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Electric Vehicle Charging Infrastructure in the U.S.

64% of Americans live within 2 miles of a public charging station, and those who live closest to chargers view EVs more positively

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How we did this

Pew Research Center conducted this study to understand Americans' views on electric vehicles. We surveyed 10,329 U.S. adults from May 30 to June 4, 2023.

Everyone who took part in the survey is a member of the Center's American Trends Panel (ATP), an online survey panel that is recruited through national, random sampling of residential addresses. This way, nearly all U.S. adults have a chance of selection. The survey is weighted to be representative of the U.S. adult population by gender, race, ethnicity, partisan affiliation, education and other categories. Read more about the ATP's methodology.

We supplemented the data from the survey with data on EVs and charging stations from the U.S. Energy Department, specifically the Office of Energy Efficiency & Renewable Energy and its Alternative Fuels Data Center. This dataset is updated frequently; we accessed it for this study on Feb. 27, 2024.

The analysis in this report relies on two different measures of community type, one based on what ATP panelists self-reported when asked "*How would you describe the community where you currently live?*" This measure is used when discussing differences in public opinion towards EV charging infrastructure or related issues and distinguishes between urban, suburban and rural areas. The other measure is based on the U.S. Census Bureau's urban-rural classification, which identifies urban and rural areas based on minimum housing unit density and/or population density thresholds.

Here are the questions used for this analysis, along with responses, and the survey methodology.

Electric Vehicle Charging Infrastructure in the U.S.

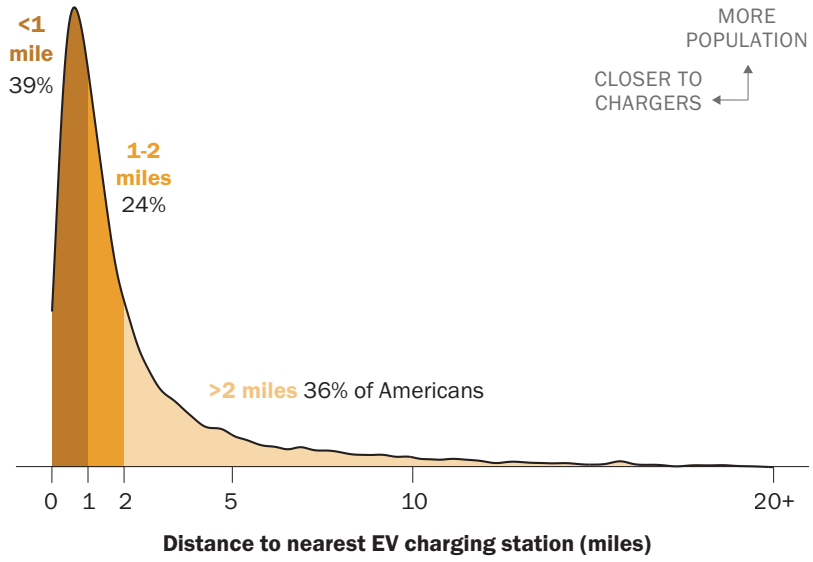
64% of Americans live within 2 miles of a public charging station, and those who live closest to chargers view EVs more positively

Several recent laws, including the 2021 Infrastructure Investment and Jobs Act and the 2022 Inflation Reduction Act, have sought to encourage the development of electric vehicle infrastructure and increase the adoption of electric vehicles (EVs). And a Pew Research Center survey paired with an analysis of U.S. Department of Energy data finds that **roughly six-in-ten Americans now live within 2 miles of a public charger**. There were over 61,000 publicly accessible electric vehicle charging stations in the United States as of February 2024.

The vast majority of EV charging occurs at home, but access to public infrastructure is tightly linked with Americans' opinions of electric vehicles themselves. Our analysis finds that **Americans who live close to public chargers view EVs more positively than those who are farther away**.

About 6 in 10 Americans live within 2 miles of a public EV charger

% of U.S. adults living ____ from the nearest public electric vehicle charging station



Note: Charger location data accessed Nov. 8, 2023.
Source: Survey of U.S. adults conducted May 30-June 4, 2023; U.S. Energy Department, Alternative Fuels Data Center.

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Even when accounting for factors like partisan identification and community type, Americans who live close to EV chargers are more likely to say they:

- **Already own** an electric or hybrid vehicle
- **Would consider buying** an EV for their next vehicle

- **Favor phasing out production** of new gasoline cars and trucks by 2035
- **Are confident that the U.S. will build the necessary infrastructure** to support large numbers of EVs on the roads

Here are some other key takeaways from our geographic analysis of EV chargers:

The number of EV charging stations has more than doubled since 2020. In December 2020, the Department of Energy reported that there were nearly 29,000 public charging stations nationwide. By February 2024, that number had increased to more than 61,000 stations. Over 95% of the American public now lives in a county that has at least one public EV charging station.

EV charging stations are most accessible to residents of urban areas: 60% of urban residents live less than a mile from the nearest public EV charger**,** compared with 41% of those in the suburbs and just 17% of rural Americans.

Related:

- *How Americans view electric vehicles*
- *Today's electric vehicle market: Slow growth in U.S., faster in China, Europe*

Distribution of EV charging stations in the U.S.

