BlastPoint

2023

EV ADOPTION OUTLOOK

Understanding EV Demand Patterns in the US

Based on BlastPoint's AI-powered models

Contents

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Overview: Using AI to Understand EV Demand Across the US

2022 represented a tipping point for EV adoption in the US. Kelly Blue Book reported that while car sales fell overall, EV sales went up by a "shocking" 65% over 2021. EVs represented 5.8% of new car sales in 2022, up from 3.2% in 2021. Even more significantly, EVs became more affordable, with the average price per car going down 5.5% - lower than the cost of the average luxury car, at $61K. In total, more than 800K EVs were sold in the US in 2022.

What changed last year to support faster EV growth? First, gas prices soared to the highest they've ever been as a result of international unrest. Many consumers were paying double the amount they had in 2021 to fill up their tanks, enough to push some to go electric. Second, the Inflation Reduction Act (IRA) was signed into law in August 2022, which included some key benefits to lower the cost of EVs and expand charging infrastructure. These two events helped take the US past the 5% sales tipping point for EVs, but does the US have the charging infrastructure in place to sustain growth and meet 2030 climate goals?

The Inflation Reduction Act & EVs

Meant to support the Biden Administration's goal to "reduce emissions by more than 1,000 million metric tons of CO2e in 2030" (*Inflation Reduction Act Guidebook*), the IRA expanded the Section 30D $7,500 EV tax credit through 2032 and removed the previous sales cap of 200K per automaker. Per the IRA, tax credits can be transferred to auto dealers and be received directly as a rebate starting in 2024, making EVs more affordable at the point of sale (*Electrification Coalition*). Used EVs are also now eligible for a tax credit of up to $4,000 or 30% of the sales price, making EVs more affordable to the middle class. Another significant provision of the IRA is the new commercial tax credit of 6% with a maximum credit of $100,000 per unit (up from $30,000 per property) for charging units - with the stipulation that chargers are placed in a low-income community or non-urban area. This new provision has the potential to expand charging infrastructure equitably in 2023 and beyond. The key to successful rollout, however, is understanding *where* to strategically expand charging infrastructure.

Is EV demand being suppressed by inadequate charging infrastructure?

Concerns about access to charging are the main reason, aside from sticker shock, why consumers hesitate to go electric. Having public and private charging options nearby assures consumers that they won't be stranded at a critical moment, or have to go out of their way to charge. Research from the World Economic Forum shows that expanding charging infrastructure removes common barriers to going electric and is key for transportation equity and meeting climate goals.

To understand the impact of charging infrastructure on EV adoption in 2022, BlastPoint utilized our proprietary AI-powered technology to analyze multiple datasets related to EV ownership and charging, including housing, EV registration, income, and charging location data. We found that housing type (single or multi-family residence), home ownership, and availability of nearby charging *did* suppress EV demand in 2022. **Based on our model, we estimate that up to 315K more EVs could have been sold in 2022 - which would have led to sales over 1M - if more public and private charging were available** (see p. 9). We found that neighborhoods with a high population density had the most suppressed EV demand due to few available public chargers (or high competition for existing chargers) and no options for private charging, particularly in rentals. BlastPoint's Demand Suppression Model is designed to identify where suppressed demand is occurring and support targeted infrastructure growth, removing charging as an obstacle.

Understanding levels of charging demand across the US

Where are EV chargers in highest and lowest demand? Being able to identify these areas is key to supporting EV growth. BlastPoint created Charging Demand Segments that weigh relevant datasets for every Census Tract, such as population density, EV registrations, and housing types, and assign a score of Highest Demand, High Demand, Moderate Demand, Low Demand, or Lowest Demand to every Tract (see p. 5). Areas with Highest and High Demand will need more chargers to support EVs currently in the neighborhood. Areas with Moderate, Low, or Lowest Demand often have very few EVs registered and few, if any, charging stations. These areas will need charging infrastructure in order to make EV ownership feasible within the neighborhood.

Areas with few or no EV chargers are called charging deserts, and they are a major obstacle to equitable EV growth. These neighborhoods, whether urban or rural, often have a history of underinvestment that has led to their current lag in EV adoption (see p. 11). BlastPoint's Charging Demand Segments are a tool that empowers stakeholders in these neighborhoods to benefit from the IRA's commercial charging credit, which enables businesses and landlords to install chargers and increase transportation equity.

Who's Ready to Adopt Now?

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BlastPoint's EV adoption model shows where, across the country, consumers are on the leading edge of EV adoption. Our model divides the US into three segments: consumers ready to adopt now (green), ready to adopt soon (yellow), and those experiencing roadblocks to adoption (red). There are distinct characteristics that "green" consumers have in common, even while there are also regional differences in who green consumers actually are. Below we call out the data factors that are predictive of readiness to adopt across the US. As the price of EVs lowers and more public charging becomes available, these factors are likely to change.

Ready-to-Adopt Data Factors

- Higher Income
- Own a single-family home
- Access to Private Parking
- Public Charging Nearby
- College & Graduate Degrees
- Own 2+ Cars
- More likely to be married

The map below shows a national view of BlastPoint's EV adoption segments. It also zooms in on four distinct areas of the country with a higher density of consumers ready to adopt EVs. These inset maps were created using the BlastPoint platform and show "green" Tracts at the neighborhood level, as well as charging stations available nearby.

Legend:
- Ready to Adopt
- Ready to Adopt Soon
- Roadblocks to Adoption
- Public EV Charging Station
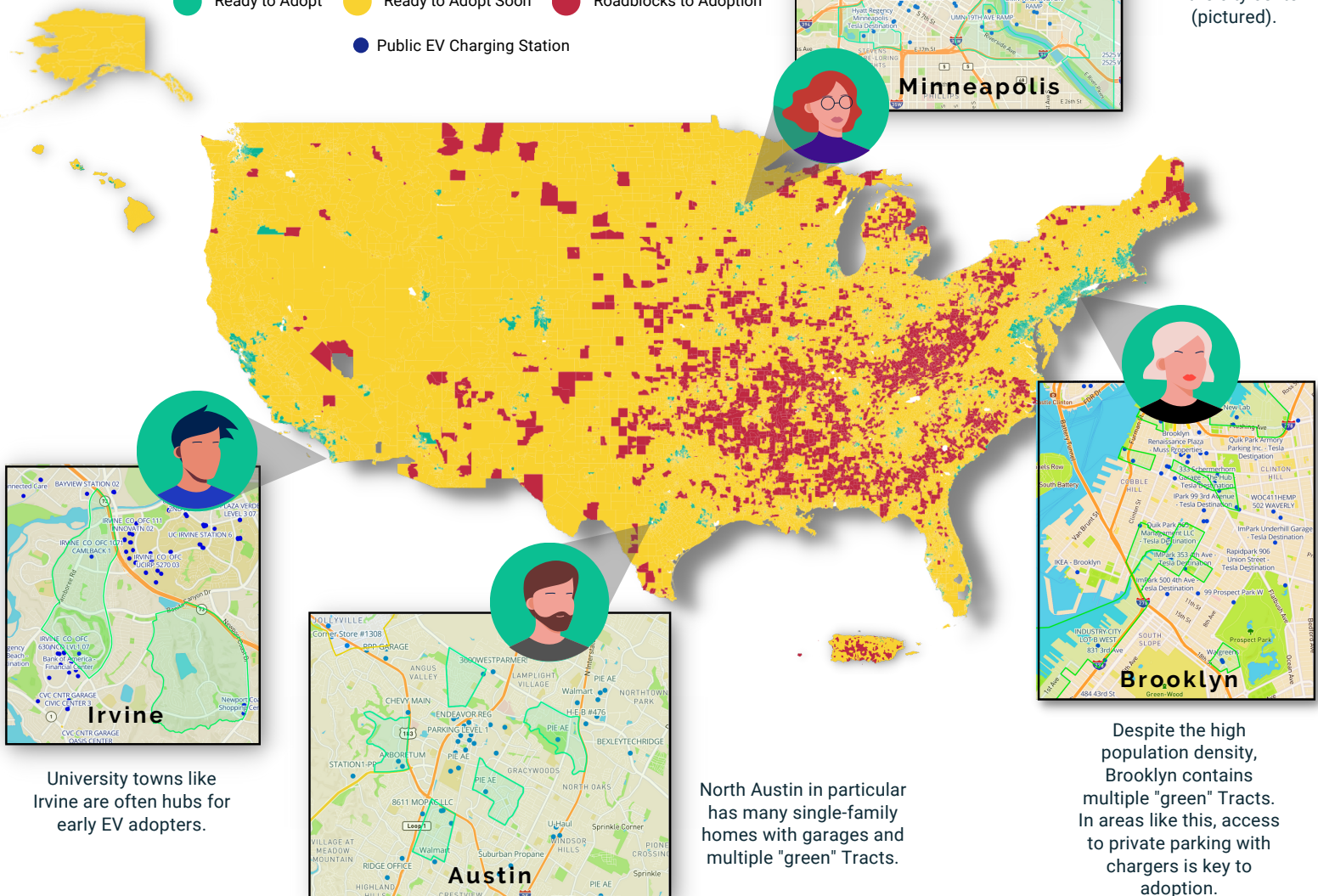
Nestled in a sea of yellow, Minneapolis stands out in the Upper Midwest for EV readiness, even in the city center (pictured).

