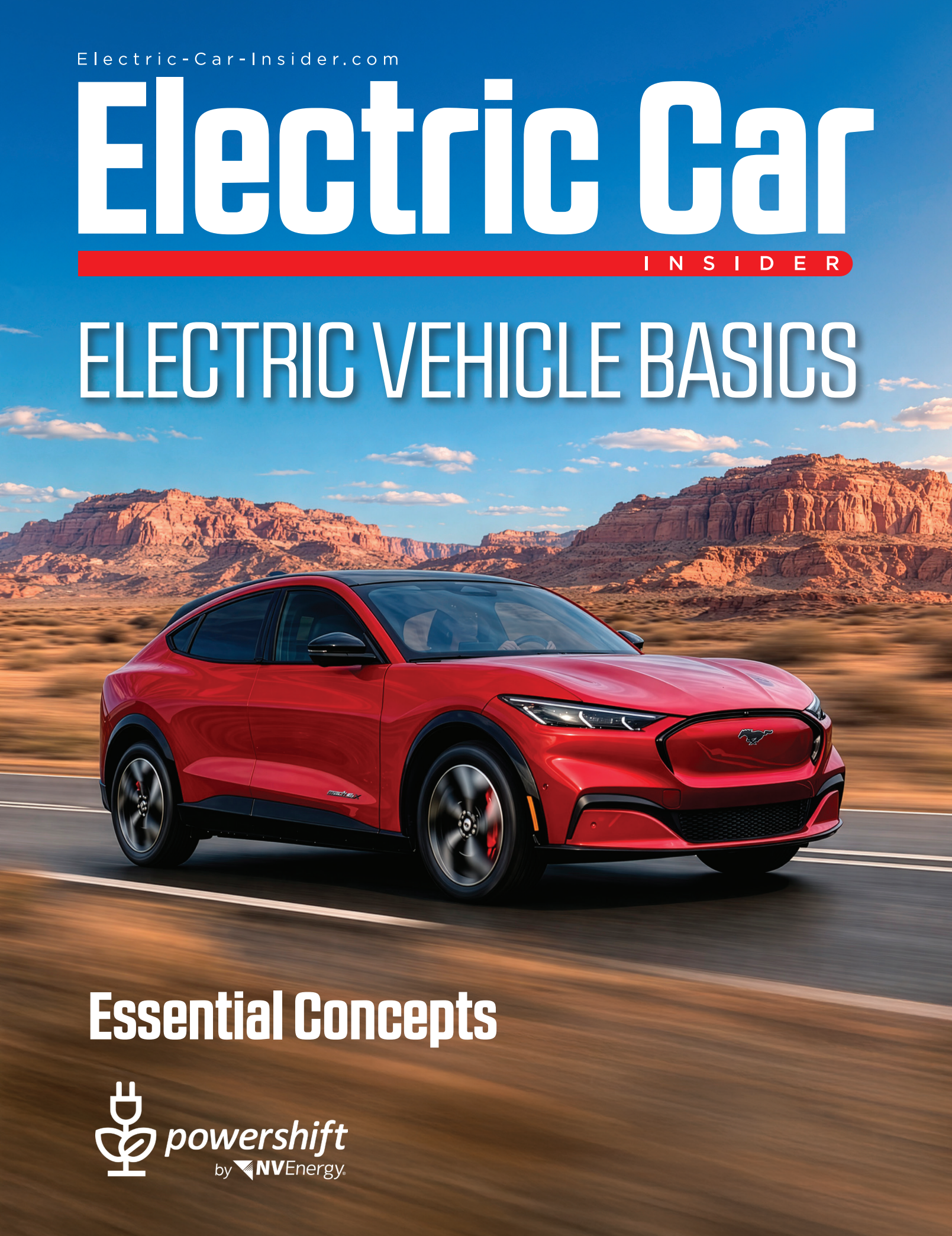
Electric-Car-Insider.com

Electric Car INSIDER

ELECTRIC VEHICLE BASICS



Essential Concepts

Automobile Matrix

Specification Quick Reference

BATTERY ELECTRIC

Make	Model	Yr Intro	Battery kWh	Range (mi)	MPGe
BMW	i3	2026	109	440	- -
BMW	i4	2022	67-84	268-333	98-118
BMW	i5	2022	84.3	259-310	80-97
BMW	iX	2022	110-113	279-364	80-97
BMW	iX3	2026	109	400	- -
Cadillac	LYRIQ	2022	102	303-317	92-105
Cadillac	OPTIQ	2024	85	303-317	92-105
Cadillac	Vistiq	2026	102	305	86
Chevrolet	Blazer EV	2023	85-102	283-334	85-104
Chevrolet	Bolt	2016	65	262	- -
Chevrolet	Equinox EV	2023	85	303-317	103-108
Chevrolet	Silverado EV	2023	119-205	286-493	64-70
Ford	Mustang Mach-E	2020	73-91	240-320	90-107
Genesis	Electrified G80	2022	94.5-95.4	282	97
Genesis	GV60	2022	84	252-306	90-110
GMC	Hummer EV Pickup	2022	170-212	312-381	52-53
GMC	Hummer EV SUV	2022	199	310-319	52-53
GMC	Sierra EV	2024	120-205	283-478	64-68
Honda	Prologue	2024	85	308	99-104
Hyundai	IONIQ 5	2022	63-84	245-318	94-115
Hyundai	IONIQ 6	2023	63-84	240-366	121-140
Hyundai	KONA Electric	2019	48.6-65.4	200-261	120-125
Jeep	Recon	2026	100	230-250	80
Kia	EV6	2022	63-84	231-319	97-117
Kia	EV9	2024	76.1-99.8	245-318	80-89
Kia	Niro EV	2019	64.8	253	113
Lucid Motors	Air	2022	84-118	420-512	146-149
Lucid Motors	Gravity	2025	89-123	386-450	92-115
Mercedes-Benz	EQS Sedan	2021	122	347-391	92-98
Mercedes-Benz	EQS SUV450+	2025	118	305-317	79-98