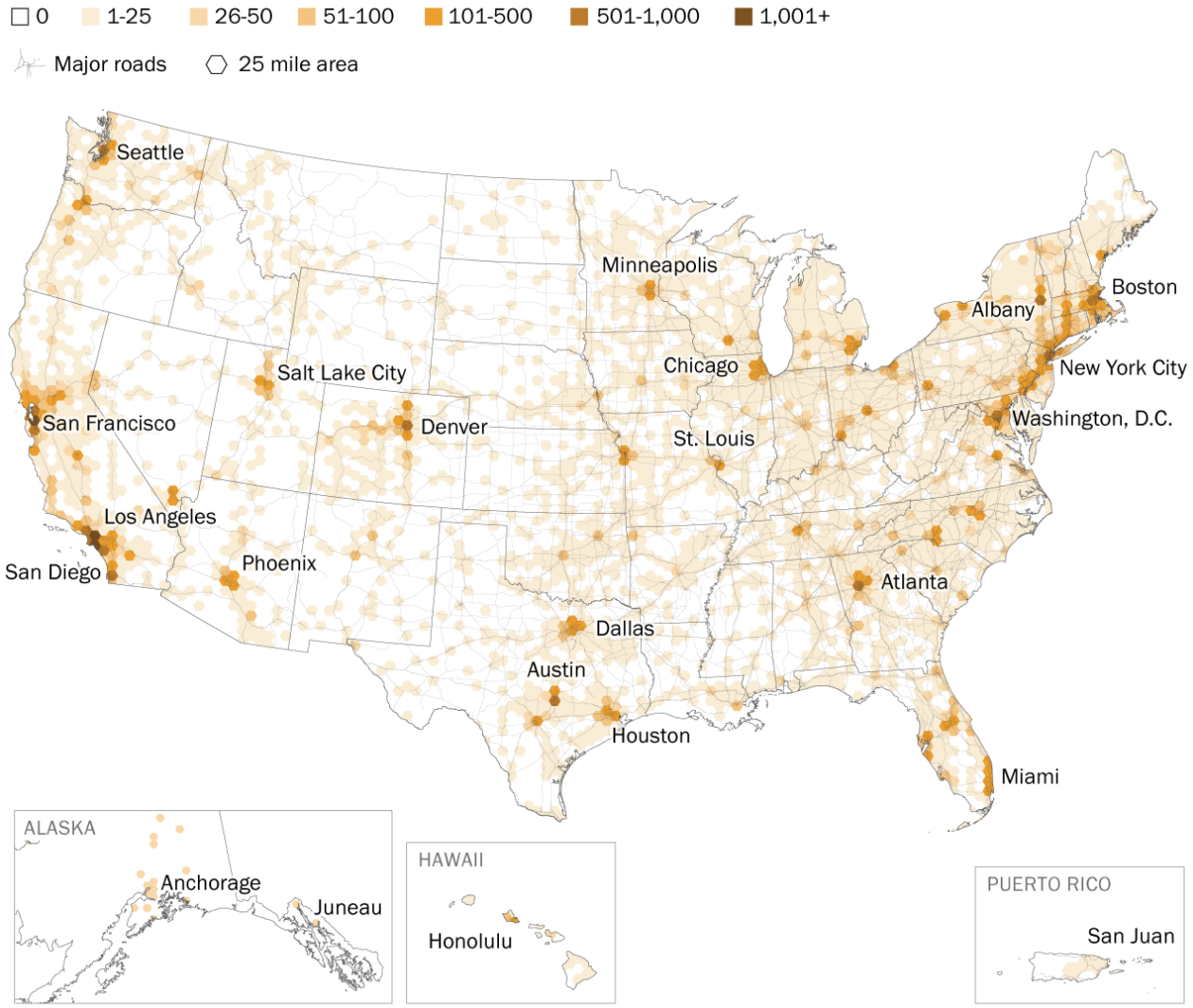
As of Feb. 27, 2024, there are more than 61,000 publicly accessible electric vehicle charging stations with Level 2 or DC Fast chargers in the U.S.[1] That is a more than twofold increase from roughly 29,000 stations in 2020. For reference, there are an estimated 145,000 gasoline fueling stations in the country.

EV charging stations can be found in two-thirds of all U.S. counties, which collectively include 95% of the country's population.

[1] These charging stations collectively contain more than 164,000 individual ports.

Electric vehicle charging stations exist across the country, but most are concentrated in and around urban areas

Number of public electric vehicle charging stations in each 25 mile area



Note: Charger location data accessed Feb. 27, 2024.
Source: U.S. Energy Department, Alternative Fuels Data Center.

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Distribution by state

As has been the case in the past, California has the most EV charging infrastructure of any state. The state is home to a quarter of all public EV charging stations in the U.S., though This represents a slightly decrease from the last time we analyzed this data source in May 2021. At that time, California contained 31% of all public EV charging stations in the U.S.

Californians with an EV might also have a harder time than residents of many states when it comes to the actual experience of finding and using a charger. Despite having the most charging stations of any state, California's 43,780 individual public charging ports must provide service for the more than 1.2 million electric vehicles registered to its residents. That works out to one public port for every 29 EVs, a ratio that ranks California 49th across all 50 states and the District of Columbia.

At the other end of the spectrum, Wyoming (one-to-six), North Dakota (one-to-six) and West Virginia (one-to-eight) have the most ports relative to the much smaller number of EVs registered in their respective states.

Infrastructure growth in rural areas

Historically, rural parts of the country have had substantially less access to EV charging stations. Addressing that issue has been a focus of recent legislation passed into law. For instance, the 2022 Inflation Reduction Act (IRA) contains tax credits designed to incentivize the installation of EV charging stations outside urban areas.

Since the IRA's tax credits became active, the number of EV charging stations nationwide has increased 29%. **But rural parts of the U.S. have a slightly faster growth rate in their total number of charging stations when compared with urban areas** (34% vs. 29%).[2] Even so, access to public EV charging remains heavily concentrated in urban areas, which account for nearly 90% of all stations in the U.S. as of Feb. 27, 2024.

[2] The 2022 Inflation Reduction Act uses the Census Bureau's definition of urban versus rural areas, which defines an urban area as a census block that encompasses at least 2,000 housing units or has a population of at least 5,000.

Who lives closest to EV charging stations?

The vast majority of Americans now live in a county with at least one public EV charging station, But some live closer to this infrastructure than others: 39% of Americans live within a mile of a public charging station, and 64% have a charging station within 2 miles of home.

Americans who live in cities are especially likely to have a public charging station very close to their home. Six-in-ten urban residents live within a mile of a public charger, compared with 41% of suburbanites and just 17% of rural Americans.

