering wheel mounted paddles. Flipping the paddles feels like downshifting or engine braking; scrubbing off speed and charging the battery pack. The Electronic Stability Program (ESP) increases braking performance by preventing skidding. The Cadillac CT6 displays all the luxury and styling-cues of the brand. Visually, the exterior of the CT6 PHEV is virtually identical to the conventional CT6. The interior also looks identical to its gas-powered counterparts. The data shown in the plug-in's displays will feature information about the drivetrain including battery state of charge, distance of all-electric miles remaining and drive mode selected.

The CT6 offers luxury buyers the smooth quietness of all-electric drive and ability to soak up long-distance miles in unparalleled comfort.



Plug-In
Hybrid



2015 BMW 330e

BMW introduces the all-new 330e, a plug-in hybrid that's part of their top-selling 3-Series line. The new 330e's 22-mile all electric range and improved fuel economy should make this a popular model in the 3-Series line. The plug-in system, which features a turbo 4-cylinder engine mated to an electric motor, promises to live up to the 3-Series' heritage as the original sports sedan by producing 250HP and 310 lb.-ft. of torque launching the sedan from 0-60 in 6.1 seconds. BMW's reputation for excellent driving dynamics with a firm ride is built into the DNA of the 3-Series. A redesigned suspension promises more driver feedback without compromising comfort. A newly engineered steering system and updated stability control continue the evolution of the ultimate driving machine.

The 330e benefits from a recent refresh of the 3-Series line's interior. Awash with fine leather, repositioned chrome highlights and new smooth gloss surfaces give the interior an even more upscale look. The 330e receives a handful of toggles and switches used in connection with the hybrid drivetrain including the Driving Experience Control switch and the eDrive switch, both of which can be found on the center console.

The 330e should appeal to traditional 3-Series buyers looking for all the sportiness and luxury associated with the line but with dramatically increased fuel efficiency over its ICE siblings. EPA numbers are not yet available, but the 330e delivers up to 114 MPGe using the generous European cycle.



ACQUISITION

MSRP	\$44,695
60 Month @ 6% est	\$1,141
Lease	--
Availability	2016
U.S. Sales Units	--

RANGE

EV Range	22
MPGe	--

PERFORMANCE

0-60 mph	6.1 sec
Top Speed	140 mph

BATTERY

Volts	--
Watts	-- kWh
Cooling	--

DRIVETRAIN (HYBRID)

HP/Lb.-ft.	250/310
Drive Type	RWD

CHARGING

Power Rating	3.7 kW
Charge Time L1	-- hrs
Charge Time L2	2.2 hrs
Charge Time DC	NA
Connector	J1772

CAPACITY

Passengers	5
Cargo	13 cu ft

DIMENSIONS

Curb Weight	3,500 lbs
Length	182 in
Width	71.3 in
Height	56.3 in



ACQUISITION

MSRP	\$39,875
60 Month @ 6% est	\$760
Lease	--
Availability	2016
U.S. Sales Units	--

RANGE

EV Range	18.6
MPGe	--

PERFORMANCE

0-60 mph	5.9 sec
Top Speed	130 mph

BATTERY

Volts	--
Watts	6.2 kWh
Cooling	Liquid

DRIVETRAIN (HYBRID)

HP/Lb.-ft.	275/443
Drive Type	RWD

CHARGING

Power Rating	3 kW
Charge Time L1	8 hrs
Charge Time L2	3.5 hrs
Charge Time DC	NA
Connector	J1772

CAPACITY

Passengers	5
Cargo	11.8 cu ft

DIMENSIONS

Curb Weight	3,693 lbs
Length	180.7 in
Width	69.7 in
Height	54.8 in

2016

MERCEDES-BENZ C350

The C-Class features dramatic body lines that give the sedan a forward-leaning profile, like a sprinter at the blocks ready to take off at the sound of the gun. Mercedes used to be the height of subtle elegance. This athletic look helps the C350 stand out in a crowd and should make it appeal to buyers of premium sports sedans. The C350 faces off squarely with BMW 330e. The two cars have similar all-electric ranges, 0-60 times and exterior dimensions. The C350 will cost about \$5,000 less than the BMW 330e. The new plug-in Audi A3 might entice some Mercedes-Benz and BMW buyers with its improved all-electric range and the extra cargo space afforded by its wagon body.

The C350's electric motor, which produces 80 HP and 251 lb.-ft. of torque, is mated to a 2.0L 4-cylinder, which produces 208 hp and 258 lb.-ft. of torque. Combined output is 275 hp and 443 lb.-ft. of torque. The electric motor is bolted to the 7-speed transmission's wet clutch. The steering-wheel-mounted shift paddles allow the driver to upshift and downshift through the gears.

The C350 comes loaded with all the features, safety equipment and options available across the C-Class line. Standard equipment on the C350 includes an air-ride suspension and a pre-trip climate control, which makes it possible to set the interior temperature before hitting the road, cooling in the summer or warming in the winter. There are 2 trim packages, standard and luxury, giving premium sports sedan buyers plenty of options.



Plug-In
Hybrid



2016

HYUNDAI Sonata PHEV

The addition of zero-emission all-electric drive is a terrific addition to Hyundai's award-winning and best-selling Sonata. The Sonata Plug-in Hybrid Electric Vehicle (PHEV) enables up to 22 miles of driving on electricity before the gas engine takes over and completes the trip. If you have a short commute or mostly local driving pattern, this mid-sized sedan could be a good option for all-electric driving. If you can plug in at work, you could manage a 40 mile all-electric commute with a fuel cost of less than \$1 per gallon equivalent and zero tailpipe emissions.

Very little distinguishes the PHEV's exterior other than slight changes to the fascia panels and a charge port on the driver's side. A plug-in specific instrument cluster and a charge indicator on the dash, for checking the charge level from outside the vehicle, are the only changes that set the the PHEV interior apart from the rest of the Sonata line.

The Sonata PHEV uses an automatic 6-speed transmission with the Hyundai Transmission-Mounted Electrical Device (TMED), an electric motor, in place of the torque converter.

The Sonata has been awarded the IIHS Top Safety Pick, been named a Best Car For The Money by *U.S. News & World Report*, and been Top-Rated by *Edmunds.com*.

ACQUISITION

MSRP	\$34,600
60 Month @ 6% est	\$669
Lease.....	\$289
Availability	2015
U.S. Sales Units	15

RANGE

EV Range	22
MPGe	99

PERFORMANCE

0-60 mph	-- sec
Top Speed	-- mph

BATTERY

Volts.....	360 V
Watts	9.8 kWh
Cooling	Liquid

DRIVETRAIN (HYBRID)

HP/Lb-ft.....	202/--
Drive Type	FWD

CHARGING

Power Rating.....	3.6 kW
Charge Time L1.....	7 hrs
Charge Time L2.....	2.5 hrs
Charge Time DC	NA
Connector	J1772

CAPACITY

Passengers.....	5
Cargo.....	9.9 cu ft

DIMENSIONS

Curb Weight.....	-- lbs
Length.....	191.1 in
Width.....	73.4 in
Height.....	57.9 in





ACQUISITION

MSRP	--
60 Month @ 6% est	--
Lease	--
Availability	2016
U.S. Sales Units	--

RANGE

EV Range	27
MPGe	99

PERFORMANCE

0-60 mph	--
Top Speed	--

BATTERY

Volts	--
Watts	9.8 kWh
Cooling	--

DRIVETRAIN (ELECTRIC)

HP/Lb-ft	--/--
Drive Type	FWD

CHARGING

Power Rating	3.3 kW
Charge Time L1	9 hrs
Charge Time L2	3 hrs
Charge Time DC	--
Connector	J1772

CAPACITY

Passengers	5
Cargo	9.9 cu ft

DIMENSIONS

Curb Weight	--
Length	191.1 in
Width	73.2 in
Height	57.7 in

2017 KIA Optima PHEV

When the latest generation Kia Optima was introduced in 2016, it was heralded for being a great mix of crisp handling, contemporary good looks and fuel efficiency wrapped in a cost-effective package. A new plug-in drivetrain is upping the Optima's fuel efficiency by letting drivers travel 27 fossil-fuel free miles before the 4-cylinder 2.0L direct-injected engine kicks in.

The plug-in carries over the wrap-around tiger eye LED headlights and smooth flowing lines that have made the Optima a popular model among mid-size sedan buyers. The only visual cues that separate the hybrid from the Optima's gas-powered variants are a smoothed out front grille featuring active grille shutters, special low-drag wheel and a beveled rear bumper. All were designed to optimize aerodynamics, which improves the car's overall efficiency. The plug-in Optima's drag coefficient is a slippery 0.24 Cd, which is equal to the Tesla Model S.

Visually, the Optima plug-in's interior is identical to the gasoline-only model. Leather seating and genuine stitching on the dash and door panels along with real metal accents, give the interior an upscale feel. The plug-in features special gauges and a hybrid-system-only screens in the center 8-inch touchscreen. The plug-in Optima looks to be a solid contender in the mid-size sedan PHEV class. Although the Chevrolet Volt has nearly double its all-electric range, the Optima should appeal to buyer's comparing it to at plug-in versions of the Hyundai Sonata and Ford Fusion.





2014 - 2016

BMW i3, i3 Rex

BMW created the “i” sub-brand for environmentally-friendly vehicles to give designers free reign to build a car that didn’t adhere to the preconceived notions of what traditionally defined a BMW. The standout innovation in this design process – the i3’s Life Cell chassis, which sits atop the aluminum Drive frame and is referred to by BMW as their LifeDrive concept – drops 1,200 lbs off the vehicle and makes this purpose-built EV one of the most fuel efficient, sophisticated and innovative entrants in the field.

Intended primarily for short to medium-length trips, the i3’s all-electric range is 81 miles, on par with other all-electric cars currently available. The i3 REX (for Range Extender) model includes a gasoline generator that recharges the battery pack increasing total range to 150 miles, enough for most short-haul trips, but less than half the total range of cross-country capable plug-in hybrids like the Chevrolet Volt or Ford Fusion Energi. Like the exterior, the interior of the i3 is distinctive and modern incorporating a unique mix of recycled and eco-friendly materials. The space is stylish with its swooping dash, thin flat-panel display screens and shifter pod mounted next to the telescoping steering wheel.

The i3 has been a popular seller, ranking in the top four of EV sales nationally. It will appeal to drivers who enjoy the car’s mix of distinctive modern looks, original and functional interior, and a desire to drive a zero emissions vehicle.