Mini	Countryman SE ALL4	2024	66.5	212	96
Nissan	ARIYA	2022	63-87	216-289	87-94
Nissan	Leaf	2010	52-75	259-303	121
Polestar	3	2024	92-106	305-315	77-105
Polestar	4	2024	100	280-310	85-95
Porsche	Taycan	2019	89-105	252-318	83-94
Rivian	R1S	2020	92.5-140	230-410	71-85
Rivian	R1T	2020	92.5-140	258-420	71-87
Rivian	R2	2026	87.9	335	109
Subaru	Solterra	2022	74.7	278-288	117-120
Subaru	Uncharted	2026	74.7	285-300	130
Subaru	Trailseeker	2026	74.7	274-281	117
Tesla	Cybertruck	2023	122.4	320-325	79
Tesla	Model 3	2017	64-82	300-363	114-139
Tesla	Model Y	2020	60-81	300-363	114-139
Toyota	bZ4X	2022	57.7-74.7	235-314	105-138
Toyota	C-HR	2026	67	273–287	112-117
Volkswagen	ID.4	2021	62-82	263-291	102-113
Volkswagen	ID.Buzz	2024	91	231-234	80-83
Volvo	EX30	2024	69	253-275	99-116
Volvo	EX40	2020	82	260-296	94-106
Volvo	EX60	2026	80-117	310-400	- -
Volvo	EX90	2024	111	310	81-84

-- Dashes in the matrix represent specs not available at time of printing.

Contents

Range, Refueling, Incentives

EV Basics

BY CHRISTOPHER ALAN

Battery Electric vs Plug-in Hybrid

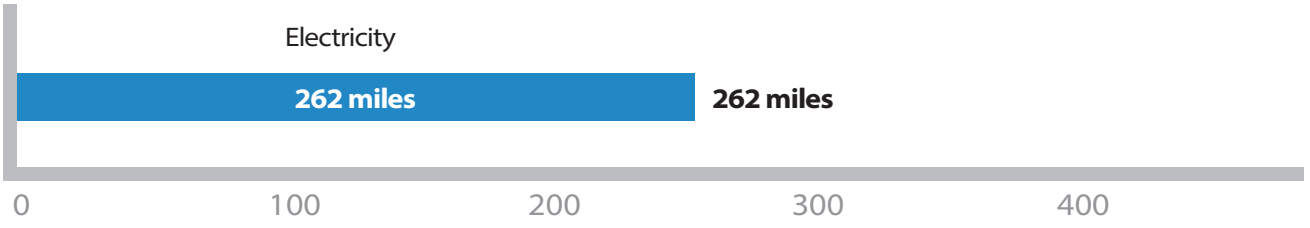
Types of Plug-In Electric Vehicles

BEV - Battery Electric Vehicle

Battery electric vehicles get all of their energy from an electrical circuit. This allows them to operate at a very low cost - electricity generally costs the equivalent of less than $1 per gallon of gasoline. When charged at the EV off-peak rate, the cost can be less than $0.60 per gallon equivalent.