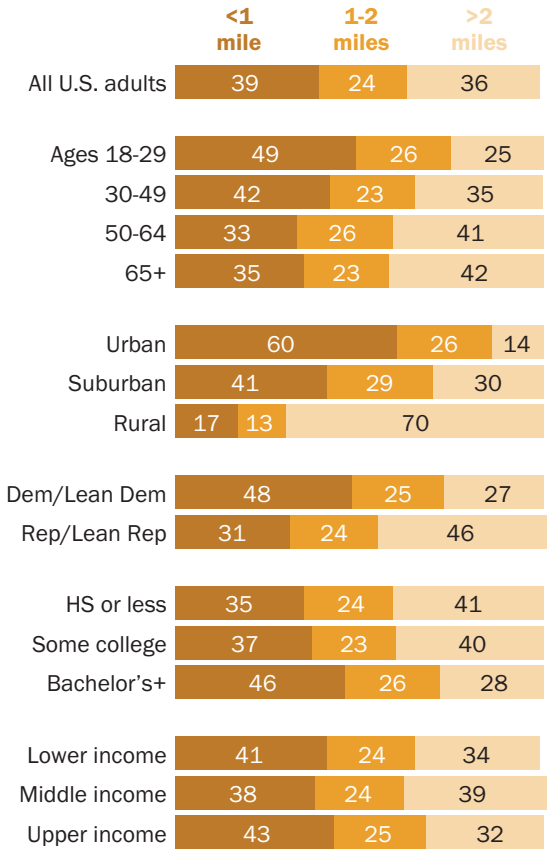
Because of this distribution, those who live closest to EV charging infrastructure tend to share the demographic characteristics of urban residents more broadly. For instance, they tend to be relatively young and are more likely to have a college degree than those in other community types.

Looking at political affiliation, 48% of Democrats and Democratic-leaning independents live within a mile of a public charger, compared with 31% of Republicans and Republican leaners.

However, there are no substantial differences in distance to the nearest charger by income. Similar shares of Americans with lower, middle and upper incomes live within a mile of public charging stations.

City dwellers, Democrats and younger adults are more likely to live near a public EV charger

% of U.S. adults living ____ from the nearest public electric vehicle charging station



Note: Charger location data accessed Nov. 8, 2023. Shares may not sum to 100% due to rounding.
Source: Survey of U.S. adults conducted May 30-June 4, 2023; U.S. Energy Department, Alternative Fuels Data Center.

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Attitudes toward EVs vary based on proximity to chargers

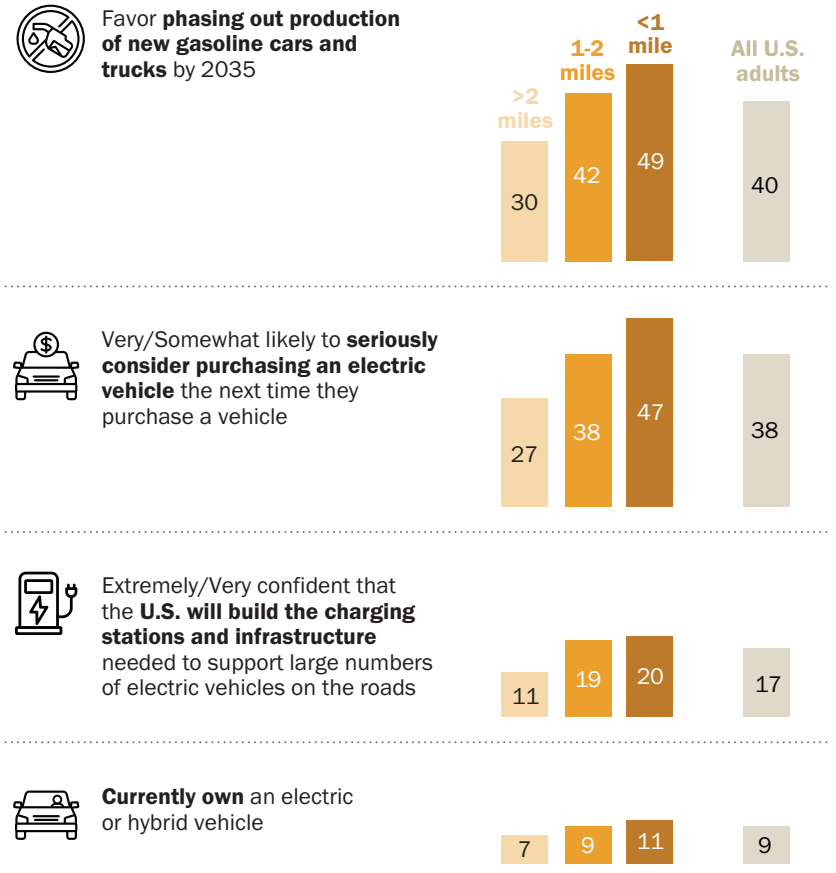
On the whole, the American public is fairly skeptical that the U.S. will be able to build the infrastructure necessary to support large numbers of EVs on the roads.

Just 17% of U.S. adults say they are extremely or very confident in the country's ability to develop this infrastructure. But 20% of those who live within a mile of a public charger say they're extremely or very confident that the U.S. will build the infrastructure necessary to support EVs, almost twice the share (11%) among those who live more than 2 miles from a charging station.

Likewise, those who live closer to public chargers are more likely to favor phasing out production of new gasoline cars and trucks by 2035. This view is held by 49% of those who live within a mile of a public charger, but just 30% of those who live more than 2 miles from one.

Those who live closest to existing charging stations are more confident that the U.S. will build necessary EV infrastructure

% of U.S. adults living ____ from the nearest public electric vehicle charging station who say they (are) ...



Note: Charger location data accessed Nov. 8, 2023.
Source: Survey of U.S. adults conducted May 30-June 4, 2023; U.S. Energy Department, Alternative Fuels Data Center.

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Owning – or considering – an electric vehicle

Americans who live near a public charger are a bit more likely to say they currently own an electric vehicle or hybrid. As of June 2023, 11% of those who live within a mile of a public charger said they owned an EV or hybrid; that figure is 7% for those who live more than 2 miles from a charging station.

Those who live close to public charging infrastructure are also much more likely to consider purchasing an EV in the future. Around half of those within a mile of a public charger say they are very or somewhat likely to consider purchasing an EV, compared with just 27% of those for whom the nearest charger is more than 2 miles away.