ACQUISITION

MSRP	\$42,400-46,250
60 Month @ 6% est	\$820
Lease	\$269
Availability	2014
U.S. Sales Units	11,024

RANGE

Range EV/Gas.....	81-150
MPGe	124

PERFORMANCE

0-60 mph	7 sec
Top Speed	125 mph

BATTERY

Volts.....	360
Watts	22 kWh
Cooling	Liquid

DRIVETRAIN (ELECTRIC/REX)

HP/Lb-ft.....	170/184
Drive Type	RWD

CHARGING

Power Rating.....	7.4 kW
Charge Time L1.....	15.25 hrs
Charge Time L2.....	4 hrs
Charge Time DC	0.5
Connector	SAE Combo

CAPACITY

Passengers.....	4
Cargo.....	15.1-36.9 cu ft

DIMENSIONS

Curb Weight.....	2,500 lbs
Length.....	151 in
Width.....	79 in
Height.....	60 in





ACQUISITION

MSRP	\$37,900
60 Month @ 6% est	\$733
Lease	--
Availability	2015
U.S. Sales Units	12

RANGE

EV Range	30
MPGe	--

PERFORMANCE

0-60 mph	7.6 sec
Top Speed	138 mph

BATTERY

Volts	390
Watts	8.8 kWh
Cooling	Liquid

DRIVETRAIN (HYBRID)

HP/Lb-ft	204/243
Drive Type	FWD

CHARGING

Power Rating	-- kW
Charge Time L1	8 hrs
Charge Time L2	2.25 hrs
Charge Time DC	NA
Connector	J1772

CAPACITY

Passengers	5
Cargo	13.6-39 cu ft

DIMENSIONS

Curb Weight	3,616 lbs
Length	169.7 in
Width	70.3 in
Height	56.1 in

2016 AUDI A3 e-tron

Audi's A3 Sportback e-tron fills a niche no other EV manufacturer currently occupies. The compact wagon body style allows the German automaker to offer the cargo space of a small SUV while providing the driving characteristics of a car. The car's 30-mile all electric range bests the Mercedes Benz C350 and BMW 330e. Although buyer's of the A3 will probably most likely cross shop the C350 and the 330e, the BMW i3 is more closely comparable. When compared to the i3, Audi's plug-in hybrid offers shorter all-electric range but its 380 mile long-distance travel capabilities more than double the i3's 150 mile total range.

Power from the 8.8 kWh lithium-ion battery pack and 101 HP electric motor is delivered through a six-speed automatic transmission. The driver can control the electric motor-gas engine power blend. 'Hybrid Charge' mode borrows power from the TFSI engine and uses it to charge the battery. Driving two hours in this mode will enable the battery to reach full state-of-charge. 'Hybrid Auto' mode will enable the car to use gasoline and electricity together, shutting off the engine when it's not needed. Audi claims fuel economy of more than 70 MPG is possible.

The A3 allows drivers to shift from all-electric commuter during the work week to long-distance, fuel-efficient traveler on the weekend. The car's 7.6 second 0-60 time is one metric of dynamic driving in a staid wagon body style that belies the car's sporty performance.





2014 - 2016

MERCEDES-BENZ B250e

Although the B-Class ED has been renamed B250e, this upscale rival to other hatchback electrics retains all of its predecessor's features. The compact 5-door EV's exterior looks more like a "regular" car when compared to its closest competitor, the BMW i3, and should appeal to drivers who want the B250e's 5th seat and ample and cargo space. The 87-mile range falls short when compared to some of the newest battery EVs, but by pushing the range extender button on the dash an additional 15 miles are on tap for a total of 102.

Mercedes has equipped the B250e with premium driver assist features like a collision-warning system with adaptive brake assist. Active park assist will parallel park the car automatically. Other options include rearview camera, blind-spot assist and lane-keeping assist.

Soft leather, satin pewter air vents and optional wood accents give the car's interior a premium feel consistent with other cars in the Mercedes line. The dashboard-mounted 5.8" touchscreen controls the audio and navigation. The optional COMAND Online system allows owners to check battery and charge status remotely using a computer or smartphone. Optional packages are available that add premium heated leather seats, top-stitched dash pad and door panel inserts, an 8-inch color freestanding display and a high-fidelity audio system.

ACQUISITION

MSRP	\$41,450
60 Month @ 6% est	\$839
Lease.....	\$319
Availability	2014
U.S. Sales Units	1,906

RANGE

EV Range	87-102
MPGe	84

PERFORMANCE

0-60 mph	7.9 sec
Top Speed	100 mph

BATTERY

Volts.....	386
Watts.....	36 kWh
Cooling	Liquid

DRIVETRAIN (ELECTRIC)

HP/Lb-ft.....	177/251
Drive Type	FWD

CHARGING

Power Rating.....	7 kW
Charge Time L1.....	19.5 hrs
Charge Time L2.....	-- hrs
Charge Time DC	NA
Connector	J1772

CAPACITY

Passengers.....	5
Cargo.....	17.23-51.4 cu ft

DIMENSIONS

Curb Weight.....	3,858 lbs
Length.....	171.6 in
Width.....	70 in
Height.....	56.6 in





ACQUISITION

MSRP	\$31,950
60 Month @ 6% est	\$618
Lease.....	\$239
Availability	2014
U.S. Sales Units	1,015

RANGE

EV Range	93
MPGe	102

PERFORMANCE

0-60 mph	11.2 sec
Top Speed	90 mph

BATTERY

Volts	300
Watts	27 kWh
Cooling	Air

DRIVETRAIN (ELECTRIC)

HP/Lb-ft	109/210
Drive Type	FWD

CHARGING

Power Rating	6.6 kW
Charge Time L1	24 hrs
Charge Time L2	5 hrs
Charge Time DC ..	30 min to 80%
Connector	J1772/CHAdeMO

CAPACITY

Passengers	5
Cargo	18.8-49.5 cu ft

DIMENSIONS

Curb Weight	3,247 lbs
Length	163 in
Width	70.86 in
Height	63 in

2014 - 2016 KIA Soul EV

The Kia Soul fills a gap in the market between a standard hatchback like the Volkswagen e-Golf and the larger, more expensive, all-wheel drive Mitsubishi Outlander SUV. The Soul EV is a small crossover with a taller ride height and more cargo space than its other hatchback competitors. If you live in one of the states where it is available, the Soul's 93-mile electric range and under \$25k price tag (after Federal and state incentives) make it an appealing option. The inclusion of CHAdeMO DC fast charging, which allows an 80% refill in under 30 minutes, gives it an advantage over the Ford Focus Electric and Mercedes B250e.

The interior is roomy with seating for five and has 24.2 cubic feet of cargo space with the rear seats in use, and 61.3 cubic feet with the seats folded. Like the Leaf, Kia has sensibly positioned the charge ports in the middle of the front grille for easy access, especially when using public chargers where the cord might have to reach past another parking spot. The Soul no longer has a range advantage over the Nissan Leaf, but fast charging and good range combined with a spacious interior make it a contender in the 4-door hatchback field.

The Kia Soul EV is \$10,000 less than the Mercedes B250e and within \$2,000 of the Ford Focus Electric and Volkswagen e-Golf. If extra electric range, crossover styling and extra cargo space are on your requirements list, the Soul EV should be on your short list of test drives.



Plug-In
Hybrid



2010-2016

CHEVROLET Volt

The first-generation Volt was the best selling plug-in hybrid in America. After a ground-up redesign for 2016, that success should accelerate. Chevrolet listened to first-generation Volt owners and made the changes needed to deliver the kind of no-compromise electric car consumers had been calling for. The biggest change is that the 2016 Volt offers an all-electric range of 50 miles; up from 35 in the previous model. According to Chevrolet, the new range means drivers will travel in all-electric mode 90% of the time and most will travel 1,000 miles before refilling with gasoline.

The new exterior styling is more sculpted with flowing lines and a more aggressive stance. The interior has been given a makeover too. The designers used customer feedback to create a cabin that is simpler and roomier than its predecessor. With a "bump seat" adding a fifth position in the middle of the back row, the Volt becomes more practical for families. The instrument cluster and the 8-inch center display are also all-new. HVAC controls have been moved below the center touch screen and now use traditional buttons.

The Volt's updated styling will draw consumer attention, but its longer all-electric range - the best of any plug-in hybrid - makes the Volt a standout. This increased electric range will reduce operating costs significantly when compared to a gasoline car. These cost savings combined with its ability to make long distance trips as easily as any gas powered car should give the Volt a broad appeal.

ACQUISITION

MSRP	\$33,170
60 Month @ 6% est	\$641
Lease.....	--
Availability	2015
U.S. Sales Units	15,393

RANGE

EV Range	53
MPGe	102

PERFORMANCE

0-60 mph	8.4 sec
Top Speed	98 mph

BATTERY

Volts.....	--
Watts.....	18.4 kWh
Cooling	Liquid

DRIVETRAIN (HYBRID)

HP/Lb-ft.....	149/294
Drive Type	FWD

CHARGING

Power Rating.....	3.3 kW
Charge Time L1.....	13 hrs
Charge Time L2.....	4.5 hrs
Charge Time DC	NA
Connector	J1772

CAPACITY

Passengers.....	5
Cargo.....	10.6 cu ft

DIMENSIONS

Curb Weight.....	3,543 lbs
Length.....	180.4 in
Width.....	71.2 in
Height.....	56.4 in





ACQUISITION

MSRP	\$33,900
60 Month @ 6% est	\$655
Lease.....	\$275
Availability	2013
U.S. Sales Units	8,692

RANGE

EV Range	21
MPGe	100

PERFORMANCE

0-60 mph	8 sec
Top Speed	-- mph

BATTERY

Volts	325
Watts	7.6 kWh
Cooling	Liquid

DRIVETRAIN (HYBRID)

HP/Lb-ft	195/200
Drive Type	FWD

CHARGING

Power Rating	3 kW
Charge Time L1	7 hrs
Charge Time L2	2.5 hrs
Charge Time DC	NA
Connector	J1772

CAPACITY

Passengers	5
Cargo	8.2 cu ft

DIMENSIONS

Curb Weight	3,913 lbs
Length	191.8 in
Width	72.9 in
Height	58 in

2013 - 2016

FORD Fusion Energi

The Fusion is a popular mid-size sedan known for its contemporary good looks which are sometimes compared to an Aston Martin but which Ford calls “Kinetic 2.0.” The Fusion Energi competes with the Chevrolet Volt and other mid-size plug-in sedans. Similar to the Volt in price, dimensions and interior appointments, the biggest difference is that the Volt has over 2 times the all-electric range. The new Hyundai Sonata PHEV also shares specs, including all-electric range, comparable to the Focus Energi.

