

# *Exploring the US Electric Vehicle Through the US Bicycle Sharing System*

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# Introduction

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“Since its inception on May 27, 2013, Citi Bike has evolved significantly, now boasting 180,000 annual subscribers, 1915 stations, and a daily ridership of 131k as of 2023. The system achieved a remarkable all-time ridership record in August 2023, with 4.07 million rides in a single month.

In the midst of the rapid and modern automotive era, how has a simple bicycle managed to establish such a robust sharing system in just a decade? What factors contribute to Citi Bike's sustained ridership, increasing station count, and loyal subscriber base? Furthermore, what insights can electric vehicle (EV) ventures draw from this bicycle sharing system to address their long-term profitability challenges?”

# Executive Summary

- ❖ **The Problem:** What insights could US electric vehicle (EV) ventures draw from US bicycle sharing system to address their long-term profitability challenges?
- ❖ **Data and Methods Used**
  - ❖ Technical Analysis
  - ❖ Time Series Analysis
  - ❖ Ratio Analysis
- ❖ **Data Source**
  - ❖ Federal Reserve Economic Data, Alpha Vantage API, Yahoo Finance, Citi Bike System Data
  - ❖ Wall Street Journal, CME Group

# Executive Summary

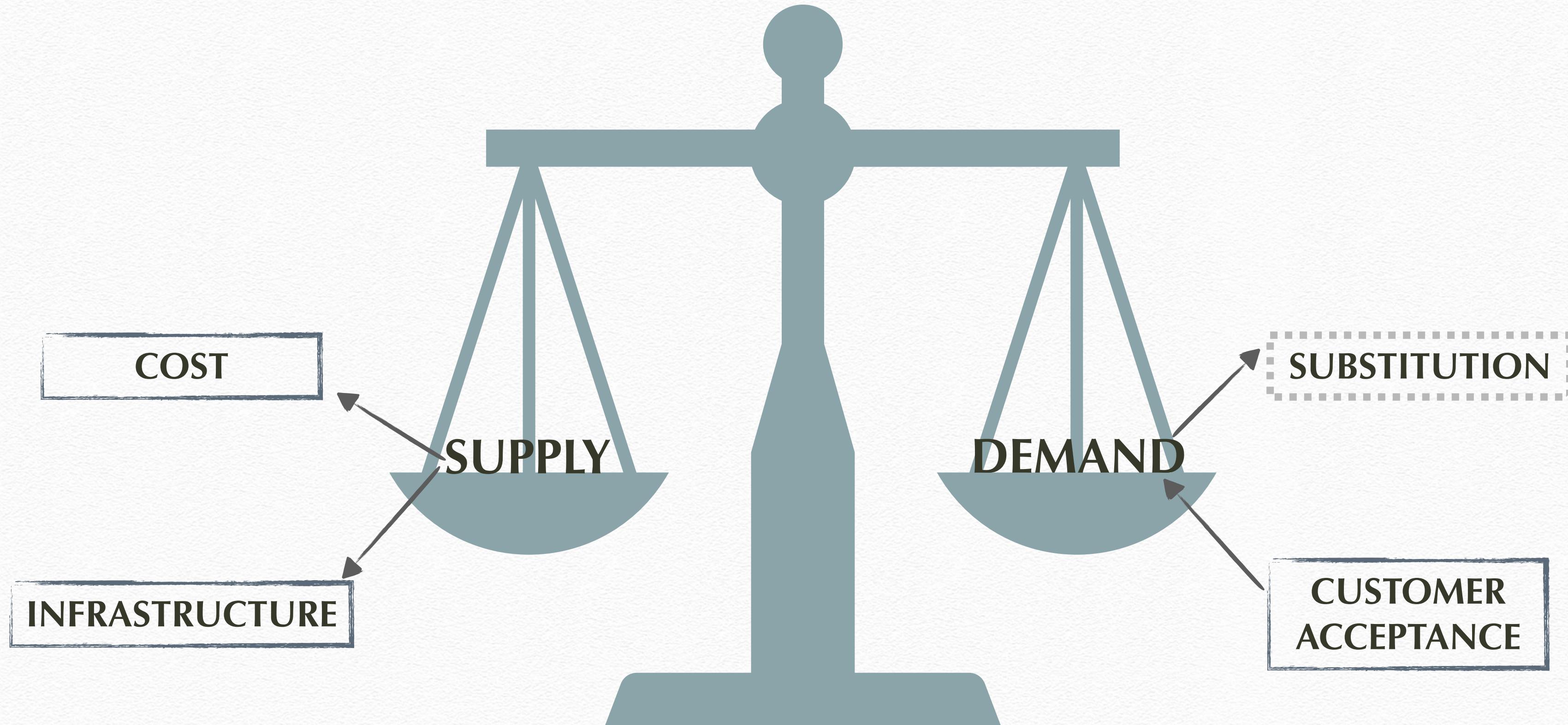
## ❖ Key Findings

- ❖ **Customer acceptance** is intricately tied to consumer awareness and the perceived resolution of their concerns. Although cost reduction can act as an incentive, it is not a universal solution for ensuring broad acceptance. Insufficient awareness of electric vehicle(EV) production and climate-related issues diminishes customer acceptance, resulting in decreased demand for EVs and impeding the progress of the energy transition.
- ❖ Meeting the growing **demand** for cyclical companies mandates high customer acceptance, cost advantages tailored for target consumers, and a strong economic environment. The low turnover of auto sales, as indicated by the lagging inventory/sales ratio, despite a rebound in sales volume, serves as a warning sign, pointing to potential challenges in efficiently managing the supply chain.
- ❖ A stable **lithium supply chain** leads to reduced battery production costs, contributing to a more cost-effective framework for EV sales. Consequently, this has the potential to stimulate consumer demand.However, All stakeholders, including lithium producers, refiners, automakers, and government entities, must be mindful of potential losses due to lithium futures market volatility.This is especially critical given the prevailing challenges in the volatile crude oil market(1)
- ❖ A robust **infrastructure** serves as the primary solution to alleviate consumer concerns (e.g. charging issues) surrounding EVs, playing a crucial role in ensuring long-term profitability.Collaborative efforts or strategic partnerships become essential for smaller entities to contribute to the broader EV infrastructure.
- ❖ **Substitution** compels progress. EVs act as a pivotal bridge, instilling confidence in alternative energy cars. Hydrogen vehicles emerge as the next frontier in the evolution of the green economy, signaling a continued commitment to sustainable transportation solutions.