Chevrolet Bolt

Driving Range

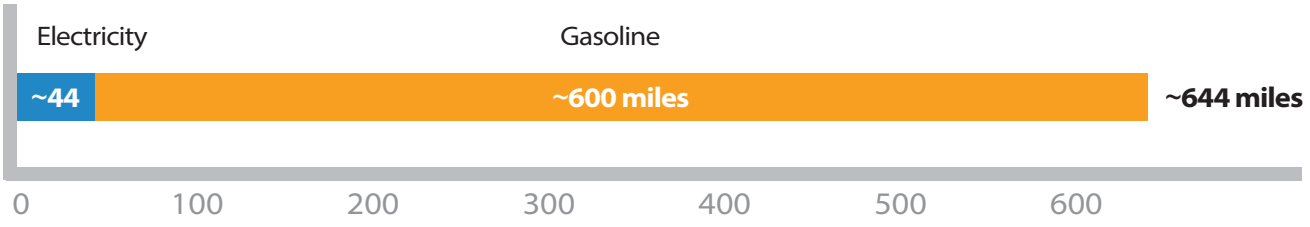


PHEV - Plug-In Hybrid Electric Vehicle

Plug-in hybrid vehicles use electricity for the first 20-60 miles of travel and then automatically switch over to the gasoline engine. PHEVs offer gasoline refueling for longer trips, with the environmental and cost benefits of an EV for most local in-town driving, like a daily commute.

Toyota Prius PHEV

Driving Range



Battery electric cars use only electricity as fuel. Plug-in Hybrid Vehicles use electricity first, then gas for extended range.

Charging Basics

Charging Levels

Charging is subdivided into 3 levels based on the amount of power available in the circuit, which in turn affects how quickly your EV will recharge its batteries.

- Level 1 uses 120V ordinary house current.
- Level 2 uses a higher powered 240V circuit, like your clothes dryer.
- DC Fast Charge uses dedicated, high-powered 200-800VDC circuits. It is found exclusively at Fast Charging stations.

Level 1

5 MPH

120V

200-Mile Charge:
36 Hrs

Where:
Home, Work

Connector

Level 2

12-25 MPH

240V

200-Mile Charge:
8 Hrs

Where:
Home, Work, Public

Connector

DC Fast Charging

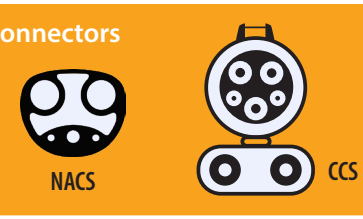
up to 750 MPH

200-800V DC

200-Mile Charge:
20-45 minutes

Where:
Road Trips, Local Public

Connectors



All ranges and times given are estimates and vary based on many factors including specific chargers and car models.
The auto industry will use the NACS connector going forward.

MPH (Miles Per Hour): Range a charging station provides per hour

Take Charge with Smart Charge

PowerShift by NV Energy introduces Smart Charge, which offers rewards to EV owners for charging smart.

CHARGE DURING NONPEAK HOURS, 12 A.M. TO 8 A.M.

When You Charge Matters

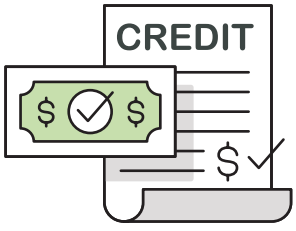
Charging overnight reduces grid impact during high use hours and keeps power flowing where it's needed most. As EV adoption grows, it will be critical to manage the grid by moving EV charging to either times of off-peak use or to times when electricity production from renewable sources is significant.

Lower Your Energy Bill

Charging during off-peak hours can help you take advantage of lower energy rates, offering real savings over time. With Smart Charge, you take advantage of these lower rates without changing your driving habits. Over time, this adds up to real savings.