For 2016, Ford has revised the interior by giving it a new center stack featuring easy-to-use buttons that replace the touch-sensitive pads.

The SE Luxury comes equipped with SYNC/Bluetooth hands-free infotainment bolstered by MyFord Touch with an 8-inch touchscreen display, along with a single-CD player, 6 speakers and satellite radio. The Titanium trim level adds standard remote engine start, sport front seats, keyless entry and ignition, and upgraded audio with 12 speakers. Optional equipment includes adaptive cruise control, parking assist, a power moonroof, a heated steering wheel, hard-drive-based navigation, blind-spot-monitoring, and lane-keeping assist. For 2016, Ford has added a cold Weather package with heated cloth seats, all-weather floor mats, and Power Code Remote Start.

If your commute will fit within the Fusion Energi’s 21-mile all-electric range, or you have access to workplace charging, the Fusion Energi is an electric car in-town that, with a full tank of gas, you can comfortably take on long trips.





2017 CHEVROLET Bolt

When GM CEO Mary Barra unveiled the Bolt prototype in early 2015 at the North American International Auto Show in Detroit, the emotional charge of the occasion was palpable. Fifteen years earlier, GM had suffered a loss of prestige with the market failure of its original electric car, the EV1. That failure was made infamous by the 1996 film "Who Killed the Electric Car". GM regained some of their electric car technology leadership credibility with the release of the Volt in 2010. But the accomplishment of the ultimate achievement - a mass produced, affordable, long range electric car - remained in the eyes of the EV enthusiasts, environmentalists and domestic energy security hawks both an important aspirational goal and the inflection point that would signal the end of the reign of fossil fuels for transportation, and the beginning of the zero emission car era.

Bolt designers were given a clean slate to create an all-new vehicle. Chevrolet used data and survey feedback collected from drivers who had accumulated more than 1.3 billion miles of EV experience from the Chevrolet Volt to make well informed decisions about what a successful electric car needed to be.

The car that will enter production this year is very similar to the prototype Chevrolet unveiled just over a year ago. The Bolt is a compact crossover with upright seating for 5 adults and much more cargo room than the current selection of short-range electric hatchbacks. The ability of the Bolt to replace a gas powered car without inconvenience on the part of the driver, at half the operating cost, is a significant achievement.



ACQUISITION

MSRP	\$37,500
60 Month @ 6% est	--
Lease.....	--
Availability	2017
U.S. Sales Units	--

RANGE

EV Range	~200
MPGe	--

PERFORMANCE

0-60 mph	under 7 sec
Top Speed	91 mph

BATTERY

Volts.....	--
Watts	60 kWh
Cooling	Liquid

DRIVETRAIN (ELECTRIC)

HP/Lb-ft.....	200/266
Drive Type	FWD

CHARGING

Power Rating.....	-- kW
Charge Time L1.....	hrs
Charge Time L2.....	50 mi in 2 hrs
Charge Time DC.....	90 mi in 0.5 hrs
Connector	SAE Combo

CAPACITY

Passengers.....	5
Cargo.....	16.9 cu ft

DIMENSIONS

Curb Weight.....	3,580 lbs
Length.....	164 in
Width.....	69.5 in
Height.....	62.8 in

**ACQUISITION**

MSRP ...	\$29,010/34,200/36,760
60 Month @ 6% est .	561/661/771
Lease.....	\$229
Availability	2011
U.S. Sales Units	17,269

RANGE

EV Range	84-107
MPGe	124

PERFORMANCE

0-60 mph	10 sec
Top Speed	94 mph

BATTERY

Volts	207
Watts	24-30 kWh
Cooling	Air

DRIVETRAIN (ELECTRIC)

HP/Lb-ft	107/187
Drive Type	FWD

CHARGING

Power Rating	6.6 kW
Charge Time L1	26 hrs
Charge Time L2	6 hrs
Charge Time DC ..	30 min to 80%
Connector	J1772

CAPACITY

Passengers	5
Cargo	24-30 cu ft

DIMENSIONS

Curb Weight	4,328 lbs
Length	172 in
Width	69.7 in
Height	61 in

2011 - 2016

NISSAN Leaf

Nissan's introduction of the 107-mile extended range Leaf SV and SL models make it likely that Nissan will remain in the top tier of electric car sales. The new 30kWh battery packs' new chemistry increases energy density without taking up more space.

The 2016 Leaf also gets a visual upgrade with three beautiful new paint colors – Forged Bronze, Coulis Red and Deep Blue Pearl – which will get the iconic car second looks in any parking lot. Seventeen-inch aluminum alloy wheels give the SV and SL models more visual flair than the hubcaps of the entry level S model. The SL model gets a few other updates including LED headlights, fog lights and a Photovoltaic Solar Panel Spoiler, which trickle charges the 12-volt battery and can run vehicle accessories like a cabin cooling fan. The Leaf S now features a 5.0-inch color display. SV and SL models have a 7.0-inch touchscreen display. A new user interface and improved connectivity make the entire system more user friendly by providing an improved graphic interface and better integrated voice-commands for navigation and audio, HD radio, and SiriusXM Travel Link.

So far, 2016 lease deals have been sharply higher than the bargains seen in 2015, but competition from the 2017 Chevrolet Bolt, with 200-mile range, will probably make those offers more competitive by summer. The highly anticipated open question in the industry is Nissan's timing of the next generation Leaf, which is widely expected to have substantially greater range and updated styling.





2014 - 2016

VOLKSWAGEN e-Golf

When VW engineers developed the latest Golf, they had electrification in mind so for the EV version integration of the electric motor, battery pack and controller was seamless. The traditionally styled hatchback matches the look of the rest of the Golf lineup except for the mildly redesigned front fascia that houses redesigned running lights and the low-drag wheels. Even the charge port is positioned in the rear passenger side quarter panel in the same location as the fuel door.

The e-Golf's performance is on par with the Ford Focus Electric and Nissan Leaf. 0-60 times for the VW is 10.4 seconds. Like all electric vehicles, because torque is instantly available, off-the-line acceleration is quick; VW says the e-Golf's 2.5 second 0-30 MPH time is quicker than its hot-hatch sibling GTI. The motor, transmission and battery is made at a Volkswagen factory in Germany, a good sign that VW is making a substantial investment and commitment to the technology.

The e-Golf's fast DC charging capability uses the SAE Combo connector (CCS). While not yet as widely supported as the CHAdeMO standard used by Asian automakers, it will soon have a large number of sites available as it is the same connector used by BMW and Chevy. Most fast-charge manufacturers are now selling dual-standard chargers with both connectors.

Traditional styling and DC fast charging have made the e-Golf popular with drivers looking for an EV that doesn't call attention to itself.



ACQUISITION

MSRP	\$28,995
60 Month @ 6% est	\$561
Lease	\$179
Availability	2014
U.S. Sales Units	4,232

RANGE

EV Range	83
MPGe	116

PERFORMANCE

0-60 mph	10.4 sec
Top Speed	87 mph

BATTERY

Volts	323
Watts	24 kWh
Cooling	Air

DRIVETRAIN (ELECTRIC)

HP/Lb-ft	115/199
Drive Type	FWD

CHARGING

Power Rating	7.2 kW
Charge Time L1	20 hrs
Charge Time L2	4 hrs
Charge Time DC	0.5 hrs
Connector	SAE Combo

CAPACITY

Passengers	5
Cargo	22.8-52.7 cu ft

DIMENSIONS

Curb Weight	3,090 lbs
Length	166 in
Width	70 in
Height	58 in

**ACQUISITION**

MSRP	\$29,190
60 Month @ 6% est	\$564
Lease.....	\$237
Availability	2012
U.S. Sales Units	1,486

RANGE

EV Range	76
MPGe	105

PERFORMANCE

0-60 mph	10 sec
Top Speed	84 mph

BATTERY

Volts	325
Watts	23 kWh
Cooling	Liquid

DRIVETRAIN (ELECTRIC)

HP/Lb-ft	143/181
Drive Type	FWD

CHARGING

Power Rating	6.6 kW
Charge Time L1	20 hrs
Charge Time L2	3.6 hrs
Charge Time DC	NA
Connector	J1772

CAPACITY

Passengers	5
Cargo	14.5-33.9 cu ft

DIMENSIONS

Curb Weight	3,622 lbs
Length	172.9 in
Width	81.1 in
Height	58.2 in

2012 - 2016

FORD
Focus Electric

The Focus Electric shares the crouched-and-ready-to-pounce aesthetic that has helped make the Focus a world-wide best seller.

The Focus Electric's cabin is decidedly upscale. Coming standard with the model line's top-spec interior – found in the Titanium trim level – the Electric has a full compliment of features like voice navigation, rearview camera, 9 speaker Sony sound system, and dual-zone automatic heating controls. For 2016, the Focus Electric gets the newly available Sync 3 touchscreen interface, which features a revamped menu system and recognizes smartphone-like gestures like swipe and pinch-to-zoom.

Another technical difference between the Focus Electric, Leaf and e-Golf is that Ford opted for a liquid cooled and heated battery pack, which allows the car to be operated in more extreme temperature ranges without degrading the battery life. A 6.6 kW on-board charger provides a 3.5 hour charge time, about half that of vehicles with 3.3 kW chargers. For people who drive more than 70 miles in a day, need quick pit stops, or want to charge within the 12 am – 5 am super-off-peak utility rate, it's a significant advantage.

The Focus Electric is crippled by lack of a DC quick charger, which Ford says will be added to the 2017 model along with 50% greater battery capacity allowing over 100 miles of electric range. People with predictable commutes or in-town driving will not miss the omission in this 2016 model.



EVSE



Residential Charge Stations

Quality Doesn't Have to Break the Bank

BY CHRISTOPHER ALAN

Left to right:
Schneider
EVlink,
Aerovironment
RS, and Clipper
Creek HCS-40

There are dozens of residential charging stations to choose from. We've tested and reviewed units from almost every manufacturer. After extensive personal use over the past three years, we've found some favorites. Here's our short list of 30 Amp Level 2 charge stations from high-quality manufacturers.