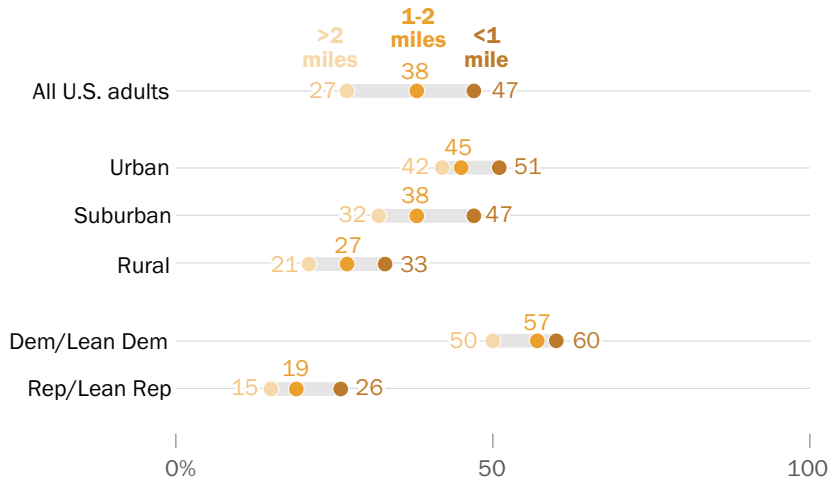
These trends persist if we look at urban, suburban and rural areas separately.[3] For instance, just 17% of rural Americans live within a mile of an EV charger, but those who *do* live close to one are substantially more likely to consider buying an EV in the future (33%) when compared with those who live more than 2 miles from the nearest charging station (21%).

Likewise, Democrats are much more likely than Republicans to say they'd consider buying an EV, but members of *both* parties are more willing to consider an EV when they live near charging infrastructure.

Just 15% of Republicans who live more than 2 miles from a charger say they are very or somewhat likely to consider an

Those who live closest to charging infrastructure are more likely to consider purchasing an EV

*% of U.S. adults living ____ from the nearest public electric vehicle charging station who say they are **very or somewhat likely** to consider purchasing an EV as their next vehicle*



Note: Charger location data accessed Nov. 8, 2023.
Source: Survey of U.S. adults conducted May 30-June 4, 2023; U.S. Energy Department, Alternative Fuels Data Center.

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[3] In addition to the results reported here, we used binary logistic regression to explore these (and other) relationships while accounting for other attributes (in regression parlance, while "controlling" for other factors). For more about this methodology and to see the results of that analysis in more detail, refer to Appendix A.

EV for their next vehicle purchase. But among Republicans who live within a mile of a charger, that share is 26%. And although 60% of Democrats living in close proximity to chargers say they'd consider buying an EV, that share drops to 50% among those whose nearest public charger is over 2 miles away.

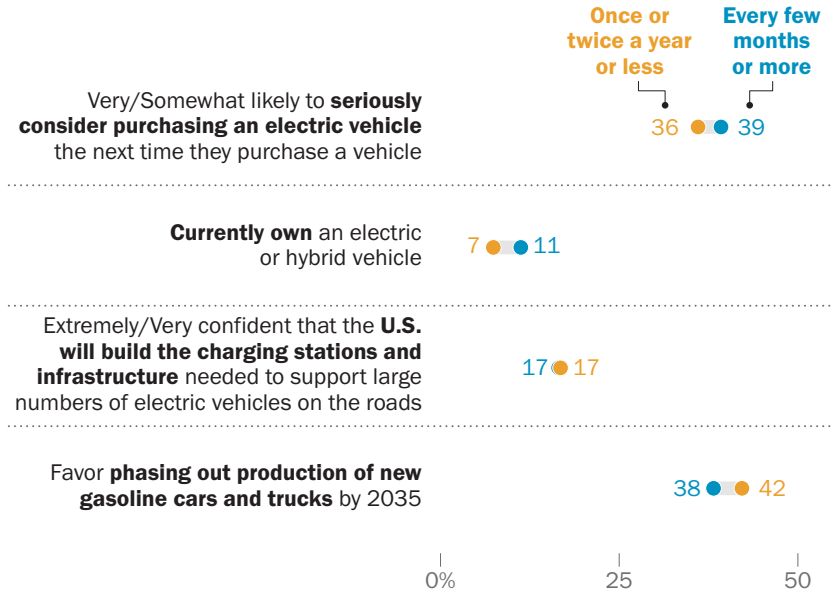
Does road tripping experience affect attitudes toward EVs?

Some transportation experts have suggested that "range anxiety" associated with the need to charge EVs partway through longer road trips is a stumbling block to widespread EV adoption. But our data finds that attitudes toward EVs don't differ that much based on how often people take long car trips.

In fact, those who regularly drive more than 100 miles are slightly *more* likely to say they currently own an electric vehicle or hybrid – and also to say they'd consider purchasing an EV in the future – when compared with those who make these trips less often.

Those who frequently take long road trips and those who don't have similar attitudes toward EVs

% of U.S. adults who take trips longer than 100 miles by car ____ who say they (are) ...



Source: Surveys of U.S. adults conducted May 30-June 4, 2023, and Aug. 7-27, 2023.

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Acknowledgments

This report is a collaborative effort based on the input and analysis of the following individuals:

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Appendix A: Regression analyses

The following table details the results of a series of statistical models predicting various measures related to people's attitudes toward electric vehicles from a set of explanatory variables, or predictors. These models can be interpreted as estimating the effect of proximity to charging infrastructure on these outcomes of interest, while controlling for other factors related to attitudes towards EVs such as urbanicity, political ideology and socioeconomic status.

The models used are binary logistic regression models based on the full sample of U.S. adults surveyed for this study. The analyses are based on the weighted sample, thus adjusting for differences in the probability of selection and nonresponse differences across groups. Results are reported as statistically significant based on a p value threshold of 0.05. Each model omits respondents who gave no response to one or more of the survey questions included in the models.

Four binary outcome variables are considered. Model 1 predicts whether respondents favor phasing out production of new gasoline cars and trucks by 2035; Model 2 predicts whether respondents say they are very or somewhat likely to seriously consider purchasing an EV; Model 3 predicts whether respondents say they are extremely or very confident that the U.S. will build the required infrastructure to support large numbers of EVs on the road; and Model 4 predicts whether respondents already own an electric vehicle or hybrid.