Rewards for Smart Choices

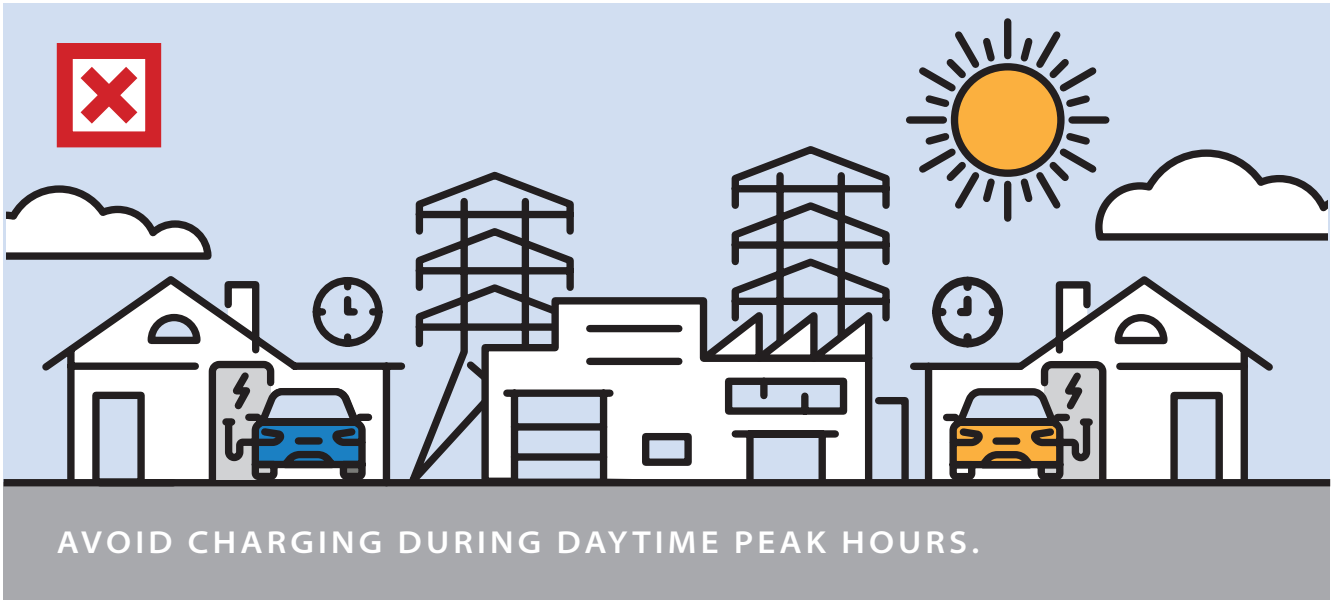
As a Smart Charge participant, you'll receive an enrollment incentive and a year-end bill credit based on your participation. It's a win for your wallet and for Nevada's energy future.



Shifting EV charging to off-peak times keeps energy flowing to where it's needed most.

powershift by NVEnergy

Peak hours are times when customers use the most energy. By charging your EV off-peak, you help to keep the grid reliable, which reduces the need for infrastructure upgrades and allows you to take advantage of cheaper energy prices.



Take Control with Smart Charge

Enroll online in the Smart Charge program that fits your household and start making the most of your electric vehicle. Customers can participate in managed charging via a compatible charger or through vehicle telematics, making it easy to participate in a way that works best for them. The program helps support a more reliable energy grid while helping customers charge smarter. Enrollment is simple, and clear program details, including eligibility and benefits, are available on the NV Energy website. By joining Smart Charge, you can play an active role in Nevada's clean energy future while enjoying the convenience of managed charging at home. Visit NV Energy online to learn more and get started today.

LEARN MORE AT NVENERGY.COM/SMARTCHARGE

By encouraging customers to shift their charging use around peak periods, energy use is easier to balance.

Refueling at Home

Level 1 and Level 2 Charging

Charging at home can be done with either ordinary house current or a dedicated 240V circuit depending on charging speed needed. Speed is indicated in miles per hour of charge time.

	Outlet	NEMA	Volts/ Amps	kW	Charging Speed
Level 1	NEMA 5-15		120V x 12A	1.4 kW	4 mph
	NEMA 5-20		120V x 15A	1.8 kW	5 mph
Level 2	NEMA 14-30		240V x 24A	5.8 kW	20 mph
	NEMA 14-50		240V x 40A	9.6 kW	32 mph
	Hardwire		240V x 80A	20 kW	57 mph

Level 1

- 120V 15-20 amp circuit
- Ordinary house current
- Charge cord supplied with car

Level 2

- 240V 16-80 amps circuit
- Dryer or similar NEMA 240V outlet
- 50 amps or greater must be hardwired

Maximum Current Rating

National Electric Code requires that the continuous current drawn from a circuit not exceed 80% of the circuit's maximum rating. Charger model numbers usually reflect the type of circuit they require, and supply the lower 80% value. For example, a charger that uses a 30 amp circuit and supplies 24 amps of current at 240V, which is 5.8 kW of power. That will allow a typical EV to travel 20 miles after one hour of charging (20 mph of charge). A 50 amp charger using a 50 amp circuit supplies 40 amps, 9.6 kW, which adds 32 miles range after one hour of charging.