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1) Crude Oil Within the Context of Oligopoly Market: [https://github.com/florenceX5/Crude\\_Oil\\_Finance\\_Project.git](https://github.com/florenceX5/Crude_Oil_Finance_Project.git)

# Concept Diagram



# Customer Acceptance

*Customer acceptance hinges on consumer awareness of the product and the perceived resolution of their concerns. While lowering costs can serve as an incentive, it is not a panacea for ensuring widespread acceptance.*

## BICYCLE

- ❖ The characteristics:
  - ❖ Efficient Manufacturing Process
    - ❖ E.g. Easy access of raw materials
  - ❖ Established Customer Acceptance
    - ❖ E.g. Steadily increasing subscribers

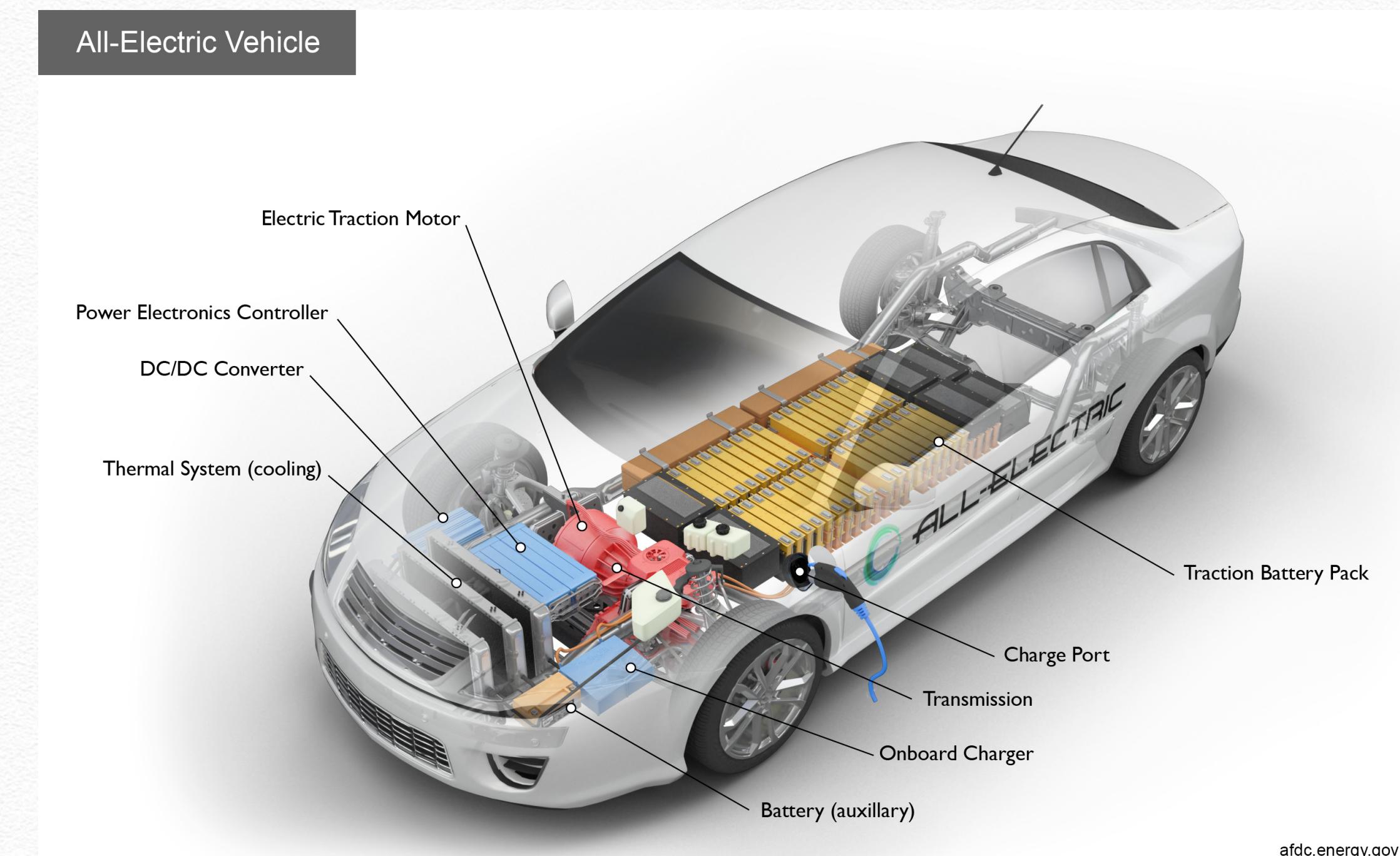
## ELECTRIC VEHICLE (EV)

- ❖ The characteristics:
  - ❖ Complex Manufacturing Process
    - ❖ E.g. **Lithium Supply Chain (Cost)**
  - ❖ Evolving Customer Acceptance
    - ❖ E.g. **Charging Issues (Infrastructure)**, safety concern, reliability in extreme weather conditions

# Customer Acceptance

*A lower awareness of climate issues leads to reduced customer acceptance, resulting in decreased demand in EV and impeding the pace of energy transition.*

- ❖ The primary distinction between electric vehicles (EVs) and traditional cars lies in their *power source* – one relies on fossil fuels, while the other operates on electricity, driven by climate change concerns.
- ❖ Consequently, if consumers fail to fully comprehend the adverse effects associated with traditional cars, instigating a change in their driving habits becomes challenging.
- ❖ The Chinese EV market's surge is fueled by the high demand for vehicle plates due to the country's large population. Government incentives and automaker discounts aid sales for cyclical companies, yet fundamental customer concerns about EVs remain.