Minneapolis

Irvine

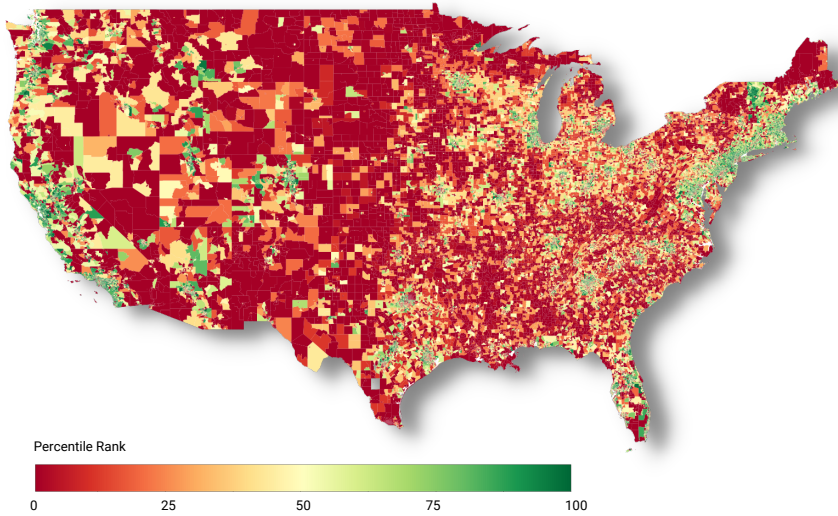University towns like Irvine are often hubs for early EV adopters.

Austin

North Austin in particular has many single-family homes with garages and multiple "green" Tracts.

Brooklyn

Despite the high population density, Brooklyn contains multiple "green" Tracts. In areas like this, access to private parking with chargers is key to adoption.

The State of EV Adoption in the U.S.

BlastPoint

Percentile of total EV registrations, Continental US

Percentile Rank

0   25   50   75   100

EV Adoption Readiness, Continental US

🟢 Ready to Adopt   🟡 Ready to Adopt Soon   🔴 Roadblocks to Adoption

EV registration patterns from 2021 (the most complete dataset available as of this writing) indicate that, with a few exceptions, major metro areas are epicenters for EV adoption. Higher registrations there make sense, given the heavier population density. However, we see large areas of the US - particularly in the Midwest, the South, and the Southwest - that have zero EV registrations. These are largely rural areas with small towns and cities. **The dominant color for EV registrations in the US is RED**.

BlastPoint has predicted EV adoption readiness at the Census Tract level across the US, based on predictive datasets such as income, housing types, presence of public charging stations, and more (see p. 2). Zooming out and looking at our model at the national level, we see "green" and "red" patterns similar to the registration map above. However, we also note that some red areas in the registration map - places with no or very few EVs - are "yellow" in our adoption model map, indicating that consumers there could be open to adopting within the next five years. **The dominant color for EV Adoption Readiness is YELLOW**, indicating that growth can occur, especially if more public chargers are installed nearby and the up-front cost of EVs decreases.

Case Study: Targeting "Ready to Adopt" Consumers

A large, Mid-Atlantic, investor owned electric utility sought to grow its residential EV programs and wanted to drive awareness of and enrollment in EV Rebate and Variable Rate offers. Additionally, they wanted to get more engagement with their web-based EV purchasing tool.

Activate Data-Driven Insights

BlastPoint's Customer Intelligence Platform segmented our partner's customers by their likeliness to adopt EVs.

Target the Right Customers in the Right way

With the highest propensity EV segment in hand, teams targeted those customers with messaging that resonated and saw engagement numbers soar.
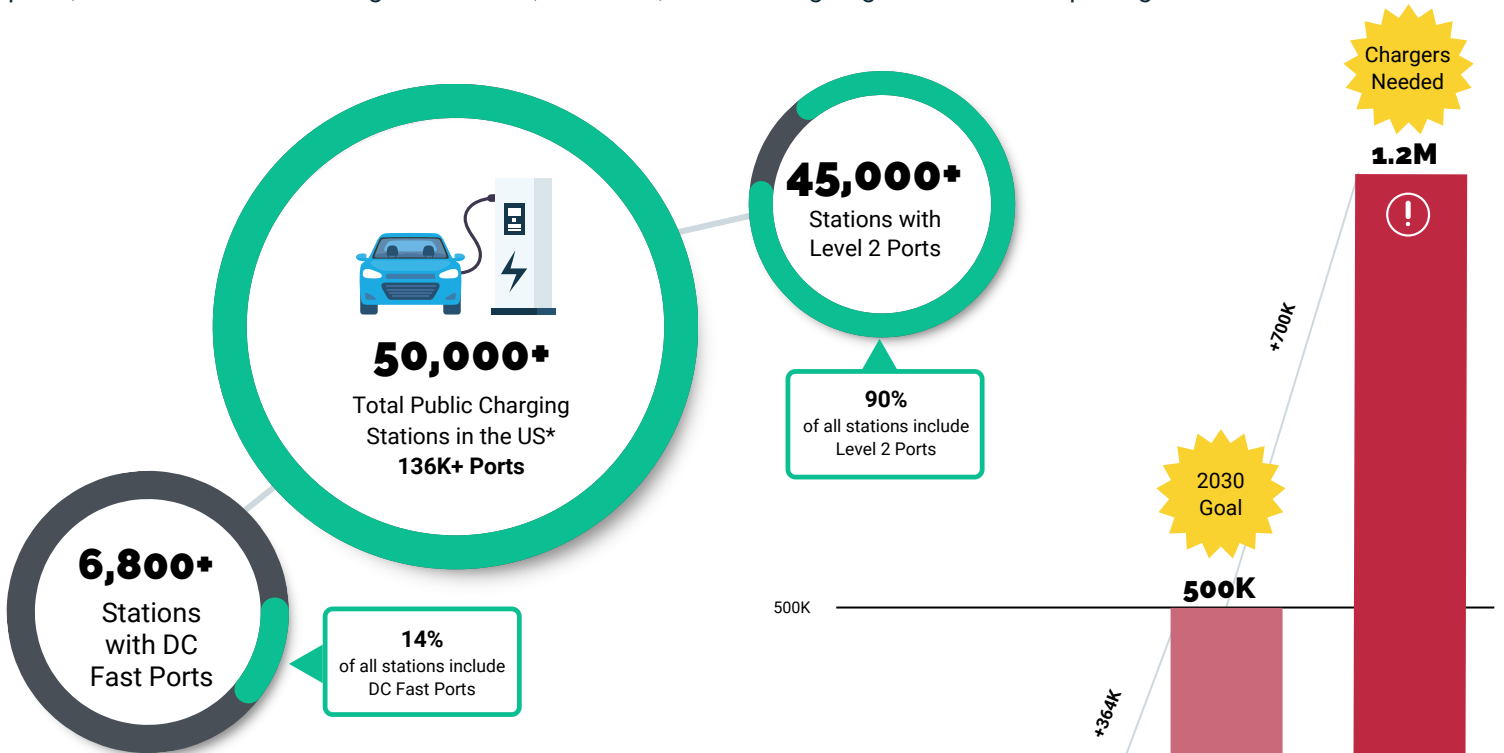
98% Enrollment Increase in EV Variable Rate Program