Plug-In vs Hardwire Installation

Almost all residential EV chargers can be purchased with a plug and installed as easily as any other appliance – simply mount it on the wall with the provided screws and mount plate and plug it in to an existing or newly installed 240V outlet. The exception is high power chargers like the 80 amp Tesla HPWC. Chargers 50 amps or greater need to be installed by an electrician and hard-wired to a dedicated circuit.

Almost all residential EV chargers can be purchased with a plug and installed as easily as any other appliance.

Refueling at Work

Many employers offer workplace charging to their employees to encourage the use of zero emission vehicles.

Level 1

Offering Level 1 charging to employees can be as simple as installing a row of 120V outdoor outlets in a parking lot.

Another option is installing low cost fixed-in-place chargers.

Level 2

UNMETERED
Simple Access Control
i.e. Key

NETWORK MONITORED
Billable Access Control

Types of Access Controls

ACCESS CARD-BASED

BLUETOOTH APP BASED

Many employers offer workplace charging to their employees to encourage the use of zero emission vehicles.

Refueling on the Road

Level 2 Charging Stations

Level 2 charging stations are located throughout communities. Sometimes retail businesses provide charging for free to customers.

Battery electric cars usually recharge at a rate of 20 miles of range per hour of charge. Plug-in hybrid cars usually charge at about 10 miles per hour, but do not require public charging because longer drives can be completed using the gasoline engine.

DC Fast Charging Stations

Quick Charge stations are located at major malls, transportation hubs and other high traffic locations. There are three DCFC standards: Tesla (NACS), SAE Combo (CCS) and CHAdeMO. Power ratings range from 25kW to 350kW.

- Some European and American cars use the CCS connector
- Tesla cars use the Tesla-developed NACS connector
- All automakers are in the process of switching to the NACS connector

Many charge stations have two connectors, one for each standard so all cars that have Quick Charge ports can be charged. Most cars can now use Tesla Superchargers with an adapter, or with their native NACS connector if so equipped.

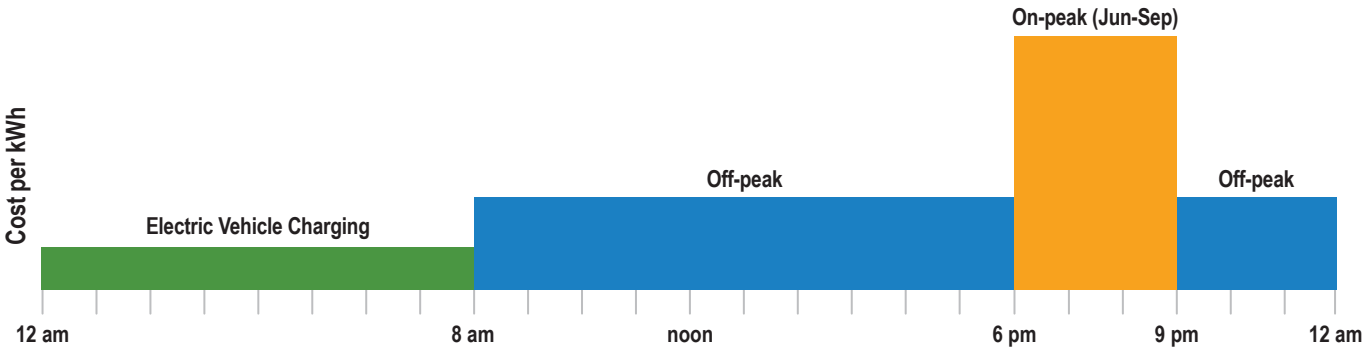
Most cars will charge to 80% within 30-45 minutes using DCFC. That will provide about 200-250 miles of range. Tesla, Hyundai, Kia, Lucid and some other cars can gain about 200-250 miles with 20-30 min of charging.

Some retail businesses provide electric refueling free of charge as a way to attract customers and reward loyalty.