CLIPPER CREEK HCS-40

Clipper Creek has developed a positive reputation among long-time EV enthusiasts for building rugged products that can withstand just about any abuse they are dealt. The HCS-40 is available in hard-wired and plug-in versions. The wall unit features built-in cord management and every HCS comes with an included wall holster to help keep the 25-foot cord and connector off the ground.

The HCS-40 features a simple plug-and-go interface. It waits in standby mode until plugged in. Plug it in and the EV begins to charge automatically. There are no on/off buttons on the unit. A series of LEDs on the unit's face indicate charge status and if there are any faults. The HCS-40 is priced at \$589.

AEROVIRONMENT RS

Aerovironment has been a pioneer in the electric vehicle market for more than 30 years and was one of the developers of the Impact concept car, the predecessor to the GM EV-1. The company is famous for their highly reliable public EV charge stations used in the "West Coast Electric Highway" that runs through Washington and Oregon. The company also produces the popular 3 kW TurboCord and

TurboDock. The Aerovironment RS is the company's 7 kW charge station designed for residential installations. The unit comes equipped with a 15-foot cord standard, and a 25-foot cable is available. In addition to the indicator lights on the front of the unit, start and stop buttons of the face of the unit make operation straightforward. The RS charge station has a holster integrated into the front of the unit. A cable holder can be mounted on the wall to help keep the cord organized when not in use. The unit is available in both hard wired and plug-in versions. Several auto makers sell branded units of this device. The Aerovironment RS is priced at \$649.

SCHNEIDER EVLINK

Schneider Electric, a multinational Fortune 500 company, has nearly two centuries of engineering experience. The company produces high-quality modern products including residential and commercial EV charge stations. The company's residential EVlink is a 30 amp, 7.4 kW wall mount unit. The EVlink uses a simplified timer delay. Just tap the button on the face panel and each click sets the timer back one hour. A segmented circle LED displays the length of the delay. The same LED display also shows charging progress once the unit starts charging. Indicator lights signify the unit status. The EVlink comes with an 18 ft. cable. The Schneider EVlink costs \$548. ⚡



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Specializing in Home EV Charger Installation



ACQUISITION

MSRP	\$31,770
60 Month @ 6% est	\$614
Lease.....	\$317
Availability	2013
U.S. Sales Units	7,012

RANGE

EV Range	21
MPGe	100

PERFORMANCE

0-60 mph	10 sec
Top Speed	115 mph

BATTERY

Volts	312
Watts	7.6 kWh
Cooling	Air

DRIVETRAIN (HYBRID)

HP/Lb-ft	188/129
Drive Type	RWD

CHARGING

Power Rating	3.3 kW
Charge Time L1	7 hrs
Charge Time L2	2.5 hrs
Charge Time DC	NA
Connector	J1772

CAPACITY

Passengers.....	5
Cargo.....	19.2-42.8 cu ft

DIMENSIONS

Curb Weight.....	3,859 lbs
Length.....	173.6 in
Width.....	75.6 in
Height.....	63.8 in

2013 - 2016

FORD C-Max Energi

Ford positioned the C-Max Energi to compete directly with the Plug-In Prius. Its crossover body style gives it a taller profile that provides the driver and passengers ample headroom. The upright seating position and taller roof line make getting in and out easy while also improving visibility.

The C-Max's 21-mile all electric range is double that of the Plug in Prius but less than half that of the Chevrolet Volt. The C-Max may appeal to buyers who have considered all-electric hatchbacks but need the long-distance driving a plug-in offers.

The C-Max's five-passenger interior features leather upholstery and a sophisticated MyFordTouch infotainment system giving it a much more refined feel than its economical price would suggest. The 2016 C-Max Energi uses Ford's dual-LCD SmartGauge with EcoGuide. The upgraded infotainment system features SYNC, which uses voice commands to make calls, search and listen to music, and control select apps. The optional SYNC 3 offers higher-speed performance, enhanced voice recognition, touch screen with swipe capability, available navigation with destination entry, and Apple Siri integration.

C-Max Energi should appeal to anyone looking for a comfortable PHEV with upscale standard features found in more expensive cars while retaining understated crossover styling. Dealer incentives are frequently available, making the C-Max Energi one of the most affordable mid-size plug-ins.





2014 - 2016

CHEVROLET Spark

The Spark was Chevrolet's first modern all-electric entry into the EV market. The five-door urban city car is the smallest vehicle Chevy has ever sold in the US, although it is larger than the Smart ED and Fiat 500e. The Spark to offer rear doors, which makes accessing the back seats easier. Fold the back seats down, and the Spark EV's cargo room comes in at approximately 23 cubic feet, enough for a week's worth of groceries.

Costing less than \$18,500, after Federal credit and \$2,500 less in California, the Spark is one of the least expensive all-electric cars available. Although the standard charger is a rather slow 3.3kW requiring 7 hours to fully charge using a Level 2 station, a SAE Combo quick charger is available as a \$750 option and provides an 80% charge in about 20 minutes. The gas version of the Spark was criticized for a lack of power. Chevrolet touted the Spark EV's 327 lb-ft of torque, although with a modest 130 hp, the compact hatchback isn't a sports car. 0-60 time is 7.2 seconds, which is almost two seconds faster than the Fiat 500e and 4.5 seconds faster than the Smart Fortwo ED. The Chevrolet MyLink Infotainment system has a 7-inch touch screen which allows access to climate control, audio and navigation. The Spark EV remains a good option for price-sensitive car buyers with lifestyles that accommodate a small car and don't need the more sophisticated driver assist features available in some of the mid-sized cars.

ACQUISITION

MSRP	\$25,510
60 Month @ 6% est	\$493
Lease.....	--
Availability	2014
U.S. Sales Units	2,477

RANGE

EV Range	82
MPGe	119

PERFORMANCE

0-60 mph	7.2 sec
Top Speed	90 mph

BATTERY

Volts.....	360
Watts	19 kWh
Cooling	Liquid

DRIVETRAIN (ELECTRIC)

HP/Lb-ft.....	130/327
Drive Type	FWD

CHARGING

Power Rating.....	3.3 kW
Charge Time L1.....	17 hrs
Charge Time L2.....	7 hrs
Charge Time DC	0.33 hrs
Connector	SAE Combo/J1772

CAPACITY

Passengers.....	4
Cargo.....	9.6-23.4 cu ft

DIMENSIONS

Curb Weight.....	3,000 lbs
Length.....	144.7 in
Width.....	62.9 in
Height.....	61 in





ACQUISITION

MSRP	\$32,300
60 Month @ 6% est	\$624
Lease.....	\$199
Availability	2013
U.S. Sales Units	6,194

RANGE

EV Range	87
MPGe	116

PERFORMANCE

0-60 mph	9.1 sec
Top Speed	88 mph

BATTERY

Volts	360
Watts	24 kWh
Cooling	Liquid

DRIVETRAIN (ELECTRIC)

HP/Lb-ft	111/147
Drive Type	FWD

CHARGING

Power Rating	6.6 kW
Charge Time L1	23 hrs
Charge Time L2	4 hrs
Charge Time DC	NA
Connector	J1772

CAPACITY

Passengers.....	4
Cargo.....	7.0-26.3 cu ft

DIMENSIONS

Curb Weight.....	2,980 lbs
Length.....	142.4 in
Width.....	64.1 in
Height.....	60.1 in

2013 - 2016

FIAT 500e

The Fiat 500e's iconic Italian styling gets a lot of attention. The energy-efficient EV provides zippy off the line acceleration beating even Fiat's high performance Abarth model in a 0-30 MPH sprint. But the best performance of the Italian classic might be its price - only \$22,300 in California after incentives. The 2016 lease deal is equally attractive: \$1,999 down, \$199 per month. Dealer discounts were frequently available in 2015 so check local pricing carefully. The \$2,500 California clean air rebate is available on the 36 month lease, making this a free car for the first seven months, and likely thereafter considering fuel cost savings.

The interior airy, open interior is available in black or white with orange accents. For 2016, the tack-on TomTom navigation system has been replaced by an all-new infotainment and navigation system. The new system uses a version of Chrysler's Uconnect infotainment system standard; its console-mounted display screen sits where the old analog audio interface used to be.

At 116 MPGe, the 500e is one of the most efficient battery electric vehicles available. Better weight distribution and a lower center of gravity than its gas siblings make the 500e the solid all-around performer its sporty looks promise. The 500e should appeal to drivers who want a fun-to-drive, small commuter and don't require quick-charging capabilities.





2013 - 2016 SMART Fortwo ED

The Smart Fortwo electric drive excels on congested urban streets where traffic is stop and go and parking scarce. Its tiny size makes it great for in-town commutes with the occasional need to carry another passenger. The tiny trunk accommodates only a few bags of groceries or a gym bag and briefcase. The Fortwo ED might be cross-shopped with the Fiat 500e and Chevy Spark EV. But with 68-mile range and two seats, the only place the Smart wins in a comparison is price and parkability.

The Smart's tiny proportions and iconic shape have its fans. The contrasting color panels in profile view, which define the Tridion steel safety cell, make the car instantly recognizable. The exterior's playfulness is matched by the car's interior accent colors highlighting the instrument cluster, door handles and center console. Despite the car's apparent tiny exterior, the interior seats two adults comfortably. The Cabrio variant has a cloth retractable top.

The car is propelled by a 74 hp electric motor delivering 96 lb.-ft. of torque. The 0-60 time is 11.5 seconds, which is 2 seconds slower than the Fiat 500e and 4 seconds slower than the Chevy Spark EV. The electronically-limited 78 MPH top speed means short highway trips are possible.

The Fortwo ED can be leased for as little as \$139/mo., less than some people spend for their smartphone. If small size and price are your primary considerations, the Fortwo deserves a little consideration.

ACQUISITION

MSRP	\$20,440
60 Month @ 6% est	\$395
Lease.....	\$139
Availability	2013
U.S. Sales Units	1,387

RANGE

EV Range	68
MPGe	107

PERFORMANCE

0-60 mph	11.5 sec
Top Speed	78 mph

BATTERY

Volts.....	--
Watts.....	17.6 kWh
Cooling	--

DRIVETRAIN (ELECTRIC)

HP/Lb.-ft.....	74/96
Drive Type	RWD

CHARGING

Power Rating.....	3.3 kW
Charge Time L1.....	6 hrs
Charge Time L2.....	3.5 hrs
Charge Time DC	NA
Connector	J1772

CAPACITY

Passengers.....	2
Cargo.....	7.8-12 cu ft

DIMENSIONS

Curb Weight.....	2,000 lbs
Length.....	106.1 in
Width.....	61.4 in
Height.....	60.7 in





Car Buying & Leasing Tips

The First Tip: Be Extremely Well Informed. Start Here

BY CHRISTOPHER ALAN AND STEVEN THOMAS

If you're not good at negotiations, consider hiring a professional car purchasing advocate. Their fee will be more than offset by the savings.