The explanatory variables included in each of these models are as follows:

- **Distance from nearest charging station:** Included in the model as the natural logarithm of the distance from each respondent's home address to the nearest publicly accessible charging station in miles.[4] In the table of results, distances of 1 mile, 2 miles, and 5 miles are compared against a baseline distance of 0.1 miles.

- **Urbanicity:** Included in the model as a categorical variable, with *suburban* and *rural* against a baseline category of *urban*.

- **Partisan identification:** Included in the model as a categorical variable, with *Dem/Lean Dem* and *No lean* against a baseline category of *Rep/Lean Rep*. In the table of results, *Dem/Lean Dem* is compared against *Rep/Lean Rep*.

[4] Including this distance variable in the model on a logarithmic scale means that the effect of a unit change lower in the variable's range will be larger than such a change higher in the range. This helps align the analysis with the way that humans actually perceive distances and ensures that the difference between a distance of 1 mile and a distance of 2 miles is not treated the same way as the difference between a distance of 50 miles and a distance of 51 miles.

- **Age:** Included in the model as each respondent's age in years. In the table of results, ages of 30, 50 and 65 years are compared against a baseline age of 18 years.

- **Educational attainment:** Included in the model as a numeric scale, ranging from 1 (equivalent to less than a high school diploma) to 6 (equivalent to a postgraduate degree). In the table of results, *some college*, *college degree* and *postgraduate degree* are compared against a baseline of *high school graduate*.

- **Frequency of car trips longer than 100 miles:** Included in the model as a numeric scale, ranging from 1 (equivalent to *never*) to 5 (equivalent to *once a week or more*). In the table of results, *Once or twice a year* and *once a week or more* are compared against a baseline of *never*.

- **Home ownership:** Included in the model as a binary variable.

- **Income class:** Included in the model as a numeric scale, ranging from 1 (equivalent to *lower income*) to 5 (equivalent to *upper income*). In the table of results, *middle income* and *upper income* are compared against a baseline of *lower income*.

Each figure in the table shows the difference in predicted probability between two categories or values of an explanatory variable if that variable is a statistically significant predictor of the outcome variable of interest in a given model. For example, in the first column of the table (Model 1), an individual who identifies with or leans toward the Democratic party is 46% more likely than a Republican to favor phasing out production of new gasoline cars and trucks by 2035, holding the other variables at their central tendency (mean or mode, as appropriate). And in the same column (Model 1), someone who lives in a rural area is predicted to be 9% less likely than an urban resident to favor phasing out gas-powered vehicles, again holding the other variables at their respective mean or mode.

The total number of respondents in each analysis ranges between 9,367 and a possible maximum of 10,329 (the total number of respondents who took part in the survey), depending on the number of missing responses to the questions included in the models.

Proximity to charging stations predicts positive attitudes towards EVs, even when controlling for other related factors

Difference in predicted probability of outcome variable associated with specified change in each predictor

	Model 1	Model 2	Model 3	Model 4
Outcome variable:	Favor **phasing out production of new gasoline cars and trucks** by 2035	Very/Somewhat likely **to seriously consider purchasing an electric vehicle** the next time they purchase a vehicle	Extremely/Very confident that the **U.S. will build the charging stations and infrastructure** needed to support large numbers of electric vehicles on the roads	**Currently own** an electric vehicle or hybrid
Predictors:				
Distance from nearest charging station:				
1 mile (vs. 0.1 mi)	-0.05	-0.09	-0.06	-0.04
2 miles	-0.07	-0.11	-0.07	-0.05
5 miles	-0.09	-0.15	-0.09	-0.06
Demographics:				
Suburban (vs. Urban)	NS	NS	NS	NS
Rural	-0.09	-0.08	-0.09	NS
Dem/Lean Dem (vs. Rep/Lean Rep)	+0.46	+0.35	+0.17	+0.03
Age 30 (vs. 18)	-0.04	-0.04	NS	-0.01
Age 50	-0.1	-0.1	NS	-0.03
Age 65	-0.16	-0.17	NS	-0.05
Some college (vs. HS diploma)	+0.04	+0.05	NS	+0.01
College grad	+0.11	+0.14	NS	+0.04
Postgraduate degree	+0.14	+0.18	NS	+0.05
Frequency of trips >100 miles:				
Once or twice a year (vs. Never)	NS	+0.03	NS	+0.02
Once a week or more	NS	+0.1	NS	+0.1
Socioeconomic status:				
Homeowner	NS	NS	NS	+0.05
Middle income (vs. Lower income)	NS	+0.11	NS	NS
Upper income	NS	+0.22	NS	NS
Model N	9,367	9,452	9,452	9,433

Note: Figures shown are differences between selected groups in the predicted probabilities of saying the response shown while other factors are held at their mean or mode using binary logistic regressions. Positive and negative values indicate the direction of effects. "NS" indicates variable coefficient is not statistically significant (based on a threshold p value <0.05).
Source: Surveys of U.S. adults conducted May 30-June 4, 2023, and Aug. 7-27, 2023; U.S. Energy Department, Alternative Fuels Data Center.

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Based on these analyses, proximity to charging infrastructure is a statistically significant predictor of more positive attitudes toward EVs, even when controlling for other factors:

- **Those who live closer to charging stations are more in favor of phasing out production of gas-powered vehicles** (Model 1). When compared with an individual who lives 0.1 miles from the nearest charger, someone who is 1 mile away is 5% less likely to say they favor phasing out production of new gasoline cars and trucks by 2035; someone 2 miles away is 7% less likely and someone 5 miles away is 9% less likely to say this.

- **Those who live closer to charging stations are more likely to consider buying an EV** (Model 2). When compared with an individual who lives 0.1 miles from the nearest charger, someone who is 1 mile away is 9% less likely to say they are very or somewhat likely to seriously consider purchasing an electric vehicle the next time they purchase a vehicle; someone 2 miles away is 11% less likely and someone 5 miles away is 15% less likely to say this.

- **Those who live closer to charging stations are more confident that the U.S. will build the required infrastructure** (Model 3). When compared with an individual who lives 0.1 miles from the nearest charger, someone who is 1 mile away is 6% less likely to say they are extremely or very confident that the U.S. will build the charging stations and infrastructure needed to support large numbers of electric vehicles on the roads; someone 2 miles away is 7% less likely and someone 5 miles away is 9% less likely to say this.