Time of Use Charging

Charge Your EV at the Lowest Rates

Plug in every night when you get home from work and wake up with full fuel every morning. Set the timer on your car once, and it will charge during the EV off-peak window, between 12-8 am.



Off-Peak Charging

In this 33 miles per day example, the time of use rate is averaged to 6.7 cents per kWh during the Electric Vehicle charging period. The fuel cost for charging 11kWh during this off-peak window, typical for traveling an average of 33 miles per day, is $0.74.

On-Peak Charging

The on-peak period rate is 11.5 cents per kWh. The fuel cost for charging during this time is $1.27 per day.

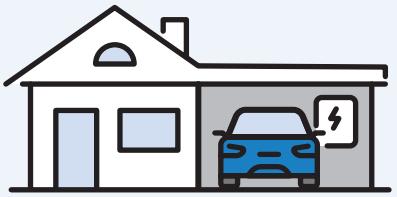
Off-peak or base rates are at night when you are sleeping.

Take Charge with NV Energy

The Transportation Electrification Plan will shift electric vehicle (EV) charging load to off-peak times of high renewable energy and lower overall energy demand through managed charging. It also includes customer outreach and pilot programs. NV Energy supports customers' interest in furthering their own transportation electrification goals through incentives, customer education and car dealer partnerships because when you charge matters!

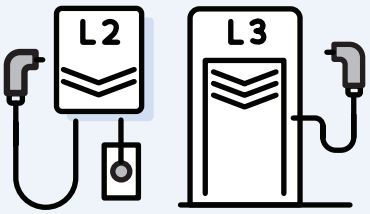
Residential Managed Charging

Participation in single-family residential managed charging programs allows customers living in single-family homes to receive two types of incentives. First, a one-time enrollment incentive for enrolling in the managed charging program with a qualified Level 2 smart charger. Second, a performance payment for participating in managed charging events that NV Energy calls during a year.



Fleet Managed Charging

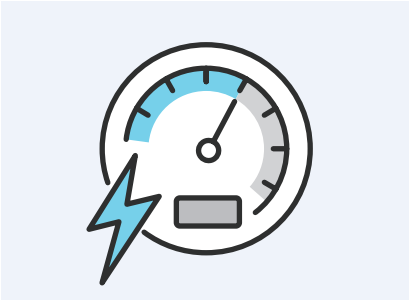
The fleet program will offer a one-time upfront enrollment incentive for installing internet-connected Level 2 chargers or DC fast chargers in exchange for a commitment to participate in the managed charging element of the program.



Program Development Trial:

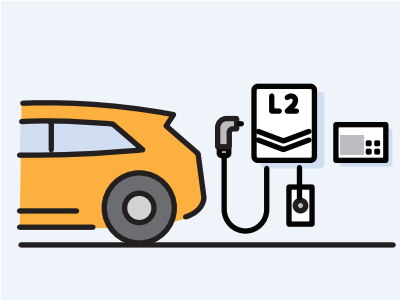
Telematics Managed Charging

The telematics pilot provides customers with incentives for participating in managed charging via the vehicle instead of through the charger, like in the residential managed charging program.



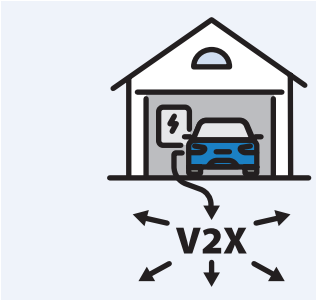
Residential Sub-Metering

The sub-metering pilot monitors the charging equipment separately. This captures data relating to the impact the charger has on the home and ultimately the grid.



Residential Vehicle-to-X (V2X)

The V2X pilot offers customers incentives for participating in this study to determine how EV's can be a resource in times of need. This study focuses on the V2X potential, e.g., Vehicle-to-Battery, Vehicle-to-Grid, etc.



Learn more at NVEnergy.com/TEP

powershift by NVEnergy

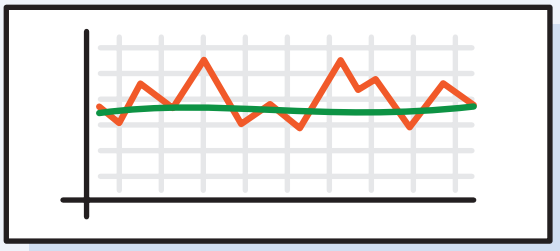
Fleet Managed Charging

Activating Incentives

NV Energy offers incentives for fleet managed charging participation, adding value to a business's energy-efficiency strategies. Combined with operational strategies and sustainability gains, managed charging optimizes EV investments while reducing grid impacts.