Negotiating the best deal on a new car is a mystery to most buyers but it is not a mystery to dealers. Here are some pointers to help level the playing field. These tips are focused on lease deals because for EVs, leasing is especially attractive due to incentives available and changes in the technology like standard 200 mile range anticipated over the next few years. The basic principles also apply to purchasing.

PRICING INTELLIGENCE

The first rule: be extremely well informed. This magazine is a good place to start. But make sure to check other sources like True Car too. The nationally advertised lease offer on the manufacturer's web site isn't always the lowest lease price. There are a variety of factors that can influence a lease price. The number of cars on the dealer's lot, demand for a particular model in a region, and where a model is in its lifecycle. For example, lease deals tend to be best when a car is new to the market because the residual value isn't known and residuals may be higher. Once a model becomes available on the used market, sometimes recalculated the value of cars and will adjust lease prices to reflect the sale price for off-lease vehicles.

MONTHLY TIMING

The end of a month can a better time to buy or lease. Dealers that need to sell a few more cars to meet quotas or bonus levels become more motivated to move the vehicles.

ANNUAL TIMING

On an annual calendar, an ideal time to buy is in late fall as dealers work to clear out the previous model year. The discounts can be substantial, as much as \$2,000 to \$5,000 just before an updated model is released.

LEVERAGE

The longer a car sits on the lot the more incentive a dealer has to sell it. If a car sits on a dealer's lot more than 90 days they have to pay finance charges on it, an expense called "flooring" in the industry. Every extra month the car sits on the lot, the more the dealer loses on that car.

PRE-NEGOTIATED PRICING

Pre-negotiated prices from associations like USAA and Costco can often save a buyer a lot of money especially if you're not a great negotiator, but understand that even those prices can often be beat. Most dealers

now have an "internet" salesperson or team who offer firm price deals over the phone or email. These prices can sometimes be negotiated too, but do your negotiating before you go to the dealership. It's a much easier way to compare pricing from multiple dealers. You'll get to drive the car. Just make sure you're going in with a firm price quote.

LEAVE THE PREMISES

One of the most important tactics when purchasing or leasing a car is to leave the dealership before agreeing to a price, even if it's just to take a short breather and think through the deal without the subtle (or not so subtle) pressure being face to face with the salesperson. Even if you just take a break for a cup of coffee or a meal, leave the dealer's lot. You'll be in a much more powerful negotiating position. The salesperson will invariably call you with a better offer within an hour or two. In a survey of 33 EV dealerships in the San Diego metro region, this reporter was routinely offered pricing \$2,500 lower than the "final and best" offer made by the salesperson on the sales floor. If you're not good at negotiations, strongly consider hiring a professional car purchasing advocate. The fee, which can range from \$250-\$1,000, will be more than made up in the savings they'll bring to a strong negotiation.

KNOW WHEN TO WALK AWAY

Be prepared to walk away from any deal that isn't perfect for you. Unless you're buying a one of a kind collectible at an auction, there are certain to be dozens of other cars just like it at other dealers in your area. This is one time that shopping around can save you thousands of dollars. With good research in hand, and a firm "do not exceed" number in mind, you'll be in a much stronger negotiation position. 🚗

Electric Motorcycle Matrix

Specification Quick Reference



MOTORCYCLES

Make	Model	Yr Intro	MSRP Base	Range (mi)	Battery kWh	HP/lb-ft	Page
Alta Motors	MX	2016	\$14,995	2 hours	5.2	25/40	Q2 28
Alta Motors	SM	2016	\$15,495	50	5.2	25/40	Q2 28
Brutus	Brutus 2 Cafe	2014	\$19,990	--	--	--	Q2 13
Brutus	V9	2015	\$32,490	125-210	19-34	125/227	Q2 16
Bultaco	Rapitan	2016	--	68-124	--	53/92	Q2 22
Bultaco	R. Sport	2016	--	68-124	--	53/92	Q2 22
Energica	Ego	2015	\$34,000	118	11.7	135/145	Q2 11
Energica	Ego45	2016	\$68,000	118	11.7	135/145	51
Harley-Davidson	LiveWire	NA	--	53	10	74/52	Q2 17
Johammer	J1.150	2015	~ \$25,000	93	8.3	15/--	Q2 30
Johammer	J1.200	2015	~ \$29,000	120	12.7	15/--	Q2 30
KTM	FreeRide	2015	\$13,000	1.5 hours	2.6	22/31	Q2 29
Lightning	LS-218	2015	\$38,000	100-180	12,15,20	200/168	Q2 8
Lito Green Motion	Sora	2015	\$77,000	60	12	--/68	Q2 12
Sarolea	SP7	2015	--	--	--	150/664	Q2 23
Yamaha	PED2	NA	--	--	--	--	Q4 13
Yamaha	PES2	NA	--	--	--	--	Q4 12
Victory	Empulse TT	2015	\$19,999	57	10.4	54/61	Q4 11
Zecoo Motor	Zec00	2015	\$73,900	55-85	11.4	67/106	Q2 14
Zero Motorcycles	DS	2011	\$13,345	76-120	9.4-15.3	54/68	Q2 24
Zero Motorcycles	FX	2015	\$9,845	30-70	2.8-5.7	27/70	Q2 26
Zero Motorcycles	S	2015	\$13,345	87-141	9.4-15.3	54/67	Q2 21
Zero Motorcycles	SR	2015	\$17,345	102-125	12.5-15.3	54/67	Q2 21

SCOOTERS

Make	Model	Yr Intro	MSRP Base	Range (mi)	Battery kWh	HP/lb-ft	Page
Amego	Wind	2014	\$1,642	27-46	--	--/--	Q2 38
BMW	C Evolution	2014	\$21,000	62	8	47/53	Q2 33
Gogoro	Smartscooter	2015	--	30-60	2.8	8.58/18.4	Q2 37
Terra Motors	A4000i	2015	\$4,500	37	1.9	1.3/--	Q2 36
ZEY	LRC	2015	\$13,990	80-160	10	16/--	Q2 32

MOPEDS

Make	Model	Yr Intro	MSRP Base	Range (mi)	Battery kWh	HP/lb-ft	Page
Bolt	M-1	2015	\$4,995	50	1.68	7.38/--	Q2 40
BOXX	BOXX	2015	\$3,797	20	--	--	Q2 41
eGO	Cycle	1999	\$1,400	--	--	--	Q2 39

The motorcycles in the matrix which have page numbers that begin with Q show the edition in which the profile appears. Motorcycles not appearing in this issue have full profile pages in the annual Q2 motorcycles edition of the Buyer's Guide. Copies of the Q3 guide are available at the electric-car-insider.com web site. Subscribe for quarterly updates of all of the electric vehicles for sale in North America. Dashes in the matrix represent specs not available at time of printing.



ACQUISITION

MSRP	\$68,000
60 Month @ 6% est	\$1,597
Availability	2016
Global Units	45
Warranty	--

RANGE

Range	118 miles
MPGe	--

PERFORMANCE

0-60 mph	3 sec
Top Speed	150 mph

BATTERY

Amp/hr	106 Ah
Volts	103.6V/117.6V (max)
Watts	11.7kWh

DRIVETRAIN (ELECTRIC)

HP/Lb-ft	135/145
Drive Type	Chain

CHARGING

Power Rating	3 kW
Charge Time L1	8 hrs
Charge Time L2	3.5 hrs
Charge Time DC	30 min
Connector	J1772

CAPACITY

Passengers	2
Cargo volume	NA
Carrying Capacity	--

DIMENSIONS

Curb Weight	569 lbs
Wheelbase	57.67 in
Seat Height	31.8 in

2016 ENERGICA Ego45

Energica has updated the Ego electric superbike with a custom variant they call Ego45. Only 45 of the hand-crafted Italian motorcycles will be built. The customizations include specially shaped carbon fiber fairings in three colors, color matched suspension pieces and premium quality seat material. The Ego45 also features 3D printed Windform components that add strength and rigidity without adding weight. The components can have 1 of 17 colors of Zircotec ceramic coating - ranging from Alaskan blue to aged brown - added to protect from heat, wear, abrasion and corrosion. The Ego45 gets upgraded front and rear fully-adjustable Ohlins suspension pieces and 17-inch Oz forged aluminum wheels shod in Pirelli Diablo Rosso Corsa rubber.

The Ego45 shares performance specs with the Ego. Tuck in behind the fairing and the instantaneous torque of the electric motor brings 0-60 MPH in 3 seconds, which is equal to the Ducati Panigale R and BMW S1000RR. Keep the right wrist twisted and feel the predictable power delivery of the electric motor as you rocket to 150 MPH. Being direct drive, there is no need to shift. Just feel the speed and focus solely on hitting the apex of the turn. The Ego and Ego45 use proven manufacturing techniques pioneered by Energica's parent company, the CRP Group, a leading supplier of components to F1 teams and the aerospace industry for 45 years. The Ego and Ego45 are true Italian superbikes that are a credible option for riders considering high-performance superbikes from BMW, Ducati, BMW, Kawasaki, Yamaha or Suzuki.