55% Increase in EV Rebate Enrollment

500% Increase in EV Webpage Views

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Charging Infrastructure Growth

The World Economic Forum reported that there are three major roadblocks to buying an EV: 1) high upfront cost, 2) an inadequate number of public charging stations, and 3) range anxiety. Two out of these three roadblocks can be removed by expanding access to public chargers around the country. While the US made a lot of progress in 2022, adding over 22K new ports, there's still a lot of chargers to install, and soon, if the US is going to meet EV adoption goals.

50,000+
Total Public Charging Stations in the US*
136K+ Ports

45,000+
Stations with Level 2 Ports

90%
of all stations include Level 2 Ports

6,800+
Stations with DC Fast Ports

14%
of all stations include DC Fast Ports

Chargers Needed

1.2M

+700K

2030 Goal

500K

+364K

136K

+22K

114K

500K

250K

Charging Ports in 2021

Charging Ports in 2022

Public ports to be installed by 2030

Public ports *actually needed* to support 100% ZEV sales in 2030

The US government's goal is to reach 500K publicly available chargers by 2030. Another federal goal is to sell only ZEVs on the new car market by 2030. The problem, according to McKinsey, is that up to 1.2M public chargers will actually be needed to support that many ZEVs on the road. That means 452K more chargers need to open up in 7 years to meet the stated goal, and over 1.1M more to properly support a ban on new gas vehicle sales. Additionally, a higher percentage of DC fast chargers will be needed to make EVs viable for long-range use.

This is the number of charging stations reported by the DoE in Jan. 2023. Note that some stations have multiple plugs, and many stations provide no information on the number and type of plugs available.

Case Study: Infrastructure Planning

ATCO, a large energy company operating in Alberta & northern Canada, wanted to get ahead of the EV adoption curve in the region by targeting commercial customers most likely to become partners in EV charging infrastructure expansion.

220 K
Potential EV Charging Partners Identified

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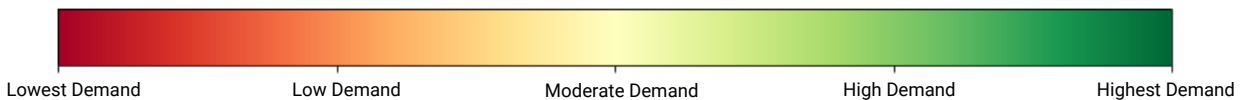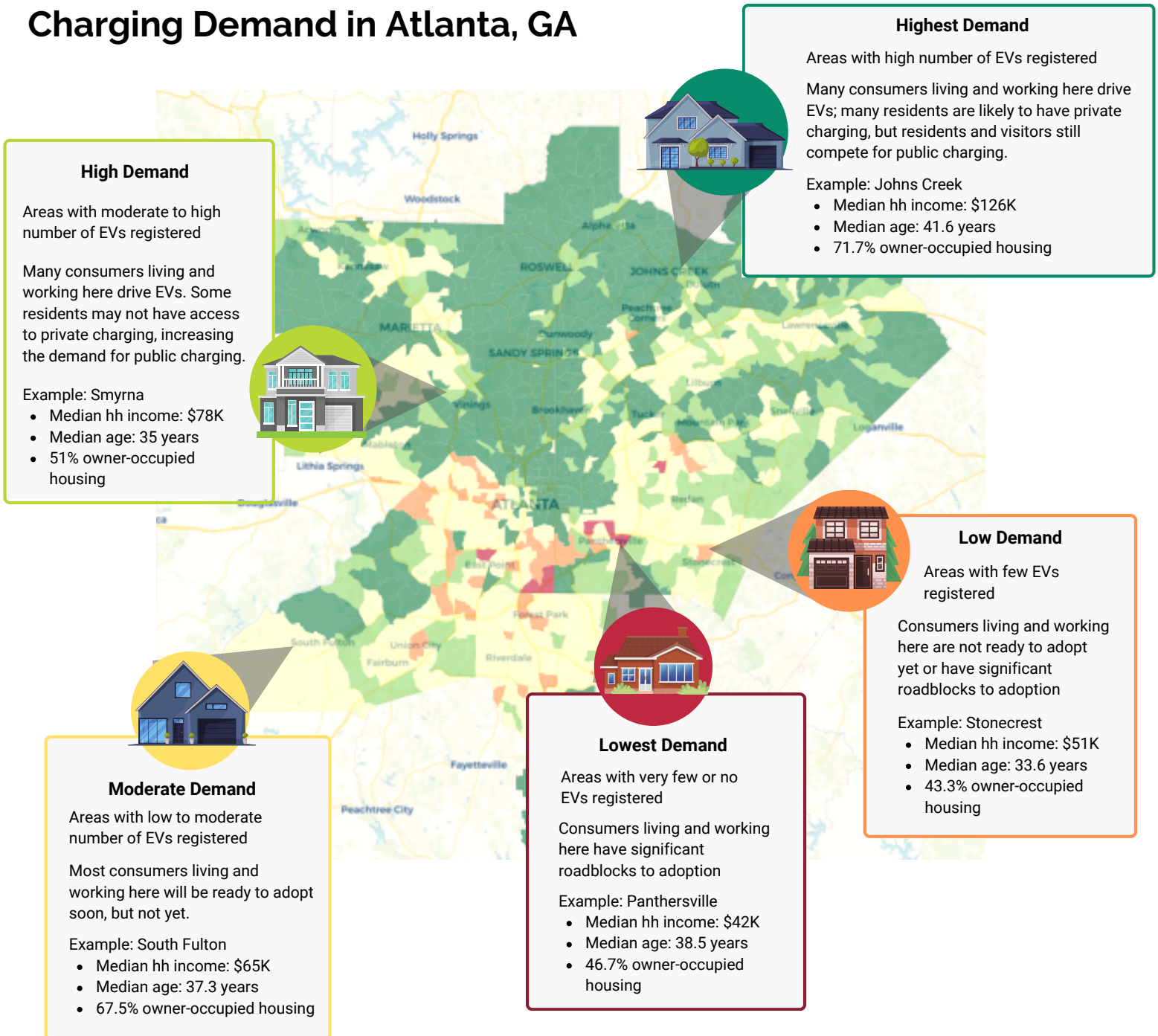### Enhanced Data Reveals Top Commercial Targets

BlastPoint's technology created commercial personas representing ATCO's most likely EV infrastructure partners & adopters.