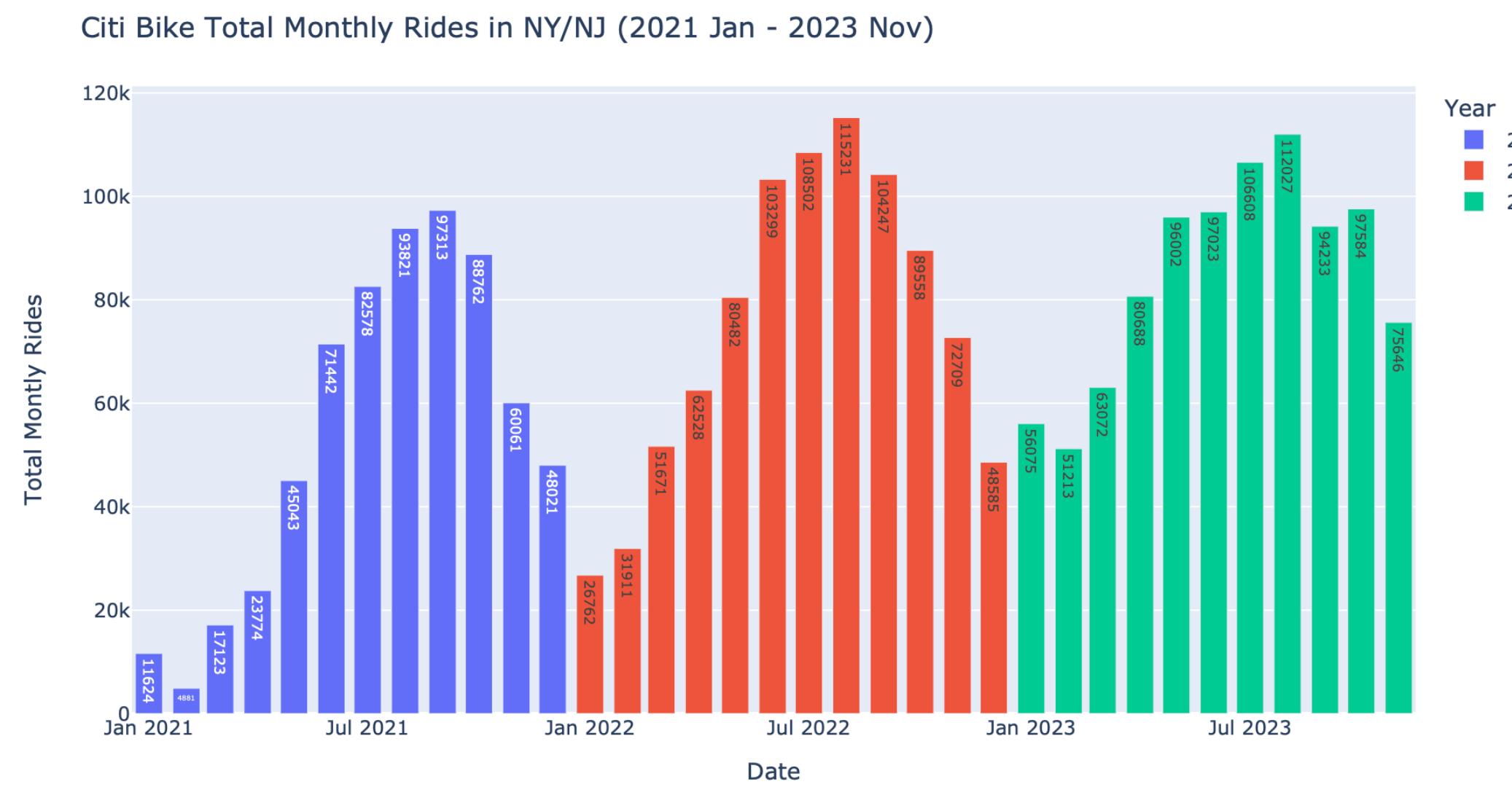


# Demand

Meeting the growing demand for cyclical companies mandates high customer acceptance, cost advantages tailored for target consumers, and a strong economic environment.

## BICYCLE

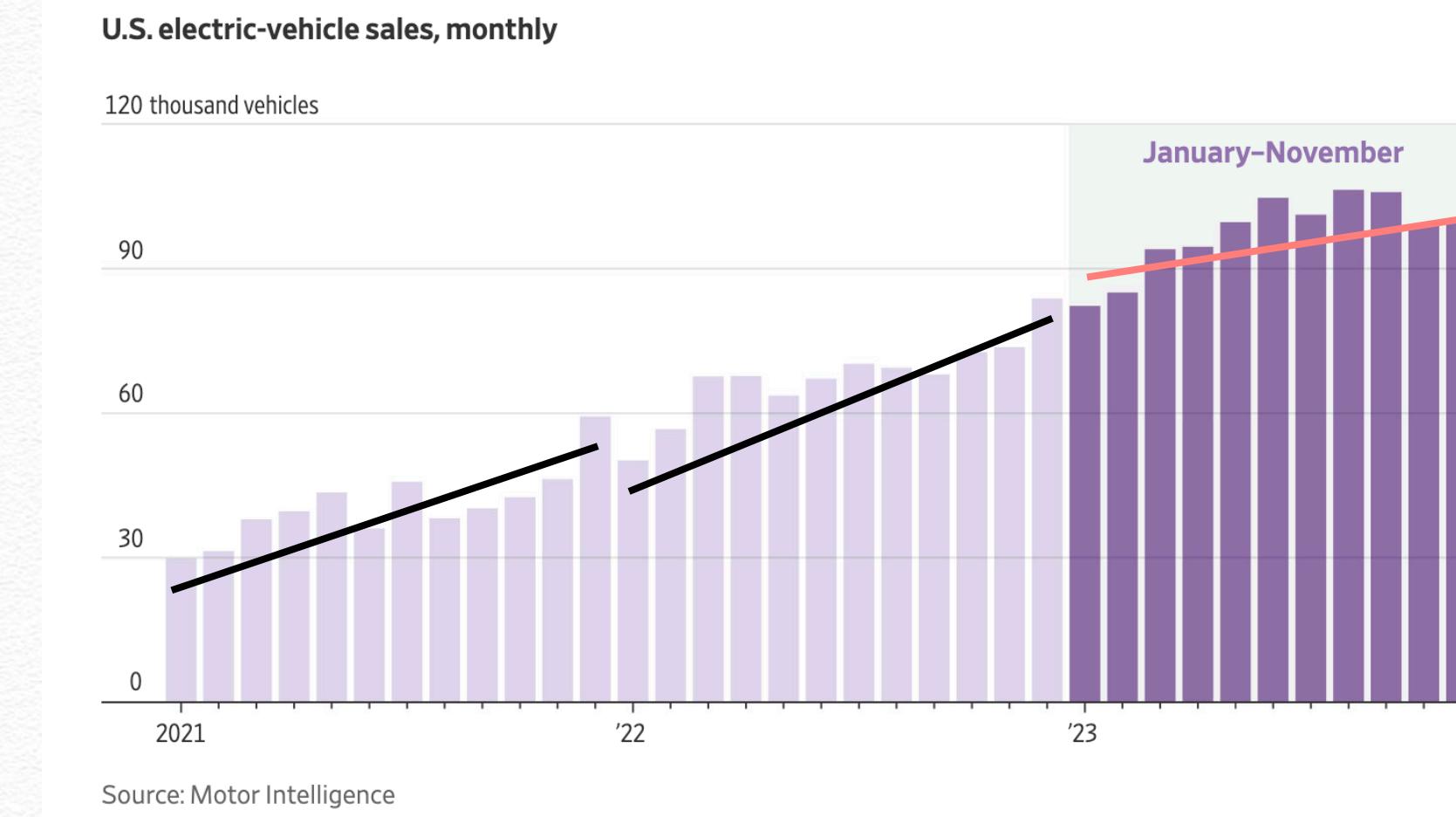
- ❖ Citi Bike maintains a stable or potentially increasing ridership, primarily attributed to its absolute cost advantage tailored for the target consumer base—short-distance travelers in urban areas (1)



## ELECTRIC VEHICLE (EV)

- ❖ Conversely, while electric vehicle (EV) sales experienced a rebound at the close of 2023, the upward trend is slower compared to the growth observed in 2021 and 2022, evident in the flat slope of the sales trajectory.