Electric Bicycle Matrix

Specification Quick Reference



BICYCLES

Make	Model	Yr Intro	MSRP Base	Range (mi)	Battery Wh	Motor Watts	Weight lb	Page
A2B	Shima	2015	\$3,500	40	317	500	72	Q3 24
A2B	Ferber	2015	\$2,399	40	317	350	48	Q3 27
Ace	Board Tracker	2015	\$3,725	20	900-1,920	900	--	Q3 32
BESV	Lion LX1	2015	\$5,000	50	288	350	95	Q3 15
e-JOE	Anggun 3.0	2014	\$1,899	50	540	350	55	Q3 28
e-JOE	Koda	2015	\$2,199	45	540	500	42	Q3 23
Easy Motion	Big Bud	2016	\$3,499	40	480	250/350	63	17
Easy Motion	EVO Snow 29	2015	\$3,299	40	432	250/350	64	Q3 17
Electra	Townie Go!	2013	\$2,409	30	288	250	52	Q3 34
Xkuty	One	2015	\$3,300	60	816-1,104	1,500	100	Q3 31
eProdigy	Jasper	2015	\$2,399	28	333-407	350	51	Q3 29
Evelo	Orion	2015	\$ 2,099	40	360	250	64	Q3 26
Faraday	Porteur	2015	\$3,725	20	250	250	40	Q4 20
GenZe	e101 Sport	2014	\$1,499	40	313	250	46	Q3 22
Gocycle	G2	2009	\$4,999	30	236	250-500	35	Q3 30
Grace	Easy	2015	\$3,200	65	302	350	42	Q3 20
Mando	Footloose	2015	\$3,895	28	295	250	48	Q3 31
NYX	Carbon Fiber Kit	2015	\$2,500	200	2,000	16,000	--	Q4 19
Optibike	Pioneer Carbon	2016	\$6,900	50	429	500	33	55
Optibike	R8	2015	\$11,990	55	962	750	59	Q3 19
Optibike	SIMBB 29	2015	\$6,700	27	720	600	42	Q3 18
Polaris	Diesel EV504-7C	2015	\$3,999	50	264	750	60	Q3 35
Prodecotech	Outlaw 1200	2015	\$2,999	--	576	1200	65	Q3 25
Prodecotech	Phantom X V5	2015	\$1,999	30	513	600	54	Q4 16
Specialized	Turbo S	2015	\$6,000	40	504	250	50	Q3 16
Stromer	ST2	2015	\$6,990	93	814	500	62	Q4 15
Trefecta	DRT	2015	~\$25,000	62	--	4,000	--	Q4 18
Urban Arrow	Family	2015	\$4,500	30	288	250	95	Q3 40
Vintage	Cruz	2015	\$ 4,995	30	650	750-3,000	72	Q3 33
Volton	Alation 500	2015	\$2,199	45	528	500	53	Q3 21
Yuba	Spicy Curry	2015	\$4,500	60	417	350	55	Q3 41

PT

Make	Model	Yr Intro	MSRP Base	Range (mi)	Battery Wh	Motor Watts	Weight	Page
Segway	i2 SE	2002	\$6,499	24	1,040	1,500	105	Q4 22
Segway	X2 SE	--	\$6,999	12	1,040	1,500	120	Q4 22
Works Electric	Rover BR2	2015	\$5,950	30	1,100	4,000	77	Q4 23
Q Lite	Electric Scooter	2015	\$1,199	20	--	500	23	--
Bladez	XTR Comp II	--	\$699	8	288	500	55	--

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ACQUISITION

MSRP	\$6,900
24 Month @ 6% est.....	\$306
Availability	2016
Warranty...2 Yr Batt/Mtr, 5 Yr Frm	

RANGE

Range.....	50 miles
------------	-----------------

PERFORMANCE

Gears	10
Top Speed.....	28 mph

BATTERY

Amp/hr.....	11Ah
Volts	37V
Watts.....	429 Wh

DRIVETRAIN

Watts.....	500 W
Drive Type.....	Mid Drive

CHARGING

Power Rating	--
Charge Time L1.....	5 hrs

CAPACITY

Carrying Capacity	--
-------------------------	-----------

DIMENSIONS

Curb Weight.....	33 lbs
Wheel Size	27.5 in

FRAME

Materials	Carbon Fiber
Size	-- in
Suspension.....	None

BRAKES

Type.....	Hydraulic Disc
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2016 OPTIBIKE Pioneer Carbon

The Optibike Pioneer Carbon is the lightest full-sized ebike we've seen to date. At 33 pounds, the bike features a carbon fiber frame, fork and handlebar helping it weigh 29 pounds less than the Stromer ST2, 17 pounds less than the Specialized Turbo S and 9 pounds less than the Grace Easy. Combine the ultra light weight with the bike's 500 W, mid drive electric motor and 10 speed Shimano SLX drivetrain and you have a bike that can travel up to 50 miles and reach speeds of 28 MPH.

Using an integrated downtube battery and bottom-bracket mid drive motor gives the bike a stealth look. This set up keeps the electric drivetrain's weight centered and low making handling feel like a traditional bike. The downtube battery weighs 5.5 lbs so battery charging and swapping is easy. Park the bike at work, unlock the battery, and drop it in your briefcase or book bag and charge it at your desk. Adding to the bike's stealth look is the handlebar integrated display. A freestanding display is available for riders who prefer to use their own handlebars on the Pioneer Carbon.

There are very few carbon fiber frame, fork and handlebar equipped ebikes. The Pioneer Carbon should appeal to riders looking for a traditionally styled ebike from a premium brand that is ultra light weight and can travel up to 50 miles on a charge. Optibike is currently offering a preorder price of \$5,520 with deliveries expected in June 2016.





2017 Chevrolet Bolt

General Motors (re)invents what comes after fire.

BY CHRISTOPHER ALAN

Burning fossil fuels has been the dominant transportation technology for the past 100 years. But it's expensive in untenable ways. Environmental degradation and armed conflict over oil supplies have required the development of better solutions.

At the Computer Electronics Show in Las Vegas in January, General Motors unveiled the production prototype of a car that may one day be regarded as the most revolutionary car in history. A car that, once in production, marks the inevitability of a new technological paradigm replacing the old. The Bolt concept model that had been unveiled in 2015 at the North American International Auto Show in Detroit had been greeted with cheers, but in 2016 GM brought drivable prototypes to CES. Firm specifications and an on-sale date – by the end of the

year – make it clear that the Bolt is no tease. GM intends to beat Tesla's Model 3 to market by at least one and probably two years.

INFLECTION POINT

The Bolt is a good looking car and has impressive technology and competitive specifications, but the significance of the achievement goes way beyond discussions of horsepower, styling and performance. The intersection of the converging price performance curves at 200 miles range and \$30,000 after-incentive price are the inflection point long

predicted by industry analysts at which electric cars will go mainstream and begin to sell hundreds of thousands of units per year. The availability of electric cars below this price point (which will continue to decline) and above this range capability, (which will continue to increase) will mark the beginning of the end of the fossil fuel era. The Bolt will be the first car to cross that threshold when it appears in dealer showrooms in early 2017. It's not the first EV. But it's the first to hit these marks and it will kick EV sales growth into a J curve.

COMPETITIVE ADVANTAGES

The reasons electric cars will replace gas powered cars are well understood. They are significantly cheaper to operate; electric fuel costs anywhere from five cents to one dollar per gallon equivalent. Electric engines are more powerful on a horsepower per pound basis. They are vastly more efficient, achieving about 85% efficiency vs only 35% for a modern fuel-efficient gasoline

from renewable sources of energy like roof or parking lot canopy mounted solar panels or utility scale wind turbines, electric cars can be operated with zero emissions.

FEWER SERVICE INTERVALS

EVs typically require far less service than gas powered cars. The Bolt will probably never need either a motor or gearbox overhaul. Brake service intervals



7.2 kW Level 2 charging enables refueling at the rate of 25 MPH. 50kW SAE Combo enables charging at 170 MPH.



Entertainment settings and navigation are managed via the user configurable 10.2-inch center console multi-touch display, reducing button clutter.

engine. They are quiet and free of vibration. But most importantly, they do not produce tailpipe pollution including CO₂ which causes climate change. If unchecked, higher levels of CO₂ will cause ocean acidification, sea level rise which will wipe out coastal cities, and extreme weather events like drought and floods that will cause massive population displacement and threaten the stability and security of hundreds of millions of human lives. When powered

will stretch past 100,000 miles because its electronic braking capability reduces wear on brake pads. It will require new tires and the occasional alignment. After a few hundred thousand miles you may have to replace moving parts that experience wear, like shock absorbers and window regulators. But with the elimination of oil changes and tune-ups, service intervals will be less frequent. The battery is expected to last 15 years and as many as 200,000 miles.



The second row seats three and has been praised for its ample legroom and headroom. Seats flip down for more cargo space.

Chevrolet Bolt

200 Mile All-Electric Range. No Gas.

THE EVERYMAN AUTOMOBILE

The significance of the technological shift the Bolt represents may not be evident unless you're technically inclined or have long experience with car ownership. But it is truly an epic achievement

buy and to operate. The Bolt has the potential to become the 21st century everyman's car.

A MULTI-GENERATION CAR

Imagine a car that could travel 10 times longer before needing major service. It allows the concept of car ownership to be rethought. In the same way a house can be passed down through several generations, it could be possible that electric cars will be passed on through



a significant victory. Upstart competitor Tesla Motors had been widely expected to be the manufacturer to play the role of recasting mainstream expectations of electric cars with their Model 3, the affordable successor



The Bolt's 0-60 time has been billed by GM at under 7 seconds, much quicker than most other compact cars and edging into the performance sedan realm.

that will probably attain for GM the blockbuster success that VW accomplished with the Beetle in the 1960s and '70s as it massively disrupted the US and worldwide auto market, eventually becoming one of the world's largest automakers. With the success of the Beetle, Volkswagen lived up to its name which in German means simply "The People's Car". Over 20 million of the cars were produced, making them cheap to

multiple generations. Electric cars might be retired only when damaged beyond repair in an accident or after the accumulation of so many minor repairs that the accumulated maintenance becomes more expensive than new car payments. For an well made electric car like the Bolt, that could be a very long time.

GM's delivery of a 200 mile electric car at an after-incentive price point under \$30,000 will be

to their premium Model S and X. Although Tesla will undoubtedly continue to play a very influential role in shaping the electric car market, by showing production intent, drivable prototypes of Bolt and announcing near term on-sale dates, GM appears poised to beat them to first place for what will almost certainly be the auto industry's most pivotal and consequential accomplishment in the last 100 years. 🚗



Kickstart EVs

Electric Car Insider Launches Second Kickstarter Campaign

The digital edition will contain videos, audio podcasts and photo slide shows.

In April, Electric Car Insider magazine will launch a Kickstarter campaign to develop an interactive App version of the EV Buyers Guide for tablets and mobile devices.

The digital edition will contain multimedia not possible in this

print edition, including high quality video, audio podcasts, and photo slide shows and image galleries with hundreds of quality images not possible to include in the print edition. The app will also allow readers to communicate with sellers while maintaining their privacy and security. Types of communication will include the ability to schedule in-person test drives, and on-site and online product demonstrations.