Data-Driven Insights Optimize Processes

With data-driven commercial personas in hand, the Customer Engagement team knew exactly who to target and who not to bother, and what to say in order to incentivize unique customers in different regions.

Understanding Charging Demand

In order for the US to meet electrification goals, public charging infrastructure must be expanded strategically across the country, particularly in areas where drivers need them most. BlastPoint's Charging Demand Segments provide a way to understand charging needs in every neighborhood and to respond with appropriate infrastructure, which is fundamental for growing EV adoption. Charging Demand Segments are based on EV registration data as well as other attributes, such as housing types, that indicate each Census Tract's level of demand for charging.
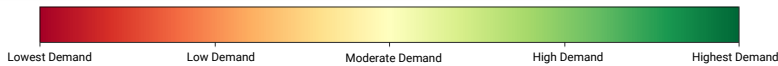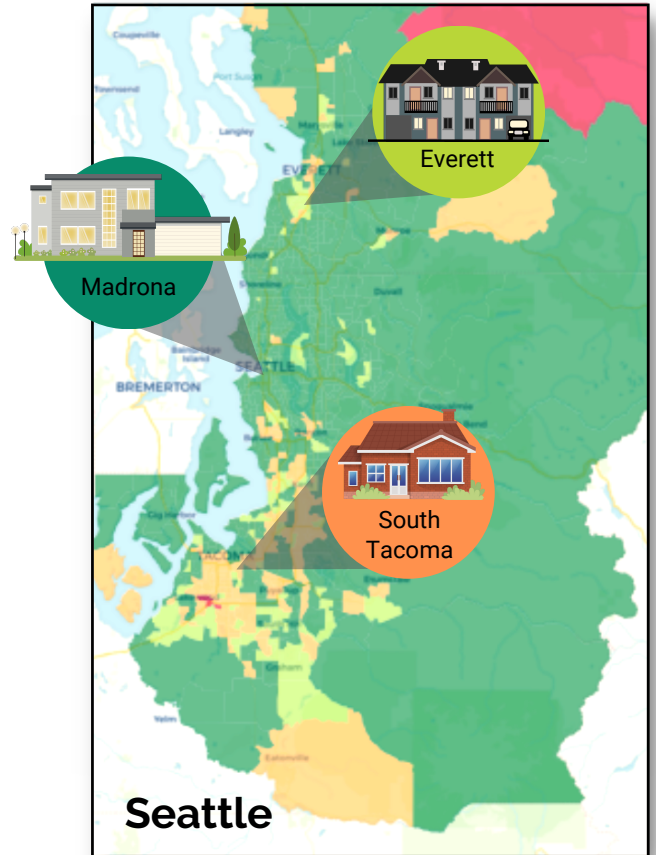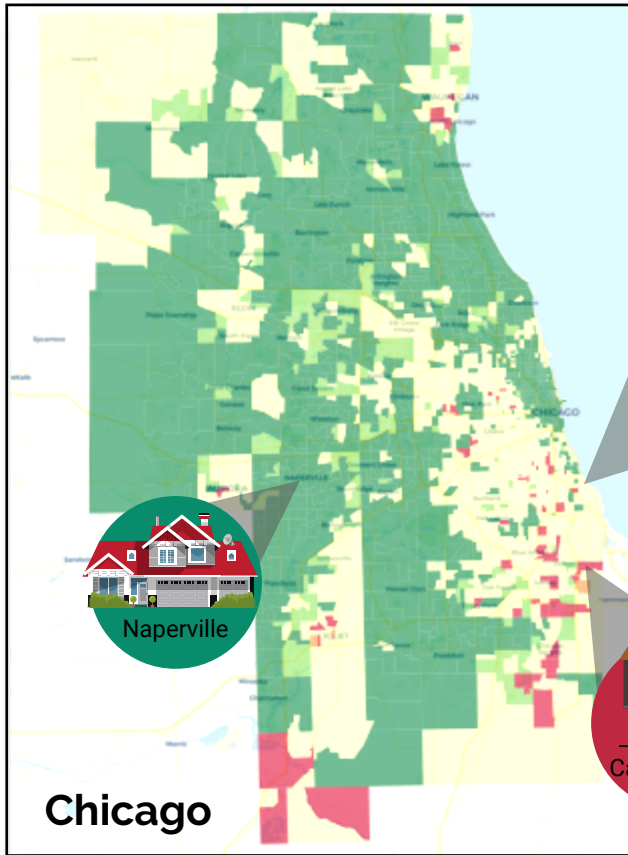
Charging Demand in Atlanta, GA

Highest Demand

Areas with high number of EVs registered

Many consumers living and working here drive EVs; many residents are likely to have private charging, but residents and visitors still compete for public charging.

Example: Johns Creek
- Median hh income: $126K
- Median age: 41.6 years
- 71.7% owner-occupied housing

High Demand

Areas with moderate to high number of EVs registered

Many consumers living and working here drive EVs. Some residents may not have access to private charging, increasing the demand for public charging.

Example: Smyrna
- Median hh income: $78K
- Median age: 35 years
- 51% owner-occupied housing

Low Demand

Areas with few EVs registered

Consumers living and working here are not ready to adopt yet or have significant roadblocks to adoption

Example: Stonecrest
- Median hh income: $51K
- Median age: 33.6 years
- 43.3% owner-occupied housing

Moderate Demand

Areas with low to moderate number of EVs registered

Most consumers living and working here will be ready to adopt soon, but not yet.

Example: South Fulton
- Median hh income: $65K
- Median age: 37.3 years
- 67.5% owner-occupied housing

Lowest Demand

Areas with very few or no EVs registered

Consumers living and working here have significant roadblocks to adoption

Example: Panthersville
- Median hh income: $42K
- Median age: 38.5 years
- 46.7% owner-occupied housing

Lowest Demand	Low Demand	Moderate Demand	High Demand	Highest Demand

Example data is supplied by datacommons.org, which combines data from census.gov, cdc.gov, data.gov, and other open sources. Note that segments are based on averages and not all consumers in a segment will be the same.

Charging Demand in Major Cities

EV demand patterns vary widely across the US, but there are a few broad patterns that can be observed. Rural areas around the country have the lowest demand. In contrast, major metro areas tend to have the highest levels of demand. However, neighborhoods with lower income, more rentals, and/or less vehicle ownership often have Low to Moderate Demand, including urban residential neighborhoods. This pattern is visible in the Los Angeles and Chicago metro areas, while greater Seattle is an exception (see below).

South Shore

Naperville

Calumet City

Chicago

Everett

Madrona

South Tacoma

Seattle

Lowest Demand | Low Demand | Moderate Demand | High Demand | Highest Demand

Yucca Valley

Compton

Los Angeles

Irvine

Both Chicago and Los Angeles include central urban areas with lower charging demand than surrounding neighborhoods, represented on the map by South Shore in Chicago and Compton in LA. There are fewer EVs registered in these areas, as well as fewer public charging stations. In fact, according to the Alternative Fuels Data Center, there's only *one* charging station with an address in Compton; there are *none* directly in the South Shore neighborhood.* Central Seattle, however, has Highest Demand throughout. Homes in central Seattle, such as in the neighborhood of Madrona, are more likely to have private parking than in other cities. Madrona residents can also find public charging at the nearby co-op and public parking lot.