- **Those who live closer to charging stations are more likely to already own an electric vehicle or hybrid** (Model 4). When compared with an individual who lives 0.1 miles from the nearest charger, someone who is 1 mile away is 4% less likely to already own an electric vehicle or hybrid; someone 2 miles away is 5% less likely and someone 5 miles away is 6% less likely to own one.

Appendix B: Vehicle-to-charger ratios for each state

Electric vehicle registrations and charging stations by state

State	Public charging stations	Registered EVs	EVs per public charging station
Alabama	361	13100	36.3
Alaska	62	2700	43.5
Arizona	1179	86200	73.1
Arkansas	308	7600	24.7
California	15710	1264700	80.5
Colorado	2110	83900	39.8
Connecticut	756	35100	46.4
Delaware	187	8200	43.9
District of Columbia	341	9100	26.7
Florida	3228	213800	66.2
Georgia	1933	78200	40.5
Hawaii	354	25400	71.8
Idaho	181	9400	51.9
Illinois	1248	92600	74.2
Indiana	536	27800	51.9
Iowa	354	11100	31.4
Kansas	514	11900	23.2
Kentucky	301	12000	39.9
Louisiana	239	8800	36.8
Maine	471	10700	22.7
Maryland	1605	69000	43
Massachusetts	2911	79900	27.4
Michigan	1394	57400	41.2
Minnesota	770	36200	47
Mississippi	142	4000	28.2
Missouri	1188	28300	23.8
Montana	124	5000	40.3
Nebraska	260	7500	28.8
Nevada	572	41700	72.9
New Hampshire	231	11800	51.1
New Jersey	1230	113800	92.5
New Mexico	293	11000	37.5
New York	3796	144500	38.1
North Carolina	1504	64400	42.8
North Dakota	95	1200	12.6

Ohio	1555	51900	33.4
Oklahoma	333	27800	83.5
Oregon	1176	69500	59.1
Pennsylvania	1667	72800	43.7
Rhode Island	300	7700	25.7
South Carolina	515	20200	39.2
South Dakota	91	2200	24.2
Tennessee	840	30900	36.8
Texas	3157	191800	60.8
Utah	880	38200	43.4
Vermont	376	9500	25.3
Virginia	1454	78300	53.9
Washington	2104	135500	64.4
West Virginia	137	3300	24.1
Wisconsin	572	25700	44.9
Wyoming	95	1400	14.7

Note: Charger location data accessed Feb. 27, 2024; vehicle registration counts reflect end of 2022.
Source: U.S. Energy Department, Alternative Fuels Data Center.

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Methodology

American Trends Panel survey methodology

The American Trends Panel (ATP), created by Pew Research Center, is a nationally representative panel of randomly selected U.S. adults. Panelists participate via self-administered web surveys. Panelists who do not have internet access at home are provided with a tablet and wireless internet connection. Interviews are conducted in both English and Spanish. The panel is being managed by Ipsos.

Data in this report is drawn from ATP Wave 128, conducted from May 30 to June 4, 2023, and includes an oversample of Hispanic adults, non-Hispanic Asian adults, non-Hispanic Black adults and 18- to 29-year-olds in order to provide more precise estimates of the opinions and experiences of these smaller demographic subgroups. These oversampled groups are weighted back to reflect their correct proportions in the population. A total of 10,329 panelists responded out of 12,178 who were sampled, for a response rate of 85%. The cumulative response rate accounting for nonresponse to the recruitment surveys and attrition is 3%. The break-off rate among panelists who logged on to the survey and completed at least one item is 2%. The margin of sampling error for the full sample of 10,329 respondents is plus or minus 1.5 percentage points.

Panel recruitment

The ATP was created in 2014, with the first cohort of panelists invited to join the panel at the end of a large, national, landline and cellphone random-digit dial survey that was conducted in both English and Spanish. Two additional recruitments were conducted using the same method in 2015 and 2017, respectively. Across these three surveys, a total of 19,718 adults were invited to join the ATP, of whom 9,942 (50%) agreed to participate.

American Trends Panel recruitment surveys

Recruitment dates	Mode	Invited	Joined	Active panelists remaining
Jan. 23 to March 16, 2014	Landline/ cell RDD	9,809	5,338	1,498
Aug. 27 to Oct. 4, 2015	Landline/ cell RDD	6,004	2,976	879
April 25 to June 4, 2017	Landline/ cell RDD	3,905	1,628	432
Aug. 8 to Oct. 31, 2018	ABS	9,396	8,778	4,113
Aug. 19 to Nov. 30, 2019	ABS	5,900	4,720	1,465
June 1 to July 19, 2020; Feb. 10 to March 31, 2021	ABS	3,197	2,812	1,541
May 29 to July 7, 2021; Sept. 16 to Nov. 1, 2021	ABS	1,329	1,162	785
May 24 to Sept. 29, 2022	ABS	3,354	2,869	1,691
	Total	**42,894**	**30,283**	12,404

Note: RDD is random-digit dial; ABS is address-based sampling. Approximately once per year, panelists who have not participated in multiple consecutive waves or who did not complete an annual profiling survey are removed from the panel. Panelists also become inactive if they ask to be removed from the panel.

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In August 2018, the ATP switched from telephone to address-based recruitment. Invitations were sent to a stratified, random sample of households selected from the U.S. Postal Service's Delivery Sequence File. Sampled households receive mailings asking a randomly selected adult to complete a survey online. A question at the end of the survey asks if the respondent is willing to join the ATP. In 2020 and 2021 another stage was added to the recruitment. Households that did not respond to the online survey were sent a paper version of the questionnaire, $5 and a postage-paid return envelope. A subset of the adults who returned the paper version of the survey were invited to join the ATP. This subset of adults received a follow-up mailing with a $10 pre-incentive and invitation to join the ATP.

Across the five address-based recruitments, a total of 23,176 adults were invited to join the ATP, of whom 20,341 agreed to join the panel and completed an initial profile survey. In each household, one adult was selected and asked to go online to complete a survey, at the end of which they were invited to join the panel. Of the 30,283 individuals who have ever joined the ATP, 12,404 remained active panelists and continued to receive survey invitations at the time this survey was conducted.