The biggest advantage of the digital edition is the ability to distribute the EV Buyers Guide to tens of thousands of people interested in driving zero emission electric vehicles who may not have access to the printed guide. Increasing awareness and education of electric cars, motorcycles and bicycles will increase the number of EV drivers and riders. Increasing the number of EV drivers will improve air quality, but will also spur the installation of more public EV charging infrastructure, improving the utility and quality of

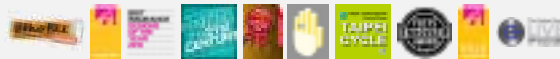
current EV drivers experiences with their vehicles.

Backers of the kickstarter program will gain early and discounted access to the product and other special rewards which will be listed on the Kickstarter web site when the campaign launches.

Most importantly, the Kickstart campaign will enable Electric Car enthusiasts and advocates to help spread the word about EVs. The campaign will offer several ways for ECI readers to amplify their influence among their friends and colleagues.

The Kickstarter campaign is the second for Electric Car Insider magazine. In the 4th quarter of 2014, ECI held a successful campaign to fund the development of the print edition of the 2015 EV Buyers Guide, raising over \$12,000.

More information about the Kickstarter campaign can be found on the company's web site at www.electric-car-insider.com/kickstarter.



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Chevrolet Bolt Review

200 mile range. No oil changes. No tune-ups. Ever.

BY STEVEN THOMAS

GM tapped its considerable engineering experience designing the Volt and Spark EVs to create a clean sheet design for the Chevrolet Bolt. LG Electronics supplied key drivetrain components, instrument cluster and infotainment system.

The Chevrolet Bolt's design, while conservative, is attractive and avoids the polarizing edginess of the Nissan Leaf and BMW i3. Its most prominent feature is a dramatically forward leaning beltline, which results in larger front windows providing improved visibility. The steeply raked windshield contributes to the contemporary profile and increases the front seats' feeling of spaciousness.

The car has narrow door sills, which when combined with the high roof, makes ingress and egress easy for both front and rear passengers. Large windows provide the rear seats with plenty of visibility.

INFOTAINMENT SYSTEM

Nestled into the middle of the dash is a 10.2 inch touchscreen monitor. Slightly larger than an iPad air, the tablet-like monitor features the redesigned Chevrolet MyLink interface that separates information into individual tiles that can be zoomed. An all-new navigation system that can route you to nearby charging stations and help to maximize total range is also used. The system uses an advanced range predictor, which accurately estimates driving range based on topography, temperature and driving habits.

An energy efficient Bluetooth system was specifically designed for the Bolt. As you walk up to

your car, the system instantly syncs with the all-new MyChevrolet app to create a seamless electric hand-off for the driver. The app expedites cabin pre-conditioning – heating in the winter and cooling in the summer – and provides information about charging status and estimated range. It also personalizes the car's home screen and loads your favorite music pre-sets.

CABIN SPACE

The Bolt's shape allowed designers to make the car's interior the largest in the class. Fold the seats down and cargo volume goes from 16.9 cu. ft. to 56.6 cu. ft. The Nissan Leaf has 23.6 cu. feet of cargo room behind the seats, fold them down and you get 30 cu. ft. With the seats down the BMW i3 offers 36.9 cu. ft. To get more interior cargo space, buyers would need to look at small SUVs.

DRIVETRAIN

Chevrolet worked with LG Chem to develop the Bolt's 60 kWh battery pack. The Bolt uses active thermal conditioning, similar to the Volt, to keep the battery pack operating at its optimum temperature, which results in solid battery life and performance especially in extremely hot and cold environments. The battery pack also uses a nickel-rich lithium-ion chemistry that, according to the manufacturer provides improved thermal operating performance over other chemistries. This chemistry, combined with the battery cooling system, allows the Bolt EV to maintain peak performance in varying climates and driver demands.

CHARGING SYSTEM

The battery is charged by an 7.2 kW onboard unit for regular overnight charging from a 240V charge station. This allows 25 miles of range to be restored for

each hour of charge. 50KW DC fast charging is provided via an SAE Combo connector. With DC fast charging, the Bolt gains 90 miles of range within 30 minutes.

The battery pack powers the system's single high-power electric motor. Producing 200 HP and 266 lb.-ft. of torque, the Bolt has twice the horsepower of the Leaf and substantially more torque. Although the Bolt is not a sports car, it's 0-60 time is under 7 seconds, a full 3 seconds faster than the Leaf.

REGENERATIVE BRAKING

Chevrolet listened carefully to experienced EV drivers and developed the Bolt's regenerative braking system so that while operating under normal conditions single-pedal driving is possible. This does not do away with the need for regular brakes. Instead, the system allows the kinetic energy available while a car is slowing down to be returned to the battery, providing additional range. Drivers lift their foot off the accelerator and either hold a paddle on the steering wheel or move the shifter into Low. Either method will slow the car and illuminate the brake lights.

HOME REFUELING

The convenience of refueling at home is one of the features that EV drivers love about their cars. With a 200-mile range car, when you start every day with full fuel, you can simply stop thinking about when you need to refuel if you're driving in town. Combined with a home solar system, the cost of refueling can be reduced to a fraction of the cost of gasoline, and the price swings of gasoline that wreak havoc on a budget can be eliminated. Even if your car is away from your home solar system during the day, utility net metering rules allow the solar system to offset the overnight energy use of charging your car.

SOLAR FUEL ECONOMICS

A 2 kW residential solar system, at an installed cost of \$4 per watt, costs \$8,000. If a homeowner provides the capital, the amortized cost is only \$22 per month. If financed over 30 years at 4.5%, the cost would only be \$40. So depending on how old you are and how long you live, you could cap the cost of your transportation fuel at somewhere between \$22-\$45 per month, possibly for the rest of your life. The fuel cost saving over those



The 960 lb., 288 cell battery produces 160 kW of peak power. The liquid cooled battery has an 8-year, 100,000 mile warranty.



A flat battery mounted low in the chassis lowers the center of gravity, improving handling. The elimination of a drive shaft tunnel increases interior space. MacPherson strut suspension in front. Coil springs in rear.

30 years would be \$64,000 vs a \$200 per month gasoline bill, a number that will almost certainly rise considerably over the next three decades. If those fuel savings were invested monthly in a tax-deferred investment account with a 7% annual rate of return, the total of the savings and earnings over the 30 year period would be a staggering \$208,775.

A non-polluting car that runs on domestically sourced fuel and can have such a positive impact on your budget surely earns the title of "game changer".



The AC electric motor produces up to 266 lb.-ft. of torque and 200 hp geared through a 7.05:1 final drive ratio.

Lease Deals

Uncle Vinny's got anotha deal fah yah.

BY NEAL GABORNO



PHOTO: RONALD SUMNERS

Table 1: National vs Dealer specials. Compare 3 yr total.

Auto dealers have a reputation for being tough negotiators. If that's all you did eight hours a day,

you'd be pretty good at it too. But if like most people, you only buy a new car once every several years

(or less), you're a paper tiger getting into the ring with a champion. Fortunately, doing

Total 3 Year Cost

Make	Model	Year	Location	State	Lease per mo	\$ Down	3 yr Total	State Rebate
BMW	i3	2015	National		289	4,214	14,329[†]	
BMW	i3	2015	Weatherford BMW	CA	99	5,000	7,871 [†]	2,500
BMW	i3	2015	Schomp	CO	249	3,425	10,646 [†]	6,000
BMW	X5 xDrive40e	2016	National		619	5,044	28,149	
BMW	X5 xDrive40e	2016	Steven Creek BMW	CA	649	4,995	27,710	2,500
Cadillac	ELR	2016	National		499	499	17,964	
Chevrolet	Spark EV	2016	Freemont Chevrolet	CA	79	1,895	4,660	2,500
Chevrolet	Spark EV	2016	Capitol Chevrolet	CA	79	1,299	4,064	2,500
Chevrolet	Volt	2016	Dubin Chevrolet	CA	99	3,995	7,460	2,500
Chevrolet	Volt	2016	Capitol Chevrolet	CA	129	4,999	9,901	2,500
Fiat	500e	2016	National		169	1,999	7,914	
Fiat	500e	2016	Hunter Fiat	CA	99	2,999	6,464	2,500
Ford	C-Max Energi	2106	National		322	977	12,597	
Ford	C-Max Energi	2016	Vista Ford	CA	279	1	9,766	2,500
Ford	Fusion Energi	2016	National		332	977	12,597	
Ford	Fusion Energi	2016	Sunnyvale Ford	CA	279	1	9,766	2,500
Ford	Focus Electric	2016	National		245	890	9,465	
Kia	Soul EV	2016	National		229	1,999	10,014	
Mercedes-Benz	B-Class ED	2015	National		319	4,113	15,278	
Mercedes-Benz	B-Class ED	2015	Mercedes-Benz of Reno	NV	289	4,083	14,228	
Nissan	Leaf S	2015	National		209	2,399	10,414	
Nissan	Leaf S	2015	Hayward Nissan	CA	129	3,500	7,980	2,500
Porsche	Cayenne S E-Hybrd	2016	National		799	7,199	35,175	
Smart	Fortwo ED Coupe	2015	National		139	1,433	6,298	
Tesla	Model S 70	2016	National		722	6,536	33,556	
Volkswagen	e-Golf	2016	National		179	2,349	8,614	
Volkswagen	e-Golf	2016	Pacific VW	CA	99	2,499	5,964	2,500
Volvo	XC90 T8	2016	National		1,107	0	39,852	

[†]30 month lease.

some research and knowing the best prices available in the market can give you an edge. We've done the heavy lifting for you. Here's the best deals we've found this quarter.

REFERENCE PRICING

Get ready for your negotiation by establishing a reference price for your new electric car. That's the maximum price you're willing to pay. If the dealer won't do a deal at that price, walk out the door. Even if there's not another better deal out there (there almost always is) the salesman will call you back at least once and will almost always meet your terms

(assuming your reference price is based in reality because you've done your homework starting with this article).

NATIONAL LEASE OFFERS

Lease offers published on the manufacturer web site should serve as not-to-exceed guidelines when negotiating with a dealer. You should never have to pay more than that price, and you may be able to pay much less.

DEALER ADVERTISED SPECIALS

Dealer advertisements, on the other hand, can serve as examples of what is achievable and in some cases represent the best deal

possible. Dealers will often dangle a single unit as a loss leader to get the phone to ring and bring people down to the lot, where the customer is shown many other higher-optioned and higher priced cars. That's the way the game is played, but understand that the dealer must honor the advertised price on a specific vehicle if it's still in stock when you come to buy it. If that specific vehicle is not available, the advertised price represents a reference price point, usually toward the lower bound.