*Data from AFDC consulted on 2/7/23.

Charging Demand at the State Level
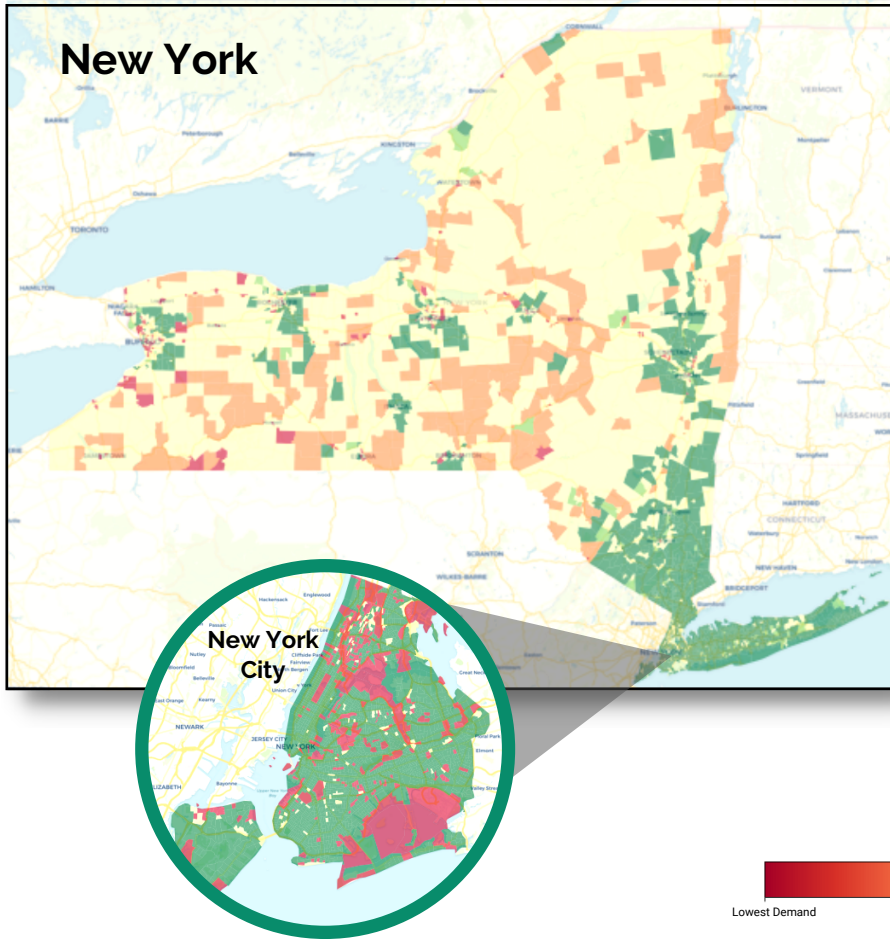
New York City, as well as Long Island and the southern Hudson Valley, have some of the highest areas of charging demand in the country. Within the five boroughs of the city, Lower Manhattan and Brooklyn have the most consistently high demand.

Travel Upstate and you'll find High and Highest Demand areas clustered around cities, including Albany, Syracuse, Rochester, and Buffalo. Ithaca, home to Cornell University, is one of a few Highest Demand areas approaching the PA border, while Lake Placid is the only High Demand area in the Adirondack Mountain region.

There are nearly 9K charging stations within NY, which is a high number compared to most states. However, NY reported 51.9K EV registrations in 2021, placing those stations in high demand.

Lowest Demand   Low Demand   Moderate Demand   High Demand   Highest Demand

California has the highest overall EV growth rate in the US and the highest number of charging stations. However, existing infrastructure may not be keeping pace with demand. Zooming out, nearly the entire coastal area has Highest Demand. In central CA, this dark green band extends inland from San Francisco through Eldorado National Forest toward Lake Tahoe and the Nevada border.

There are very few Lowest Demand tracts in CA - the largest is near Death Valley - but areas of Low Demand are found in the northern national forests and in the desert region south of Las Vegas.

The main takeaway is that while CA is the best-equipped state in the US for EV growth with over 37.5K charging stations, widespread Highest Demand across the state means that targeted growth must continue at a rapid pace to support the now well over 563K EVs registered in the state (2021 data).
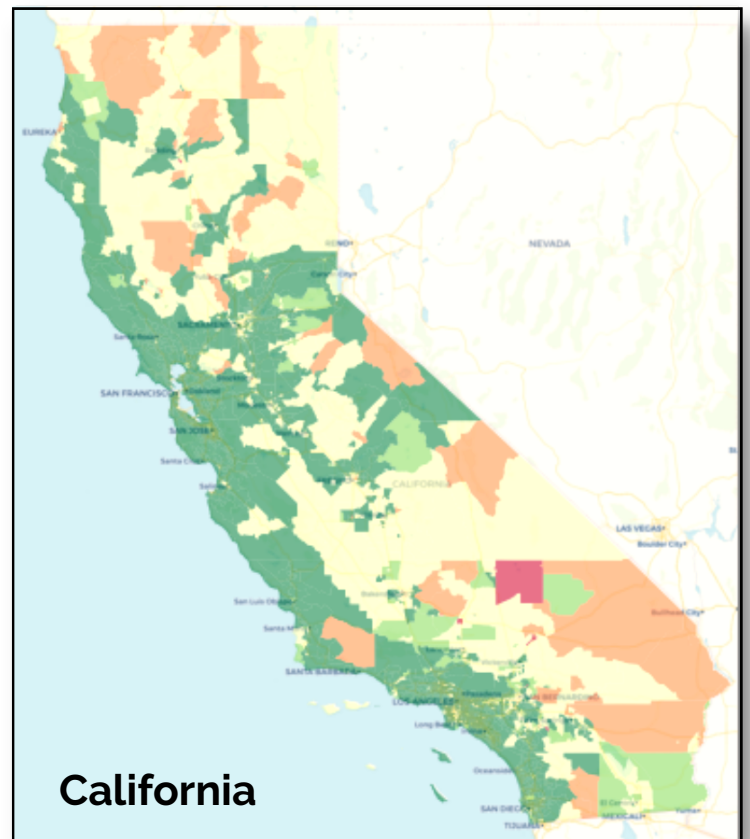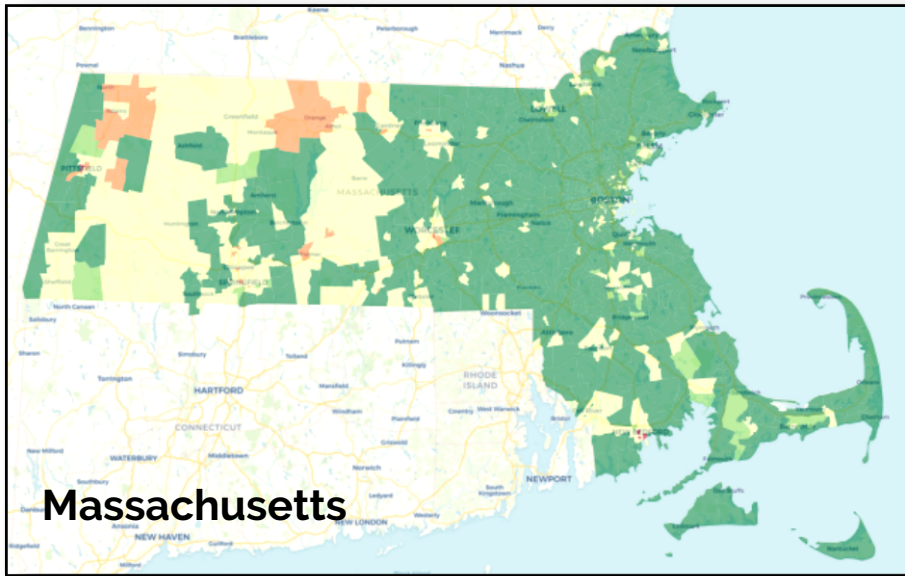
Massachusetts

More than half of the state of Massachusetts has Highest or High Demand. This isn't surprising given that 30.5K EVs were registered within the state as of 2021. From the Greater Boston area up to the New Hampshire border, then around Amherst and along the NY border, there is Highest Demand for charging in MA. Currently there are over 5K public charging stations within the state - a respectable number, but likely no match for surging EV growth.