The U.S. Postal Service's Delivery Sequence File has been estimated to cover as much as 98% of the population, although some studies suggest that the coverage could be in the low 90% range.[5] The American Trends Panel never uses breakout routers or chains that direct respondents to additional surveys.

Sample design

The overall target population for this survey was noninstitutionalized persons ages 18 and older living in the U.S., including Alaska and Hawaii. It featured a stratified random sample from the ATP in which Hispanic adults, non-Hispanic Asian adults, non-Hispanic Black adults and 18- to 29-year-olds were selected with certainty. The remaining panelists were sampled at rates designed to ensure that the share of respondents in each stratum is proportional to its share of the U.S. adult population to the greatest extent possible. Respondent weights are adjusted to account for differential probabilities of selection as described in the Weighting section below.

Questionnaire development and testing

The questionnaire was developed by Pew Research Center in consultation with Ipsos. The web program was rigorously tested on both PC and mobile devices by the Ipsos project management team and Pew Research Center researchers. The Ipsos project management team also populated

[5] AAPOR Task Force on Address-based Sampling. 2016. "AAPOR Report: Address-based Sampling."

test data that was analyzed in SPSS to ensure the logic and randomizations were working as intended before launching the survey.

Incentives

All respondents were offered a post-paid incentive for their participation. Respondents could choose to receive the post-paid incentive in the form of a check or a gift code to Amazon.com or could choose to decline the incentive. Incentive amounts ranged from $5 to $20 depending on whether the respondent belongs to a part of the population that is harder or easier to reach. Differential incentive amounts were designed to increase panel survey participation among groups that traditionally have low survey response propensities.

Data collection protocol

The data collection field period for this survey was May 30 to June 4, 2023. Postcard notifications were mailed to all ATP panelists with a known residential address on May 30.

Invitations were sent out in two separate launches: soft launch and full launch. Sixty panelists were included in the soft launch, which began with an initial invitation sent on May 30. The ATP panelists chosen for the initial soft launch were known responders who had completed previous ATP surveys within one day of receiving their invitation. All remaining English- and Spanish-speaking sampled panelists were included in the full launch and were sent an invitation on May 31.

All panelists with an email address received an email invitation and up to two email reminders if they did not respond to the survey. All ATP panelists who consented to SMS messages received an SMS invitation and up to two SMS reminders.

Invitation and reminder dates, ATP Wave 128

	Soft launch	Full launch
Initial invitation	May 30, 2023	May 31, 2023
First reminder	June 2, 2023	June 2, 2023
Final reminder	June 4, 2023	June 4, 2023

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Data quality checks

To ensure high-quality data, the Center's researchers performed data quality checks to identify any respondents showing clear patterns of satisficing. This includes checking for very high rates of leaving questions blank, as well as always selecting the first or last answer presented. As a result of this checking, 19 respondents were removed from the survey dataset. An additional 70 respondents were removed from the survey due to a sample loading error which occurred during survey launch. All 89 ATP respondents were excluded from the data prior to weighting and analysis.

Weighting

The ATP data is weighted in a multistep process that accounts for multiple stages of sampling and nonresponse that occur at different points in the survey process. First, each panelist begins with a base weight that reflects their probability of selection for their initial recruitment survey. These weights are then rescaled and adjusted to account for changes in the design of ATP recruitment surveys from year to year. Finally, the weights are calibrated to align with the population benchmarks in the accompanying table to correct for nonresponse to recruitment surveys and panel attrition. If only a subsample of panelists was invited to participate in the wave, this weight is adjusted to account for any differential probabilities of selection.

American Trends Panel weighting dimensions

Variable	Benchmark source
Age (detailed) Age x Gender Education x Gender Education x Age Race/Ethnicity x Education Born inside vs. outside the U.S. among Hispanics and Asian Americans Years lived in the U.S.	2021 American Community Survey (ACS)
Census region x Metro/Non-metro	2021 CPS March Supplement
Volunteerism	2021 CPS Volunteering & Civic Life Supplement
Voter registration	2018 CPS Voting and Registration Supplement
Party affiliation Frequency of internet use Religious affiliation	2022 National Public Opinion Reference Survey (NPORS)
Additional weighting dimensions applied within Black adults	
Age Gender Education Hispanic ethnicity	2021 American Community Survey (ACS)
Voter registration	2018 CPS Voting and Registration Supplement
Party affiliation Religious affiliation	2022 National Public Opinion Reference Survey (NPORS)

Note: Estimates from the ACS are based on noninstitutionalized adults. Voter registration is calculated using procedures from Hur, Achen (2013) and rescaled to include the total U.S. adult population.

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Among the panelists who completed the survey, this weight is then calibrated again to align with the population benchmarks identified in the accompanying table and

trimmed at the 1st and 99th percentiles to reduce the loss in precision stemming from variance in the weights. Sampling errors and tests of statistical significance take into account the effect of weighting.

The following table shows the unweighted sample sizes and the error attributable to sampling that would be expected at the 95% level of confidence for different groups in the survey.

Sample sizes and margins of error, ATP Wave 128

Group	Unweighted sample size	Plus or minus ...
Total sample	10,329	1.5 percentage points
<1 mile from EV charger	4,031	2.4 percentage points
1-2 miles	2,544	3.0 percentage points
>2 miles	3,536	2.5 percentage points
Ages 18-29	861	4.5 percentage points
30-49	3,282	2.5 percentage points
50-64	3,006	2.6 percentage points
65+	3,143	2.5 percentage points
Urban	2,610	3.1 percentage points
Suburban	5,305	2.0 percentage points
Rural	2,377	3.0 percentage points
Rep/lean Rep	4,716	2.1 percentage points
Dem/lean Dem	5,336	2.1 percentage points
H.S. graduate or less	1,914	3.1 percentage points
Some college	3,296	2.5 percentage points
College graduate +	5,086	1.8 percentage points
Lower income	2,208	3.3 percentage points
Middle income	5,030	2.1 percentage points
Upper income	2,496	2.7 percentage points

Note: This survey includes oversamples of Hispanic adults, non-Hispanic Asian adults, non-Hispanic Black adults and 18- to 29-year-olds. Unweighted sample sizes do not account for the sample design or weighting and do not describe a group's contribution to weighted estimates. See the Sample design and Weighting sections above for details.