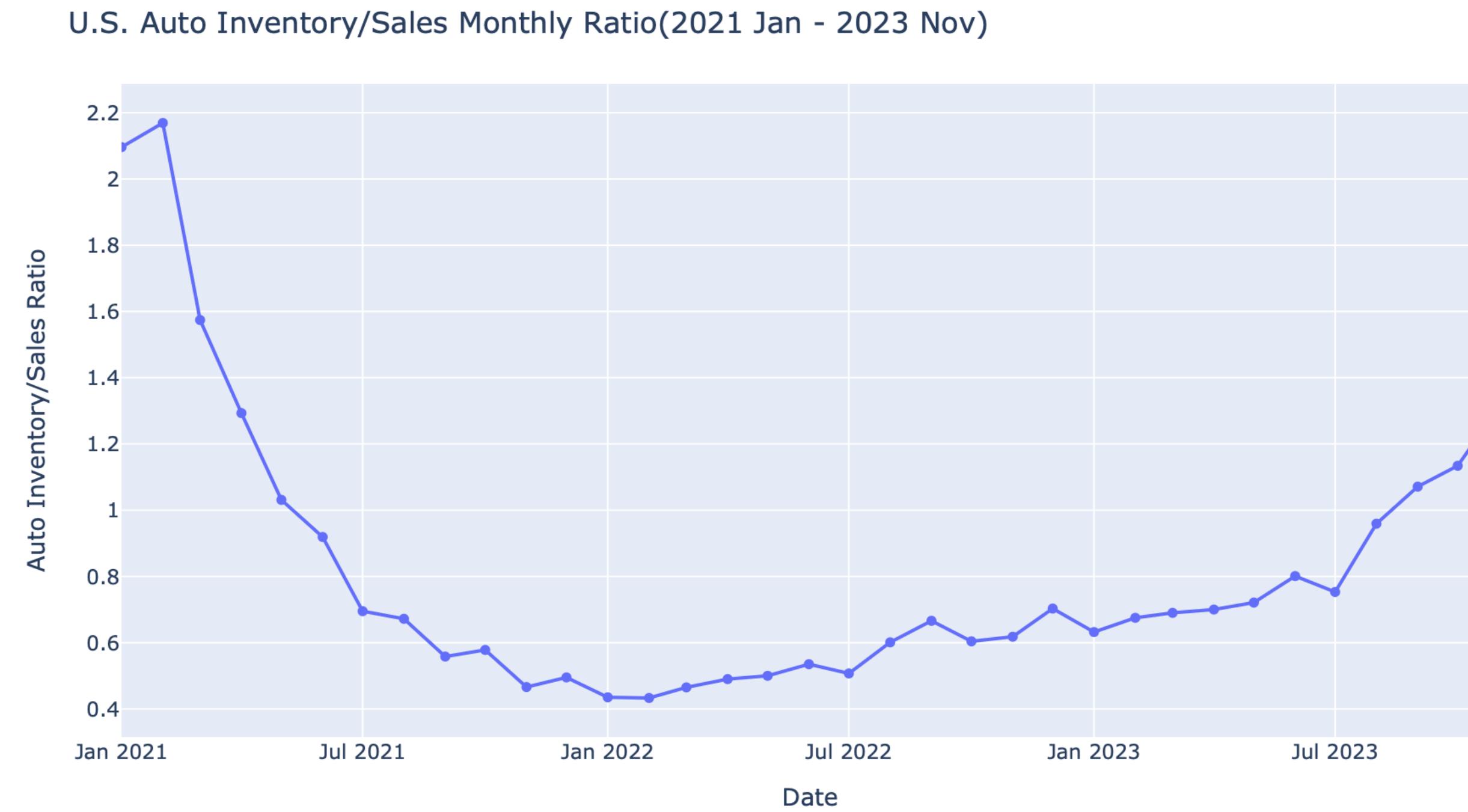
THE WALL STREET JOURNAL.



1) Bike Network (Tableau Dashboard): [https://public.tableau.com/app/profile/florence.xu/viz/BikeNetwork\\_16928557600630/BikeNetwork](https://public.tableau.com/app/profile/florence.xu/viz/BikeNetwork_16928557600630/BikeNetwork)

# Demand

*Relying solely on sales volume trends overlooks the warning sign of low turnover in auto sales, indicated by the lagging inventory/sales ratio. This suggests potential challenges in supply chain management efficiency.*



- ❖ Despite the analysis from WSJ (refer to previous page), 2023 increase in electric vehicle (EV) sales, the auto inventory/sales ratio since January 2022 reveals a consistent upward trend.
- ❖ As of November 2023, the ratio stands at approximately 1.3, marking the highest point in the past two years. This implies a imbalance, with auto demand growing at a considerably slower rate than supply.

# Cost

## BICYCLE

- ❖ The cost calculation for bicycle production is more simplistic than that for vehicles.
  - ❖ Raw Materials
  - ❖ Production
  - ❖ System
- ❖ Furthermore, bicycle cost budgeting entails less uncertainty, particularly in regard to factors like climate risks, market's volatility (e.g. crude oil, lithium, etc).