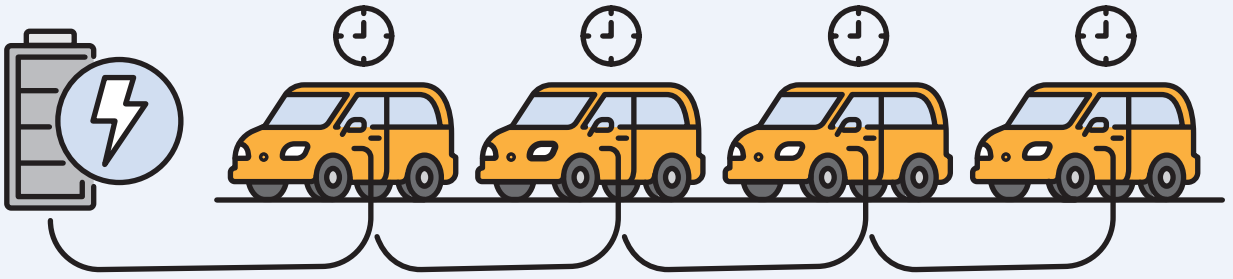
Controlling Costs at Scale

By transitioning fleet charging to off-peak times, operating expenses can be maintained predictably. Managed charging participation, coupled with enrollment in the EV time-of-use rate, facilitates cost savings without compromising convenience or vehicle operational readiness.



Ensuring Vehicle Readiness

Enrollment in the fleet managed charging prioritizes low-cost, low-demand charging, ensuring vehicles are ready for deployment. Intelligent charging keeps vehicles fully charged for scheduled routes while optimizing grid-friendly charging, maintaining operational reliability without requiring manual alteration to the charging schedule.



Save energy and money by charging fleets for scheduled routes and times.

Learn more at NVEnergy.com/TEP

Charging Basics

Home and Public Charging Options

BY CHRISTOPHER ALAN

EV Charging Options

Over 204,000 public charging stations are available nationwide to extend the range of EVs, but realistically, unless you drive more than 200 miles a day, your home is your fuel stop. Charge overnight, and your car is ready to go in the morning.

Although it's possible to charge EVs with the standard 120v cord that comes with the car, it may take longer than you sleep. At 120v, it will take longer than the time-of-use off-peak discount some utilities offer. The Kia EV6 and Hyundai Ioniq 5, for example, take about 20 hours to charge from empty to full at 120v. In practice, you only need to charge enough to replace the energy you used the previous day, typically 30-40 miles, so Level 1 can be used if you don't drive much.

Most EV drivers purchase 240v charge stations, usually referred to as "Level 2" chargers, which can charge the Kia EV6 or Hyundai Ioniq 5 from empty to full in just 6-7 hours.

Almost all modern Battery Electric Vehicles, with the exception of older EVs and most PHEVs, can also use a DC Fast Charger that can fill the battery to 80% within 15-30 minutes. These are found only at retail and commercial sites that have 480v industrial power supplies.

HOME CHARGING

One of the things that will most influence the installation cost is whether your charger is hard wired, or it can be plugged into a 240v outlet.

Professional installations, which will run dedicated wiring to your charge port, generally run between $500 - $1,700. A electrical code compliance inspection typically ranges from $10 to $100. The cost of a permit for a 240v receptacle, used with a plug-style charge station, may be less expensive.

Cord lengths vary from 16-25 ft, be sure to check your requirements before ordering. Most chargers come with a holster that keeps the J1772 plug secure and the cable neat when not in use.

PUBLIC CHARGING

The appearance of orange pins on charge station software like PlugShare, signifying Fast Charge Stations, are the equivalent of being notified of range boost. The radius of travel just got larger. An EV driver can now easily drive to a city 200 miles distant and back again with just a 30-minute stop at a public fast charge station. Charging sessions that would require a 4-8 hour stop at a Level 2 240v station can be done in 10-20 minutes at a DC Fast Charge station.

NV Energy PowerShift Program Approved Chargers

PowerShift continues to expand the number of level 2 chargers eligible for participation in SmartCharge, NV Energy's residential managed charging program. View the most up-to-date list of approved chargers at **nvenergy.com/smartcharge**.