Lowest Demand   Low Demand   Moderate Demand   High Demand   Highest Demand
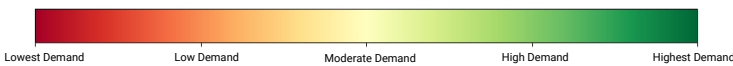
Texas, more so than other states with a high number of registered EVs, has a distinct urban/suburban-rural divide when it comes to charging demand. Houston, Dallas, Austin, and San Antonio appear as constellations of Highest and High Demand on the map. Odessa and Amarillo are outposts of Highest Demand in western Texas, where Low and Moderate Demand are widespread.
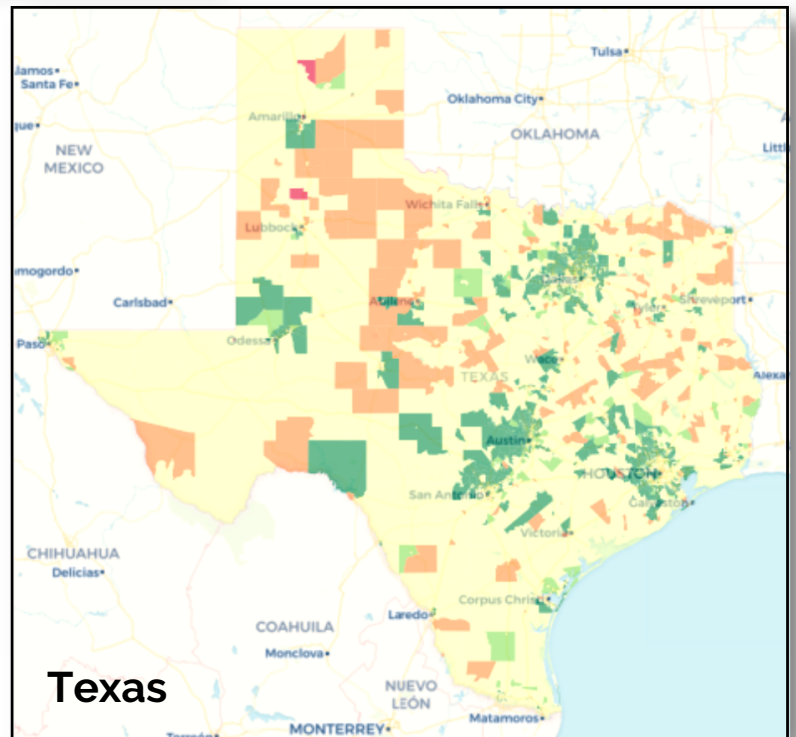
As of January 2023, Texas reported a little over 6K public charging stations. Yet, Texas had nearly 90K EV registrations by the end of 2021, which means that public chargers are stretched thin, particularly in major metro areas.

Texas
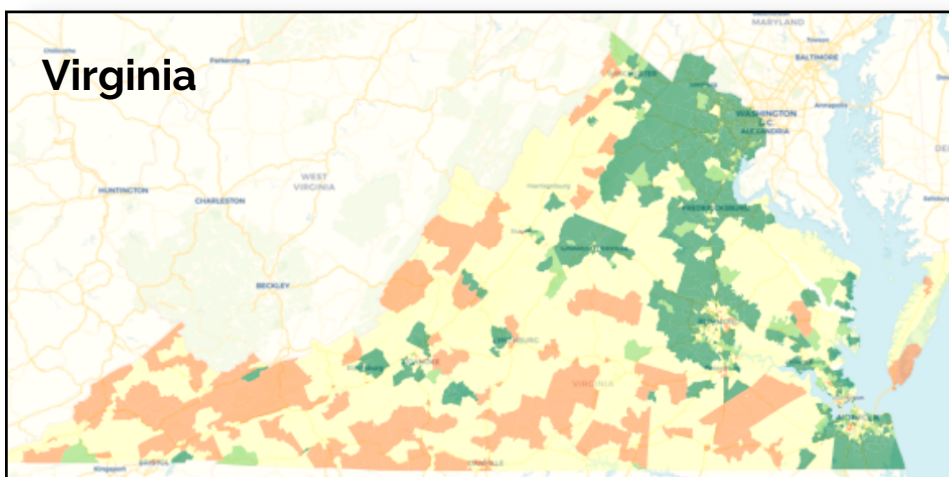
Virginia

Eastern and Western Virginia almost appear to be different states when considering EV charging demand. Northeastern VA (essentially suburban Washington, D.C.) is a densely Highest Demand area. So, too, are greater Virginia Beach, Richmond, and Charlottesville. The central and western regions of the state, however, have mainly Low and Moderate Demand. With slightly more than 3K public charging ports in the state, VA has some work to do to meet demand.

Is EV Demand Being Suppressed?

BlastPoint

Many consumers who don't currently own an EV are interested in doing so. This is particularly true in more populated metro areas, where BlastPoint's EV Adoption Model reveals that EV ownership will grow the fastest. However, we noticed a pattern of slower-than-expected adoption in many urban areas, particularly city centers, and we investigated causes of this "suppressed" EV growth. By manipulating our adoption model, we found that charging access and housing type are key demand suppression factors, meaning they are barriers to adoption. According to our model, **a lack of access to both public and private charging was likely responsible for keeping hundreds of thousands of EVs off the road in 2022.** The good news, however, is that adding more charging access can reduce demand suppression in 2023.
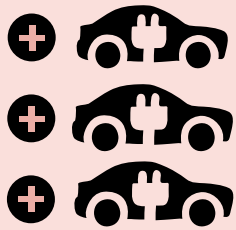
Up to 315K More EVs