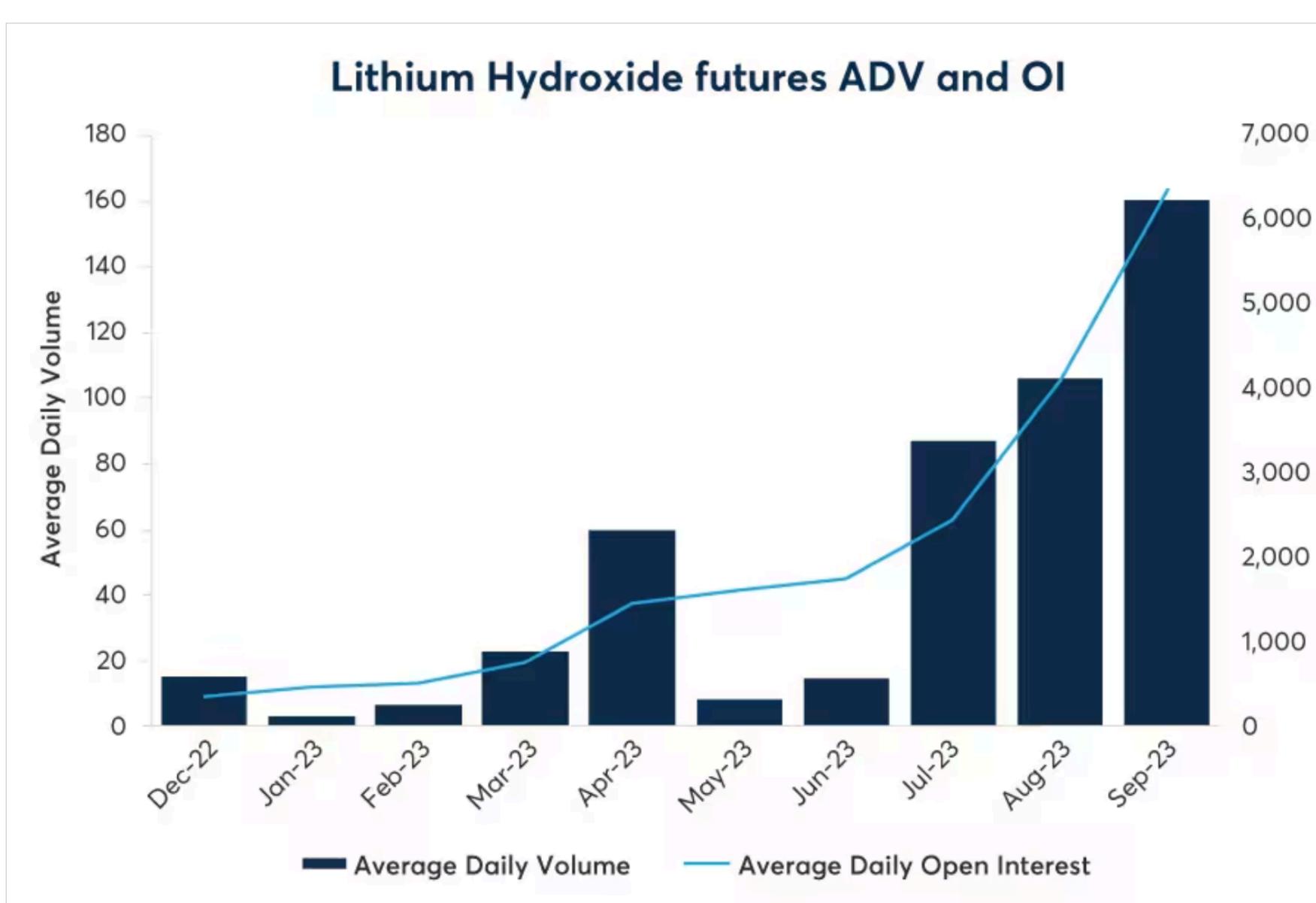
## ELECTRIC VEHICLE (EV)

- ❖ Operating within cyclical industries, cost control poses a formidable challenge in the EV sector, heavily contingent on technological advancements and a stable economic environment.
- ❖ **Lithium Supply Chain**
- ❖ Chips

# Cost

The lithium market is currently more active than in previous periods, evidenced by the increased variety of financial products trading in lithium. This trend underscores the strong demand prevailing in the market.

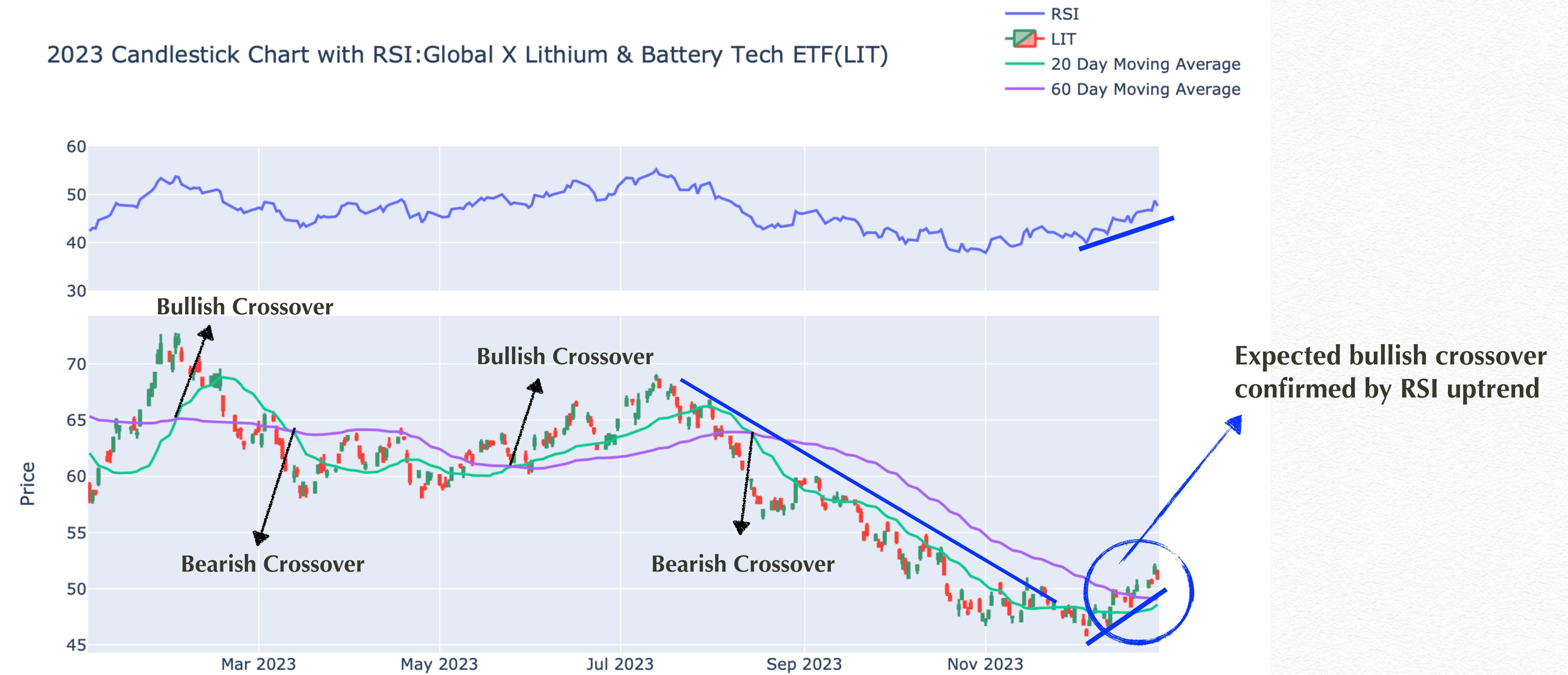
Source: CME Group



- ❖ As per CME Group, there is an anticipated surge in lithium demand in the upcoming years.
- ❖ Examining Global X Lithium & Battery Tech ETF's monthly trading volumes, although a clear year-long increasing trend is not evident, December recorded the highest total trading volume (13.8m) compared to January.

# Cost

A stable lithium market is essential for long-term EV sales, benefiting both automakers and consumers. This significance is particularly pronounced in the current economic environment, where the volatility of the crude oil market(1) already poses substantial challenges.



- ❖ Global X Lithium & Battery Tech ETF, following a clear downtrend lasting five months, commencing in July, a brief period of consolidation period followed.
- ❖ In early 2024, an anticipated bullish crossover, confirmed by the Relative Strength Index (RSI), indicates enhanced internal momentum. Significant potential remains for an upward trajectory in the price of this prominent lithium commodity.