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Sample sizes and sampling errors for other subgroups are available upon request. In addition to sampling error, one should bear in mind that question wording and practical difficulties in conducting surveys can introduce error or bias into the findings of opinion polls.

Dispositions and response rates

Final dispositions, ATP Wave 128

	AAPOR code	Total
Completed interview	1.1	10,329
Logged on to survey; broke off	2.12	186
Logged on to survey; did not complete any items	2.1121	100
Never logged on (implicit refusal)	2.11	1,467
Survey completed after close of the field period	2.27	7
Completed interview but was removed for data quality		89
Screened out		0
Total panelists sampled for the survey		**12,178**
Completed interviews	I	10,330
Partial interviews	P	0
Refusals	R	1,753
Non-contact	NC	7
Other	O	89
Unknown household	UH	0
Unknown other	UO	0
Not eligible	NE	0
Total		**12,178**
AAPOR RR1 = I / (I+P+R+NC+O+UH+UO)		85%

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Cumulative response rate as of ATP Wave 128

	Total
Weighted response rate to recruitment surveys	12%
% of recruitment survey respondents who agreed to join the panel, among those invited	71%
% of those agreeing to join who were active panelists at start of Wave 128	48%
Response rate to Wave 128 survey	85%
Cumulative response rate	**3%**

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Adjusting income and defining income tiers

To create upper-, middle- and lower-income tiers, respondents' 2021 family incomes were adjusted for differences in purchasing power by geographic region and household size. "Middle-income" adults live in families with annual incomes that are two-thirds to double the median family income in the panel (after incomes have been adjusted for the local cost of living and household size). The middle-income range for the American Trends Panel is about $43,800 to $131,500 annually for an average family of three. Lower-income families have incomes less than roughly $43,800, and upper-income families have incomes greater than roughly $131,500 (all figures are expressed in 2021 dollars).

Based on these adjustments, 29% of respondents in Wave 128 are lower income, 47% are middle income and 18% fall into the upper-income tier. An additional 6% either didn't offer a response to the income question or the household size question.

Here is more information about how the income tiers were determined.

Additional survey questions

Additional questions used for this analysis were asked on ATP Wave 133. Read more about the methodology for Wave 133.

Sources for geographic data

EV charger locations

Data on the locations of EV chargers in the United States comes from the U.S. Energy Department's Office of Energy Efficiency & Renewable Energy and its Alternative Fuels Data Center, which maintains a database of alternative fueling stations that includes EV chargers.

EV registrations

Data on the number of electric vehicles registered in each state comes from the U.S. Energy Department's Office of Energy Efficiency & Renewable Energy and its Alternative Fuels Data Center, which maintains a database of vehicle registration counts and associated fuel types by state.

Urban and rural census blocks

Data on whether a census block is considered an urban or rural area is based on the Census Bureau's updated urban-rural classification scheme.

Survey question wording and topline

2023 PEW RESEARCH CENTER'S AMERICAN TRENDS PANEL
WAVE 128 – EV TOPLINE
May 30-June 4, 2023
N=10,329

NOTE: ALL NUMBERS ARE PERCENTAGES UNLESS OTHERWISE NOTED. ROWS/COLUMNS MAY NOT TOTAL 100% DUE TO ROUNDING. THE QUESTIONS PRESENTED BELOW ARE PART OF A LARGER SURVEY CONDUCTED ON THE AMERICAN TRENDS PANEL. THE OTHER QUESTIONS ON THIS SURVEY HAVE BEEN PREVIOUSLY RELEASED.

	Sample size	**Margin of error at 95% confidence level**
U.S. adults	10,329	+/- 1.5 percentage points

ASK ALL:
EVCAR3 Do you favor or oppose phasing out the production of new gasoline cars and trucks by the year 2035?

	Favor	Oppose	No answer
May 30-Jun 4, 2023	40	59	1
May 2-8, 2022	43	55	2
Apr 20-29, 2021	47	51	3

ASK ALL:
EVEREAD How confident are you that the U.S. will build the charging stations and infrastructure needed to support large numbers of electric vehicles on the roads? **[RANDOMIZE ORDER OF RESPONSE OPTIONS 1-5 AND 5-1 FOR RANDOM HALF SAMPLE]**

May 30-Jun 4, 2023	
5	Extremely confident
12	Very confident
30	Somewhat confident
26	Not too confident
27	Not at all confident
<1	No answer

ASK ALL:
EVCAR2 The next time you purchase a vehicle, how likely are you to seriously consider purchasing an electric vehicle?

	Very likely	Somewhat likely	Not too likely	Not at all likely	I do not expect to purchase a vehicle	No answer
May 30-Jun 4, 2023	15	23	22	28	13	<1
May 2-8, 2022	16	25	21	24	13	<1
Apr 20-29, 2021	15	24	24	23	14	<1

ASK ALL:
EVCAR1 Do you currently have an electric or hybrid vehicle?

	Yes	No	No answer
May 30-Jun 4, 2023	9	90	<1
May 2-8, 2022	9	91	<1
Apr 20-29, 2021	7	93	<1

2023 PEW RESEARCH CENTER'S AMERICAN TRENDS PANEL
WAVE 133 — EV TOPLINE
AUGUST 7-27, 2023
N=11,945

NOTE: ALL NUMBERS ARE PERCENTAGES UNLESS OTHERWISE NOTED. ROWS/COLUMNS MAY NOT TOTAL 100% DUE TO ROUNDING. THE QUESTIONS PRESENTED BELOW ARE PART OF A LARGER SURVEY CONDUCTED ON THE AMERICAN TRENDS PANEL. THE OTHER QUESTIONS ON THIS SURVEY HAVE BEEN PREVIOUSLY RELEASED.

	Sample size	Margin of error at 95% confidence level
U.S. adults	11,945	+/- 1.4 percentage points

ASK ALL:

LONGTRIPS How often do you take car trips that are 100 miles or more? **[RANDOMIZE RESPONSE OPTIONS 1-5 OR 5-1]**

Aug 7-27 2023	
5	Once a week or more
15	Around once a month
28	Every few months
40	Once or twice a year
13	Never
<1	No answer