Could have been on the road in 2022 if demand barriers had been removed.
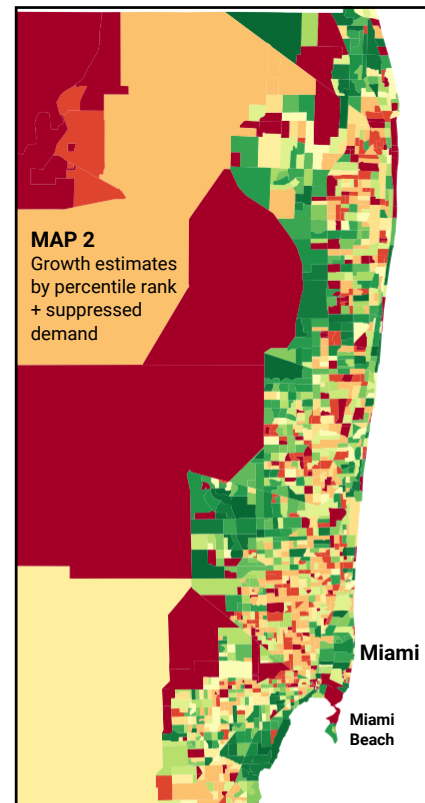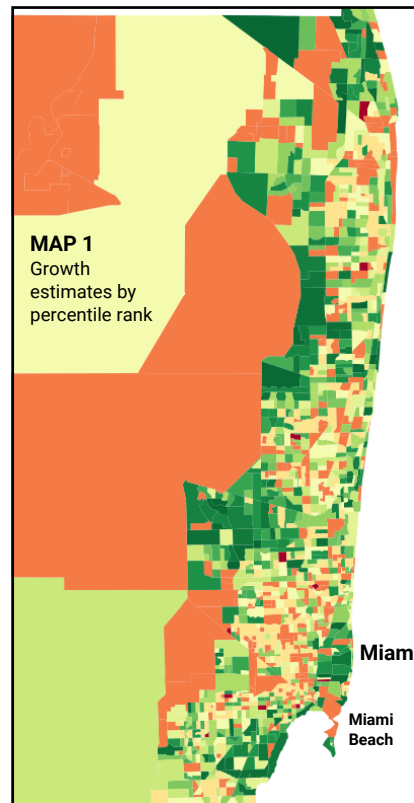
Demand Suppression Factors

In metro areas, neighborhoods with a high density of rental and multi-family units exhibit significant suppressed demand. According to a report by the Smart Energy Consumer Collaborative, only 1% of renters surveyed currently own an EV, but 37% said they plan to buy one in the next 5 years. However, renters often don't have access to charging because landlords have been slow to add EV charging as an amenity, except in the most high-end rentals.

While 79% of renters surveyed said they are concerned about the environment, 40% said there are not enough charging stations nearby to own an EV right now.

Not enough public charging options

Inability to access private charging

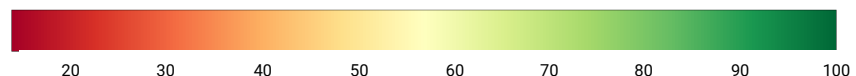High density of rentals & multi-family units

Demand Suppression: Miami

Applying our Demand Suppression Model to the Miami metro area, we see that growth percentiles go down per Census Tract when we add suppression factors. For example, Miami Beach's EV growth percentile rank is reduced from 40 (map 1) to less than 20 (map 2) when we consider housing and charging availability.
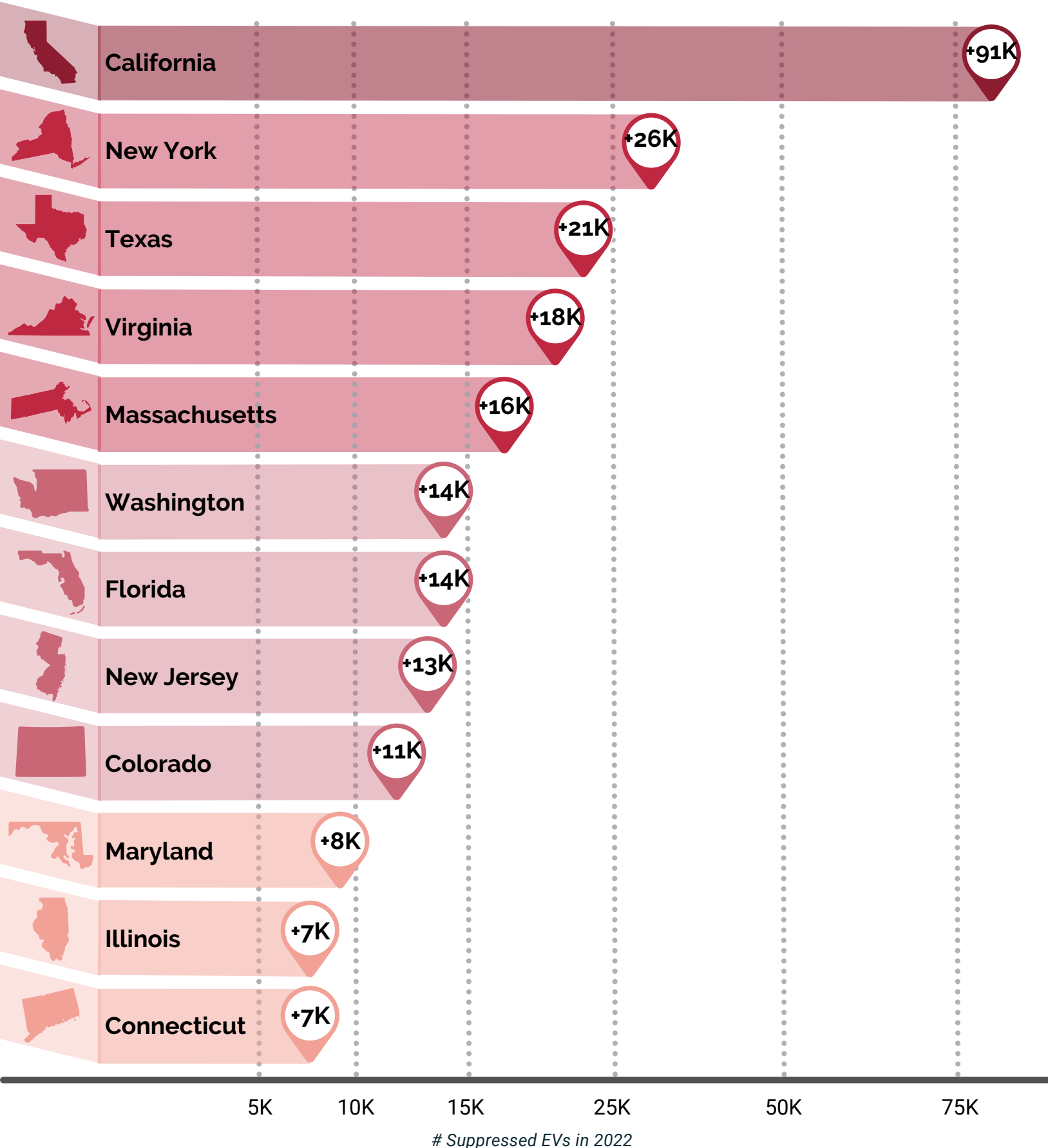
MAP 1
Growth estimates by percentile rank

MAP 2
Growth estimates by percentile rank + suppressed demand

Miami

Miami Beach

Miami

Miami Beach

Growth Percentile Rank

20   30   40   50   60   70   80   90   100

Where Is Demand Suppression Highest?

Using BlastPoint's Demand Suppression Model, we estimated the number of EVs that could have been sold in each state during 2022, but were not due to lack of charging availability. Below, we rank the states with the highest amount of demand suppression, which helps to identify where charging infrastructure intervention can have the highest impact in 2023.

State	# Suppressed EVs in 2022
California	+91K
New York	+26K
Texas	+21K
Virginia	+18K
Massachusetts	+16K
Washington	+14K
Florida	+14K
New Jersey	+13K
Colorado	+11K
Maryland	+8K
Illinois	+7K
Connecticut	+7K

 # Suppressed EVs in 2022

Eradicating EV Charging Deserts

What comes first in a neighborhood: EV ownership or charging infrastructure? While that "chicken-or-the-egg" question can't be answered definitively, it is true that consumers in neighborhoods lacking charging infrastructure - also known as charging deserts - are not adopting EVs as rapidly as consumers in neighborhoods with more access to charging, public and private. To promote transportation equity, it's important to investigate potential reasons behind Low and Lowest Demand.