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# Cost

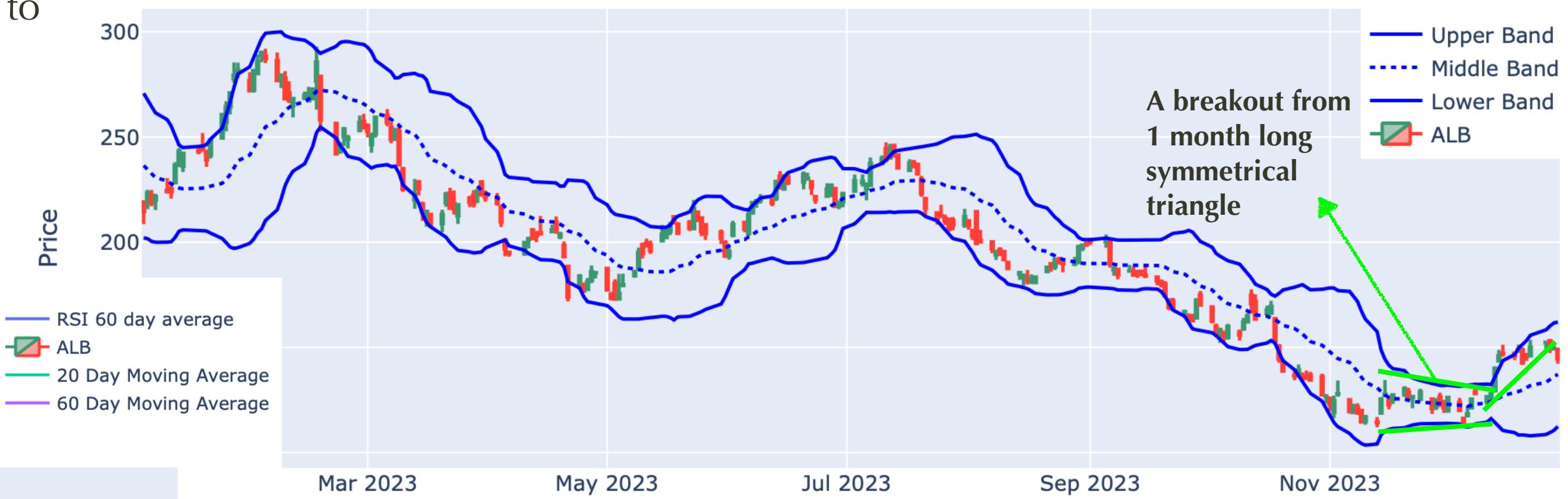
Maintaining equilibrium between supply and demand is imperative. Blindly augmenting supply without commensurate demand is not an optimal strategy for enhancing the value of the lithium supply chain.

- ❖ Albemarle Corp., a leader in the lithium industry, is expected to undergo a bullish crossover in early 2024. Its stock performance closely mirrors that of the Global X Lithium & Battery Tech ETF (refer to previous page), with simultaneous instances of bearish and bullish crossovers.

2023 Candlestick Chart with RSI: Albemarle Corporation(ALB)



2023 Bollinger Bands Using 20-day Average and 2 Stdv: Albemarle Corporation(ALB)

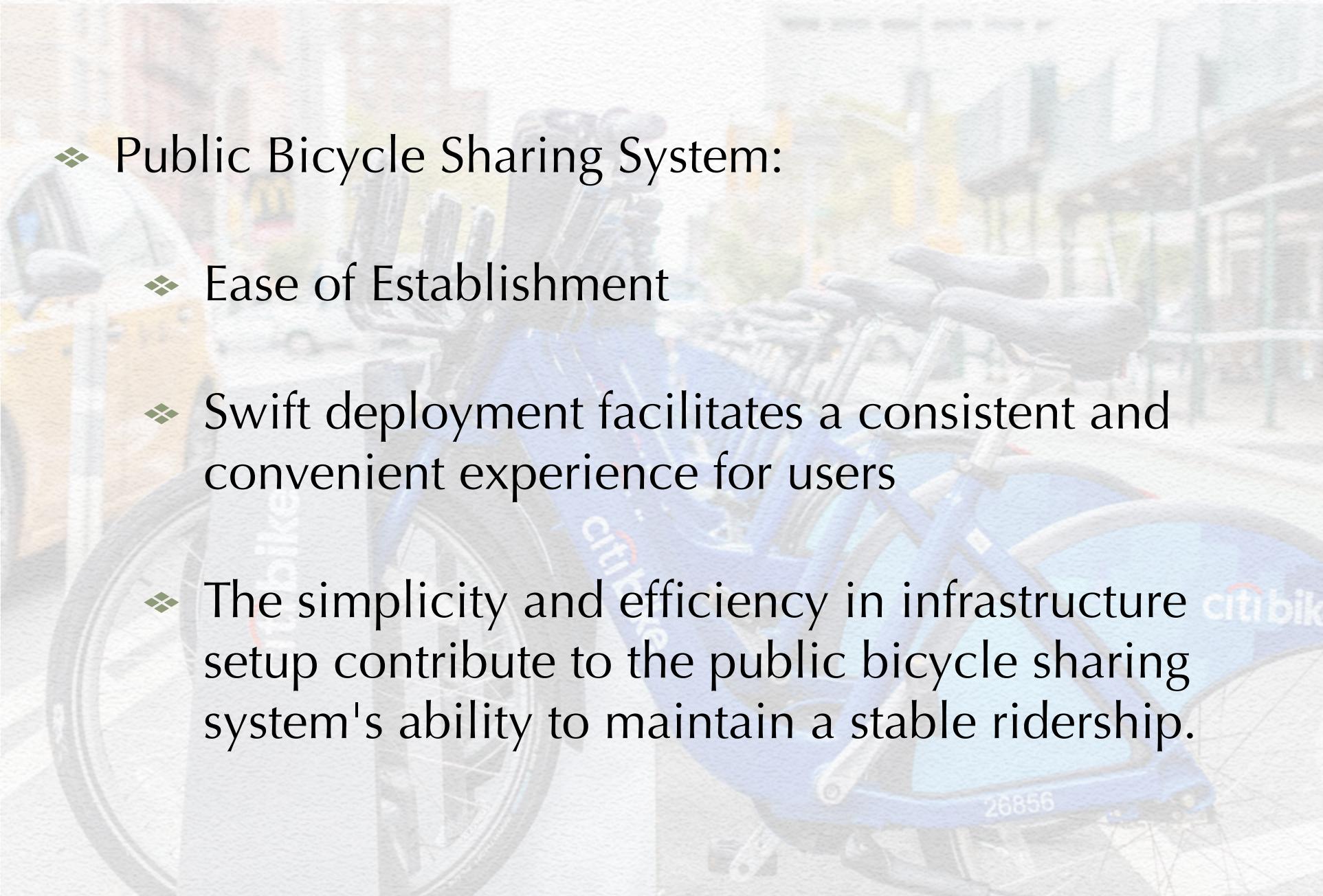


- ❖ In December 2023, a breakout was followed by a month-long consolidation, marked by Bollinger Bands' reduced width signaling low volatility. This may suggest an impending period of increased volatility.