THE BARGAINS

We've compiled the table with recent offers from a variety of dealers that publish lease deals online. These serve mostly as reference pricing, since by the time you see this table and get down to a dealer, a specific vehicle may no longer be available. But it does give you an idea of the kind of pricing a dealer may be willing to offer if you play your cards right.

THE ROAD AHEAD

By the end of 2016, we expect see The 200 mile Chevrolet Bolt, an updated version of the Ford Focus Electric with 100 mile range and plug-in versions of the Mitsubishi Outlander, Kia Optima, BMW 330e, and the Mercedes C-Class on sale. The extra competition will almost certainly put downward price pressure on the current 80 mile battery electrics and plug-in hybrids that have been available for several years.

By the end of 2017 over a dozen more plug-in models are expected to hit the market. That may give you good reason to wait or it could just be a great reason to take advantage of today's lease deals instead of buying. 🚗

Neal Gaborno lives the good life in Southern California with three electric cars in the driveway.

Table 2: Acquisition net cost after state rebate.

Mileage Cost

Make	Model	Acquisition Net Cost	Miles Per Yr	Lease \$/mile	Total Mo. Cost \$	Total 3yr Cost Including Fuel
BMW	i3	14,329	10k	0.48	478	15,529
BMW	i3	5,371	10k	0.18	179	6,571
BMW	i3	4,646	10k	0.15	195	5,846
BMW	X5 xDrive40e	28,149	10k	0.94	782	35,219
BMW	X5 xDrive40e	25,210	10k	0.84	700	31,692
Cadillac	ELR	17,964	10k	0.60	499	22,997
Chevrolet	Spark EV	2,160	10k	0.07	60	4,032
Chevrolet	Spark EV	1,564	10k	0.05	43	3,317
Chevrolet	Volt	4,960	10k	0.17	138	7,392
Chevrolet	Volt	7,401	10k	0.25	206	10,321
Fiat	500e	7,914	10k	0.26	220	10,937
Fiat	500e	3,964	10k	0.13	110	6,197
Ford	C-Max Energi	12,597	12k	0.42	350	16,556
Ford	C-Max Energi	7,266	10.5k	0.24	202	10,159
Ford	Fusion Energi	12,597	12k	0.42	350	16,556
Ford	Fusion Energi	7,266	10.5k	0.24	202	10,159
Ford	Focus Electric	9,465	12k	0.32	263	12,798
Kia	Soul EV	10,014	12k	0.33	278	13,457
Mercedes-Benz	B-Class ED	15,278	10k	0.51	424	19,774
Mercedes-Benz	B-Class ED	4,083	10k	0.14	113	6,340
Nissan	Leaf S	10,414	12k	0.35	289	13,937
Nissan	Leaf S	5,480	12k	0.18	152	8,016
Porsche	Cayenne SE-Hybrd	35,175	10k	1.17	977	43,650
Smart	Fortwo ED Coupe	6,298	12k	0.21	175	8,998
Tesla	Model S 70	33,556	12k	1.12	932	41,707
Volkswagen	e-Golf	8,614	12k	0.29	239	11,777
Volkswagen	e-Golf	3,464	7.5k	0.12	96	5,597
Volvo	XC90 T8	39,852	10k	1.33	1,107	49,262

State rebate not applied to National Lease deals, but may be available in your state. Lease \$/mile is net cost divided by mileage.



PHOTO COURTESY WAIDY LEE

EV Pioneers

Waidy Lee: Energetically Saving the Planet



BY CHRISTOPHER ALAN AND STEVEN THOMAS

Adding solar to the roof of her sister's house in Hong Kong involved learning about integrating the panels into three phase circuits.

A first generation Toyota RAV4 EV was Waidy's first EV, followed by a Nissan Leaf, two 2nd generation RAV4 EVs and a Tesla Model S.

Waidy Lee moves with the intensity of someone on a mission. Watching her work the room at the Electric Power Research Institute's Plug-In conference a few years ago, this reporter began to appreciate what has made her so effective as one of the electric car movement's front line proponents. She has enthusiasm that is contagious and works fast. In each of the short breaks between presentations at the conference, she connected with dozens of people, each of whom came away with a smile.

Waidy, who came to the U.S. from Hong Kong in 1975 to attend college and worked as a computer engineer in a series of Silicon Valley startups, has been an EV pioneer in the south San Francisco Bay Area for over fifteen years. Advocacy for a sustainable lifestyle is a core component of her identity and message. "It has always been my privilege be a citizen of the Planet Earth," she boldly proclaims on her website. "I want to do everything I can to help to make this a better place for

us to live. Use of renewable energy and eliminating the use of fossil fuel is my primary goal."

ELECTRIC DRIVE

Putting that message into action, Waidy has been driving electric for the past fourteen years, purchasing one of the original Toyota RAV4 EVs in 2002. Since then, the small SUV has been driven more than 100,000 emission-free miles. In 2011, she added a Nissan Leaf to her collection. The Leaf was used primarily by her son and daughter. A Generation Two 2012 RAV4 EV was later purchased and

became her daughter's main transport. A third RAV4 EV she calls "Dolphin" was acquired in 2013 and is Waidy's daily driver. A fifth EV, a white Tesla Model S P85, affectionately called "The White Star," is the most recent addition to the garage and is driven mainly by son Darren.

STRAW BALE HOUSE

For Waidy and her family, commitment to environmental responsibility goes beyond their choice of transportation, it's an entire lifestyle. Her house is a custom built straw bale passive solar house which is almost entirely fossil-fuel free. Only the cook top and a couple of gas burning stoves, intended for emergency use during long power outages, do not use the renewable energy provided by the sun.

The home uses passive features that make it very energy efficient. The straw bale structure was designed with high thermal mass which keep the temperature stable. Louvered vents and passive solar management by the south facing windows and eaves help even out the day's temperature swings.

The home's roof is covered in both photovoltaic panels by Sharp and Uni-solar thin film panels, providing electric power for the lights and appliances.

Adding to the three acre property's combined energy production are an array of Sharp panels atop the barn that produce another 11kW of energy. Inside



the barn is a battery backup system consisting of eight Concorde PVX-2580L 258Ah@2h batteries. This system provides sufficient backup so the home is powered overnight from stored solar energy. The system also ensures the property never runs out of electricity during power outages. Xantrex converters are used in both the barn and the main residence.

SUNFLOWER SOLAR ARRAYS

In order to maximize energy production on the property, Waidy installed two Sunpower arrays in the area that had once



been a horse pasture. Unusual for a residential installation, the solar arrays are mounted atop 13-foot poles and move on Wattsun heads to track the sun. The moveable heads ensure the solar panels track to within a fraction of a degree of the sun's arc from sunrise to sunset, and then slue back to the East to be ready for the next day. The combined output of the arrays is 26kW, about six times the size of a typical residential system.

NATIVE CREEK

With a sincere desire to be a great steward of her local environment, Waidy designed the landscaping around the property

with native plants and grasses that require minimal upkeep. Some of the landscaping required a significant commitment of resources. When the family moved into the home in 1994, they inherited a native creek whose stream bed had been lined with concrete. After learning that the concrete had negative effects on the local ecosystem and wildlife, Waidy worked with Acterra, a company that had done a big creek restoration project in Portola Valley, to restore the creek to its natural state. Jute netting made of 100% natural coconut was used to

keep soil in place while vegetation on the banks, which were planted with native grasses and seeds, became established. The reseeded



plants include Poppy, Blue Wildrye, Hillside Gooseberry, Purple Needlegrass, Sagebrush, Arroyo Willow and Brome.

LIVING ROOF

Waidy is especially proud of the living roof on the north and south wings of the house. In addition to looking nice, the plants and flower bed help insulate the roof, reduce the heat island effect and prevent run-off.

After completing the work on her Los Altos Hills home, Waidy helped her sister in Hong Kong and son Darren upgrade their homes' energy efficiency and add solar power. "I am proud of being a net energy producer" she commented, adding "I feel great about what I accomplished with the house, and I am now interested to work in the green tech industry so I can promote what I have learned to others. I believe that individual actions can collectively make a difference." 🍷

A roof top garden provides more greenery over the north and south wings of the house.

A concrete stream bed was restored to soil banks planted with native grasses and plants.



Federal Solar Tax Credit

Installing A Solar System Has Never Been a Better Deal

BY STEVEN THOMAS AND CHRISTOPHER ALAN

Installing solar panels as a source of fuel for your car can save you tens of thousands of dollars over the life of the system.

Here's some remarkably good news for EV drivers thinking about installing a solar system to charge their car: Congress has extended the Solar Investment Tax Credit. The law allows purchasers of solar power arrays to recover 30% of the price of the system in the form of a federal tax credit. The ITC applies to both residential and commercial installations. Originally scheduled to expire at the end of 2015, the credit can now be obtained through 2019. After that, the value of the credit will taper, declining to 10% in 2022 and thereafter.

The cost to install solar is at a historic low. Although costs will probably continue to decline slightly in the future, the total dollar value of the year over year reduction is diminishing, while utility rates continue to increase. So now is a good time to add solar to a residence or business.

The number of solar photovoltaic panels needed to fuel each EV in a household will depend on the mileage each EV is driven over the course of a year and some details about how and where the panels are installed. Sunnier locations can

produce more power per panel. A typical number, and one used in the estimate below, is 2kW per EV.

In 2016, the average installed cost of solar slightly less than \$4 per watt. An additional 2 kW added to a residential rooftop system would add about \$8,000 to the cost of the system, \$5,600 after considering the tax credit. If your average gasoline bill was \$200 per month, this addition to your home energy system would be repaid from fuel cost savings within 2.3 years not including finance charges. If the system were financed, over three years at 4% interest, the monthly payments would be \$165 and the total interest would be \$352. As you can see, even with \$0 down financing, you would pay less for electric fuel than you do for gas for the first three years, and after that, your transportation fuel would be completely free for the life of the system, which is typically 30 years. Financed over a longer term, for example 15 years, the monthly cost would be \$41, although you'd end up paying about \$1,850 in interest.

If your goal is to simply apply your current gasoline expense to the cost of the system, and then to put the monthly savings into an investment account after it is paid off, your savings over the next 27 years would be a healthy \$64,800. If your investment account accumulated an average 7% annual return, the value of the investment account would balloon to a staggering \$191,427.

It pays to drive on sunshine. ☀



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