Wallbox Pulsar Plus

Siemens Versicharge

Chargepoint Homeflex

powershift by NVEnergy

Charging Apps

Plan Charging Stops on your Phone

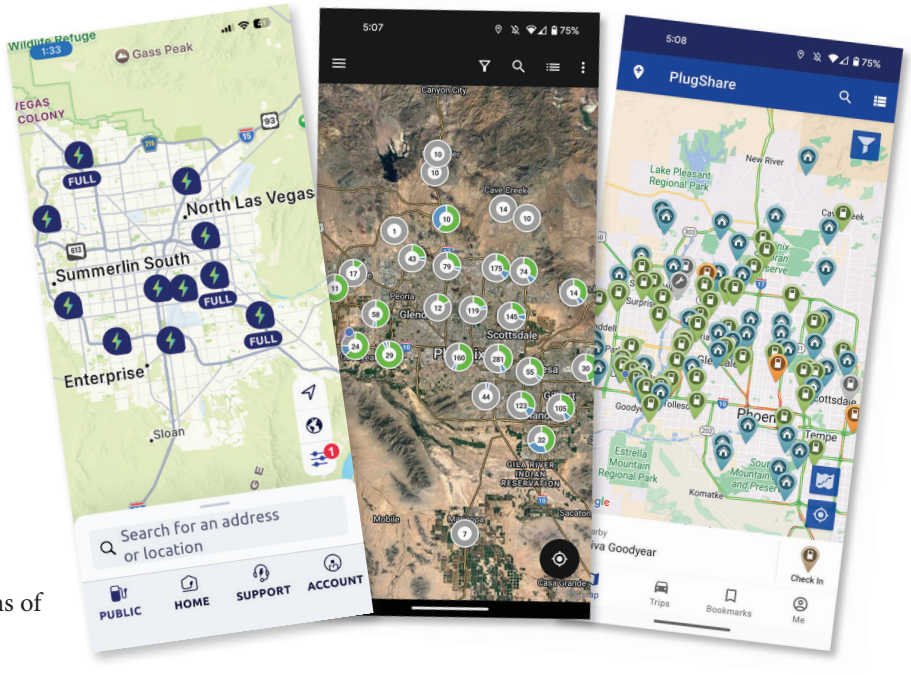
BY CHRISTOPHER ALAN

There's an App for That

Finding a charge station for an EV is really easy. Go out to your garage, pick up the coupler and plug it in. But for those occasions when you need to charge as you're out and about, there's an app for that.

The market is split between public charging networks and third party apps. Charging networks like ChargePoint have their own apps which report whether a charger is in use, while third party apps such as PlugShare list stations and user reviews.

How do the apps stack up against each other?



ChargePoint lists thousands of public charging stations, giving drivers the options of an updated "list view" to see how far a destination is, payment options, and 24x7 telephone support. ChargePoint also offers its "trip mapping," allowing for a user to plan a trip route and flag charging stations along the way. The "charging status" screen lets you remotely keep track of your charging session.

The Electrify America app only displays chargers on the EA network, but shows how many chargers are in use. The EA display includes type of chargers, charging cost per kWh, and the hours of operations for the charging station. When plugged in, the app shows your car's charging status so you are free to walk around, go shopping or get a meal. The app will send you notifications as your charge session nears completion. EA's hardware reliability is spotty, but multiple units at each charge site mean you can usually complete a charge session. EA's telephone support is excellent and can often restart a balky charger.

An app from Electrify America lists station status and info on EA's nationwide fast charger network.

PlugShare uses crowd-sourced information. It represents the community of EV owners, and includes private residences and businesses that are available to fellow EV drivers who need a quick fill to get back home or to a another charge point. PlugShare's map includes chargers from all of the major charging networks. PlugShare's station info profiles are the best of the mobile apps, displaying a photo of the location of the charge station, a map of the charging station, types of plugs, access, cost, and reviews for each charging station.

TAKE CHARGE.

GET $100 UPON SIGN-UP + A $150 END-OF-YEAR BILL CREDIT

PowerShift by NV Energy invites you to join Smart Charge, where you optimize your charging schedule and help save energy and money.

After enrollment, you'll receive $100, plus up to $150 as a bill credit at the end of the year.

Check our website for the "Smart Charger Qualifying Equipment List" to see if your EV charger is compatible.

To learn more and to enroll, scan here:

powershift by NVEnergy
This is what we do

NVEnergy.com/SmartCharge