# Infrastructure

A robust infrastructure serves as the primary solution to alleviate consumer concerns (e.g. charging issues) surrounding electric vehicles, playing a crucial role in ensuring long-term profitability. Collaborative efforts or strategic partnerships become essential for smaller entities to contribute to the broader EV infrastructure.

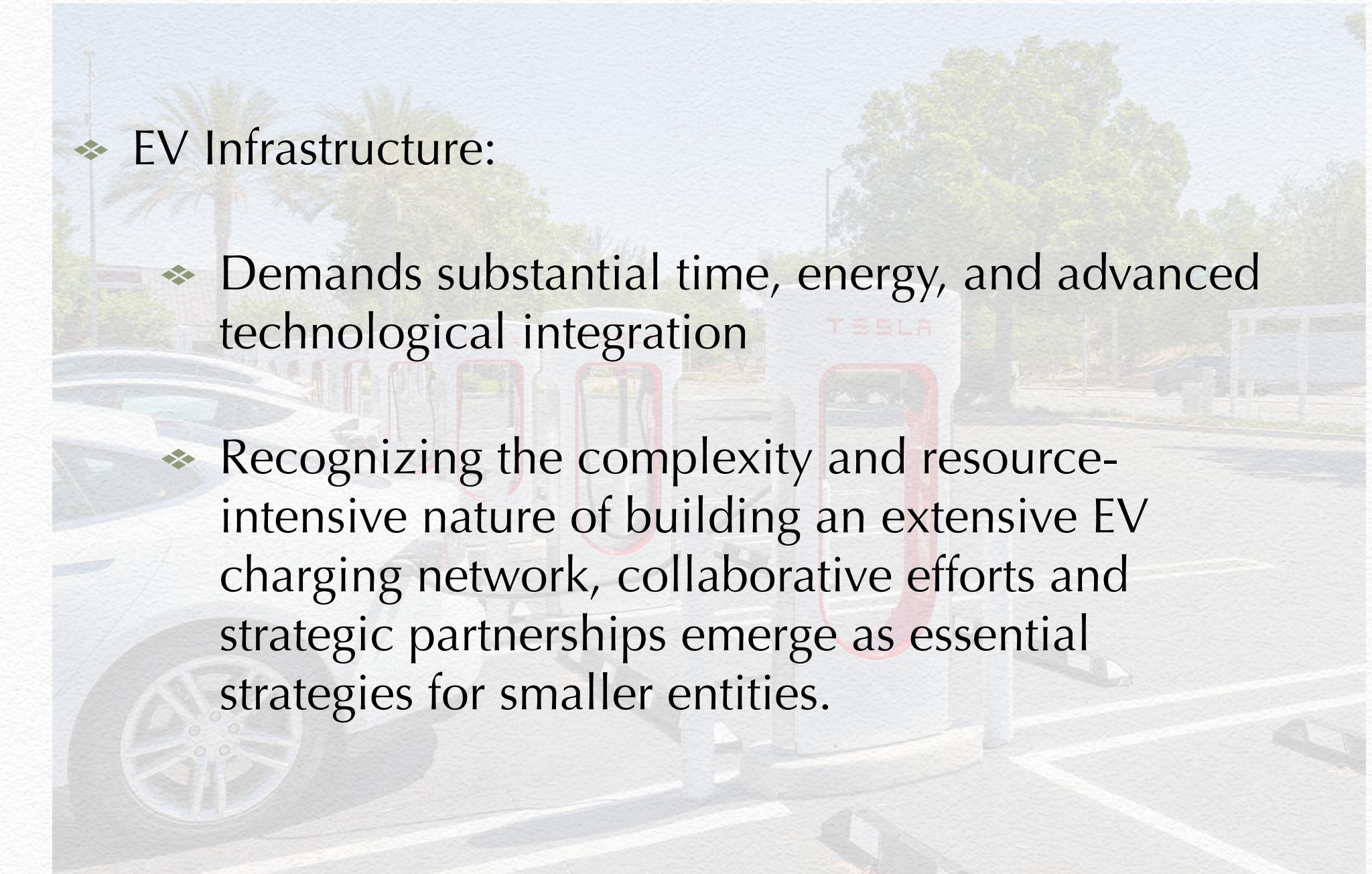
## BICYCLE



### ❖ Public Bicycle Sharing System:

- ❖ Ease of Establishment
- ❖ Swift deployment facilitates a consistent and convenient experience for users
- ❖ The simplicity and efficiency in infrastructure setup contribute to the public bicycle sharing system's ability to maintain a stable ridership.