While the price of new EV models fell 5.5% in 2022 and more used EVs are on the market, economic constraints around EV ownership and charging remain. Because of this, there's an inherent bias in EV data. Specifically, EVs and EV chargers are most prominent in more affluent, non-minority neighborhoods. While this is partially due to EV affordability and housing type, we shouldn't overlook the over-dependence of charging infrastructure on public/private partnerships, especially when minority and economically depressed neighborhoods have a history of underinvestment.
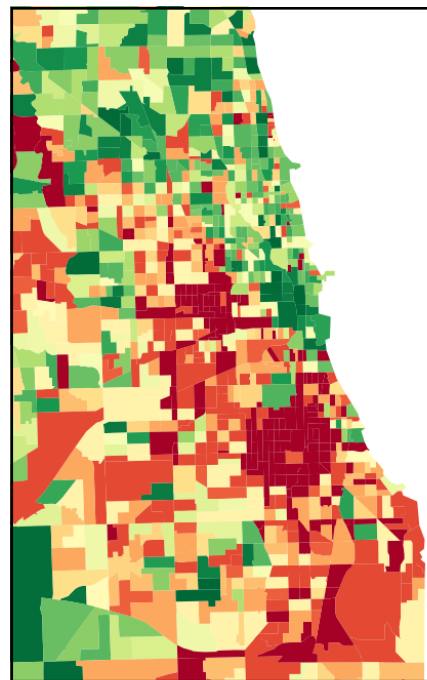
The three maps of Chicago, below, illustrate the connection between historical underinvestment and EV charging inequity. The map on the left shows "redlining" practices in 1950; the heat map in the middle shows EV registration data percentiles (2021 registration data); and the map on the right plots EV charging stations in Chicago as of February 2023.
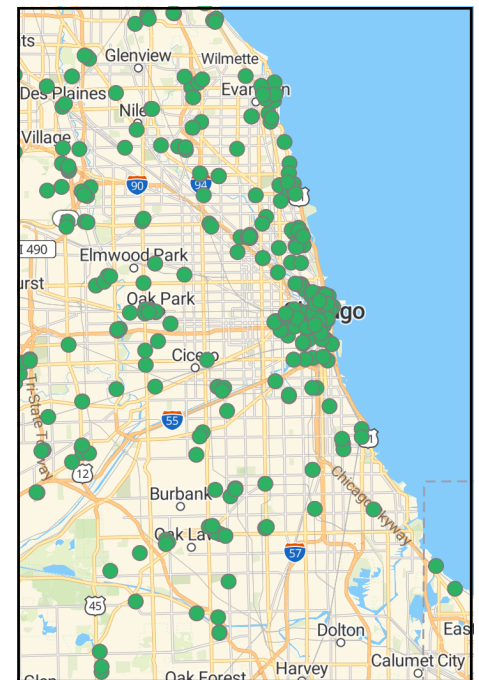
Chicago Redlining Map, 1950
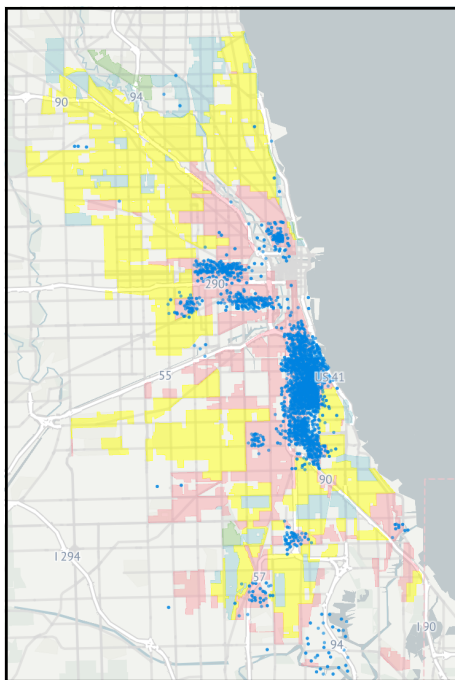
Source: American Panorama, Mapping Inequality

- Graded A
- Graded B
- Graded C
- Graded D
- Concentration of Black residents

Chicago EV Registration Map, 2021

Source: BlastPoint

Percentile Rank

0   25   50   75   100

Chicago EV Charging Stations, 2023

Source: Alternative Fuels Data Center

- EV Charging Station

Compare the redlining map on the left with the visualization of EV registration in the center, and it's clear that areas with low EV registrations - and low charging demand - correlate with redlined communities. This is most noticeable on Chicago's South Side, as well as neighborhoods immediately west of the city center, such as North Lawndale and East Garfield Park.

Factoring in current EV charging station data, we see infrastructure gaps in previously redlined communities. While Chicago's northern neighborhoods are well-populated with chargers, the South Side is much more sparsely developed, and there's also a gap between the inner loop and Cicero. This pattern is noticeable in cities across the US.

BlastPoint's charging demand model considers the question of whether EVs or chargers come first, and answers: BOTH. Placing more chargers where there are more EVs supports current demand. However, placing chargers where there aren't EVs *yet* is a strategic intervention that helps to create future demand and to ensure that all communities have access to charging, making EVs more feasible for everyone - while also supporting US climate goals.

Understand EV demand in your region. BlastPoint

Inspire consumers. Build partnerships. Get results.

BlastPoint helps stakeholders in the EV space get the most out of the Inflation Reduction Act with AI-powered, data-driven tools that identify who will adopt EV next, where they're located, and how to reach them. Visit our EV Solutions page and schedule a consultation with our team to learn more.

Schedule a Consultation

Sources & Notes

Overview
- For an overview of 2022 EV sales, see Kelly Blue Book, "New Car Sales Fell in 2022, But New Electric Car Sales Rose Dramatically."
- The White House, *Inflation Reduction Act Guidebook*.
- Electrification Coalition, "Inflation Reduction Act Impact on Electric Vehicles."

Who's Ready to Adopt Now?

BlastPoint's EV adoption model utilizes datasets from the 2020 US Census, the DoE Alternative Fuels Data Center, as well as proprietary consumer data. Note that EV registration data is from 2021, which is the most recent complete dataset as of this writing.

Charging Infrastructure Growth
- World Economic Forum, "Electric vehicles: The 3 main factors holding back sales."
- McKinsey & Co., "Building the electric-vehicle charging infrastructure America needs."
- For an overview of 2022 charging infrastructure, see AFDC, "U.S. Public Electric Vehicle Charging Infrastructure."

Understanding Charging Demand
- BlastPoint's Charging Demand Segments utilize datasets from the 2020 US Census, the Alternative Fuels Data Center, as well as proprietary consumer data.
- For more information about specific Census Tracts, visit datacommons.org/place.

Charging Demand at the State Level

The current number of charging stations per state, which updates regularly, can be found at afdc.energy.gov/states/.

Is EV Demand Being Suppressed?
- BlastPoint's Demand Suppression Model utilizes datatsets from the 2020 Census, the Alternative Fuels Data Center, as well as proprietary consumer data.
- Smart Energy Consumer Collaborative, Understanding the Wants and Needs of Renters.

Eradicating Charging Deserts
- To explore the location of EV charging stations, visit AFDC's Alternative Fueling Station Locator.
- For redlining maps of US cities, see Mapping Inequality: Redlining in New Deal America.

Blast Point

Discover the humans in your data.