## ELECTRIC VEHICLE (EV)



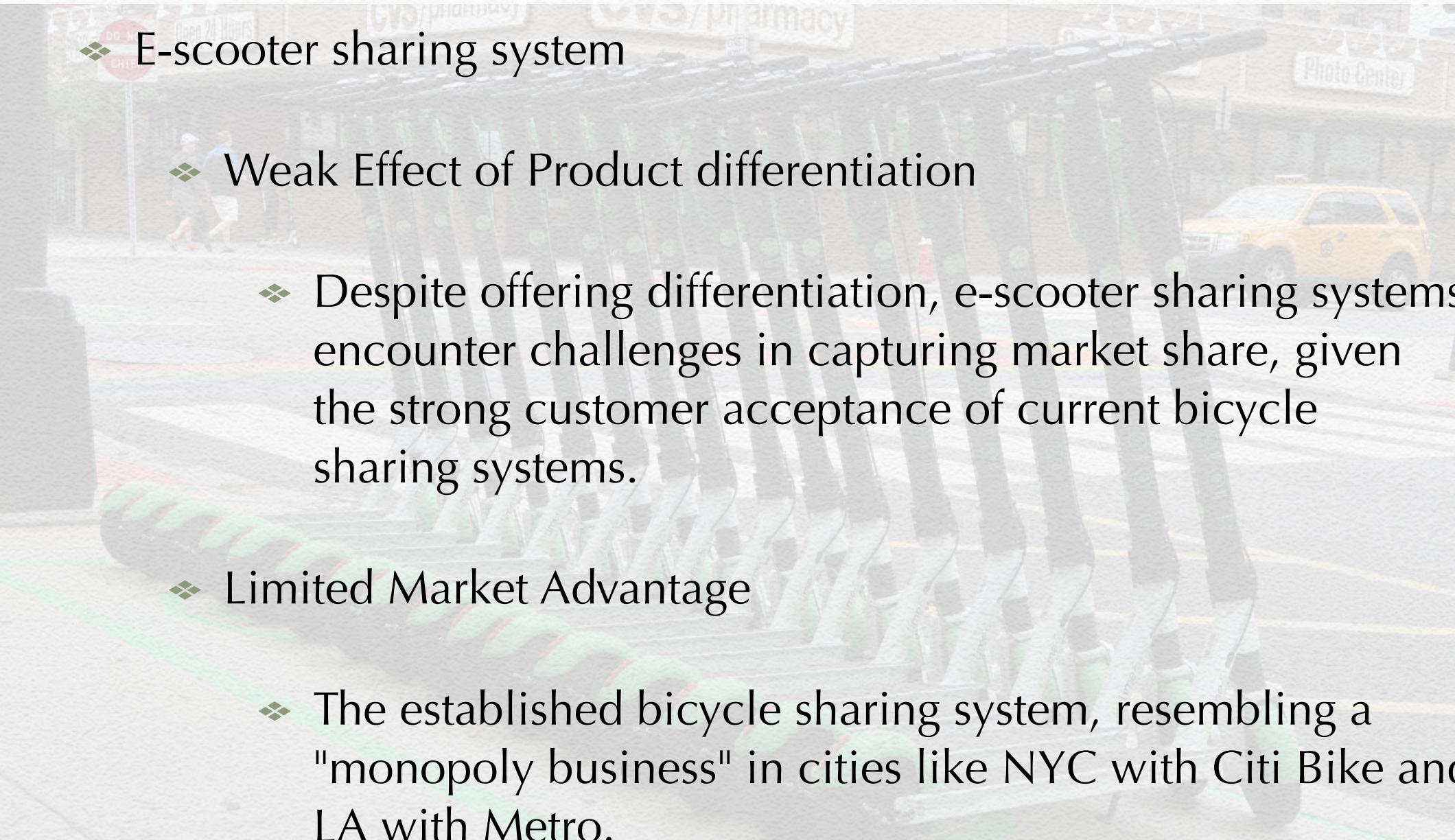
### ❖ EV Infrastructure:

- ❖ Demands substantial time, energy, and advanced technological integration
- ❖ Recognizing the complexity and resource-intensive nature of building an extensive EV charging network, collaborative efforts and strategic partnerships emerge as essential strategies for smaller entities.

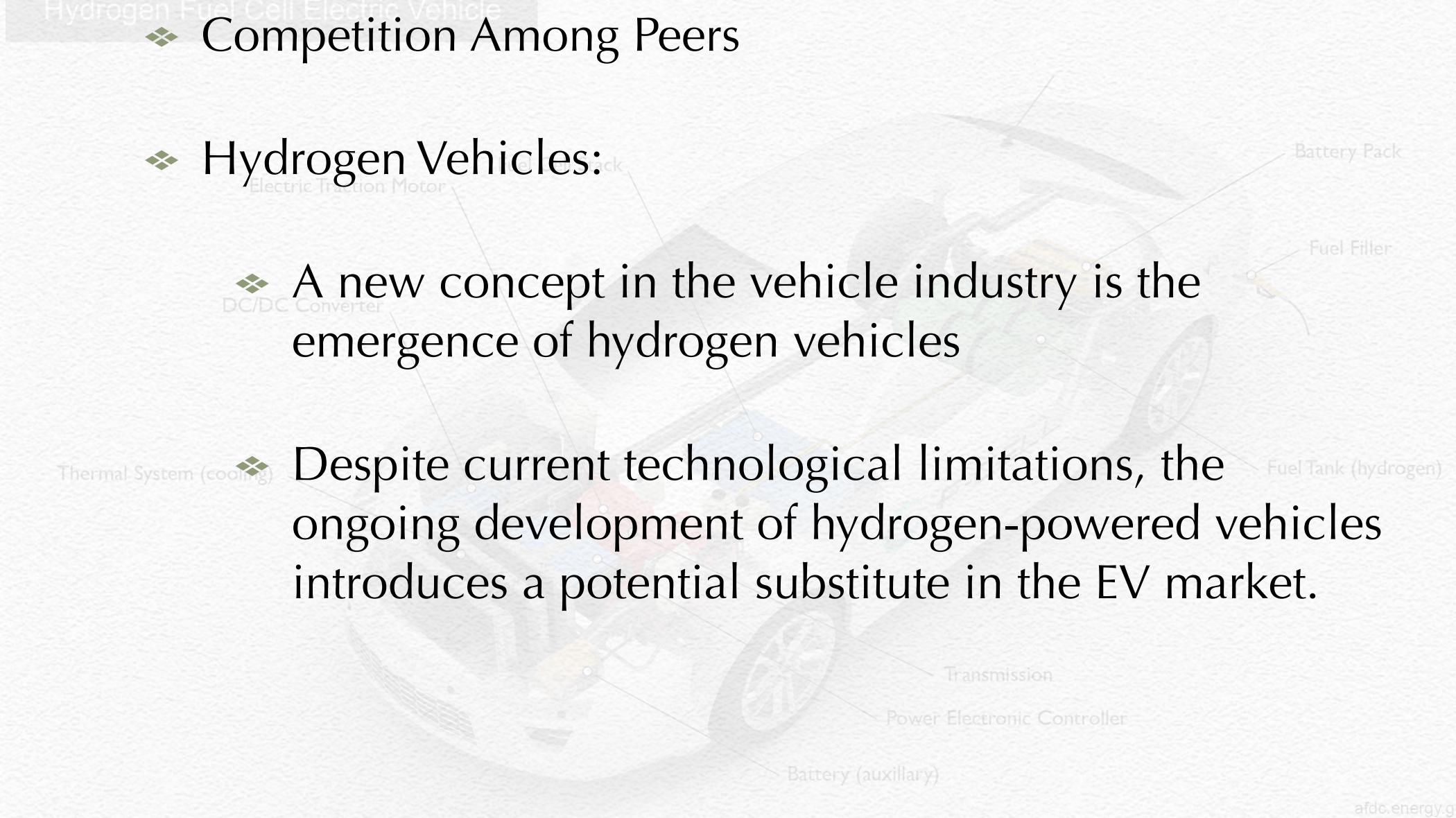
# Substitution

*Substitution compels progress. Electric vehicles act as a pivotal bridge, instilling confidence in alternative energy cars. Hydrogen vehicles emerge as the next frontier in the evolution of the green economy, signaling a continued commitment to sustainable transportation solutions.*

## BICYCLE



## ELECTRIC VEHICLE (EV)

- ❖ Competition Among Peers
  - ❖ Hydrogen Vehicles:
    - ❖ A new concept in the vehicle industry is the emergence of hydrogen vehicles
    - ❖ Despite current technological limitations, the ongoing development of hydrogen-powered vehicles introduces a potential substitute in the EV market.
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- afdc.energy.gov

THANK YOU:)