Environmental Sustainability Board
ESB Learning Academy

City of Bellaire

Electric Vehicles 101

3Q2022 Education Session

July 30, 2022

EVOLVE

Presented by Local Non-Profit Evolve Houston

Environmental Sustainability Board

- A non-statutory board that reviews and makes advisory recommendations to the City of Bellaire in the initiation, prioritization, and development of public education programs, policies, and actions relating to *Environmental Sustainability*.

- Seven Bellaire residents are appointed to the ESB by Bellaire City Council and serve a two-year term with a maximum of three consecutive terms.

- Current Citizen Volunteer Members of the ESB:

Rajiv Pandya - Moderator	Arlene Dooley
Elena Dilorio	Allison Piper
Todd Autwarter	
Joyce Gigout	Michael Leech – Public Works Liaison
Michael Bloesch	Dr Catherine Lewis – City Council Liaison

- The ESB organizes an education session related to Environmental Sustainability once a quarter as part of its ***ESB Learning Academy*** initiative. Past sessions covered Residential Solar, Solid Waste & Recycling, Texas Electrical Grid, Composting & Green Waste, Houston Area Climate Events

Before We Start

- A Show of Hands: your Electric Vehicle adoption and lifestyle journey

- Rapid Improvement to Top EV Concerns:
  1. High List Price
  2. Low Driving Range
  3. Lack of Charging Availability

- In Addition to Lower Fuel Cost, some Lesser-Known Benefits of EV's:
  1. Very Low Maintenance
  2. Long Battery Life
  3. High Resale Value
  4. Fast and Quiet Acceleration

- Proposed New Federal Climate Law Expands Tax Credits to $7,500 (new cars) and $4,000 (used cars) with car price and income caps

- Please attend Evolve Houston's Aug 18 large public event at GRB Conv Ctr

Questions and Answer Time reserved at the end. For virtual participant questions will be through the Zoom chat feature. Also, this event is being recorded and will be posted on the City of Bellaire ESB Website

Evolve Houston Presenters Today

Katheryn "Kate" Abou-Chakra

Director of Marketing & Memberships at Evolve Houston, where she oversees the marketing strategy and focuses on raising consumer awareness related to EVs and eMobility overall. Her role focuses on managing Evolve's digital campaigns, managing the electric ride & drive event series, and working with stakeholders to organize local and regional experiences related to EVs. Kate's career began and has been maintained within the transportation / automotive industry and she brings experience working alongside automotive manufacturers and consumer fleets, as well as knowledge in the energy, sustainability, and mobility industries. Kate is a graduate from the Automotive Business School of Canada and holds an MBA from the University of Calgary.

Harry Tenenbaum

Director of Commercialization & Infrastructure at Evolve Houston, where he focuses market research & analytics, fleet electrification, and working with stakeholders to strategize the expansion of the EV charging infrastructure. Harry brings deeps industry knowledge working in technology assurance, cybersecurity, emerging technologies, and political risk. Harry is a graduate of the University of Alabama, where he studied Management Information Systems with an emphasis on emerging technologies and cyber security.

Evolve Houston

CITY OF BELLAIRE Presentation

ELECTRIC TRANSPORTATION TODAY

EVOLVE

EVOLVE
ELECTRIFYING TRANSPORTATION

INTRODUCING

VIRTUALLY

Harry Tenenbaum

Director of Commercialization & Infrastructure

Katheryn Abou-Chakra

Director of Marketing & Memberships

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Who is Evolve Houston?

About Evolve Houston

MISSION Improve air quality and reduce greenhouse gas emissions by promoting the development of a landscape that enables mass EV adoption in the Greater Houston Area.

VISION To make clean transportation and clean air a reality for all Houstonians.

FOUNDING MEMBERS:

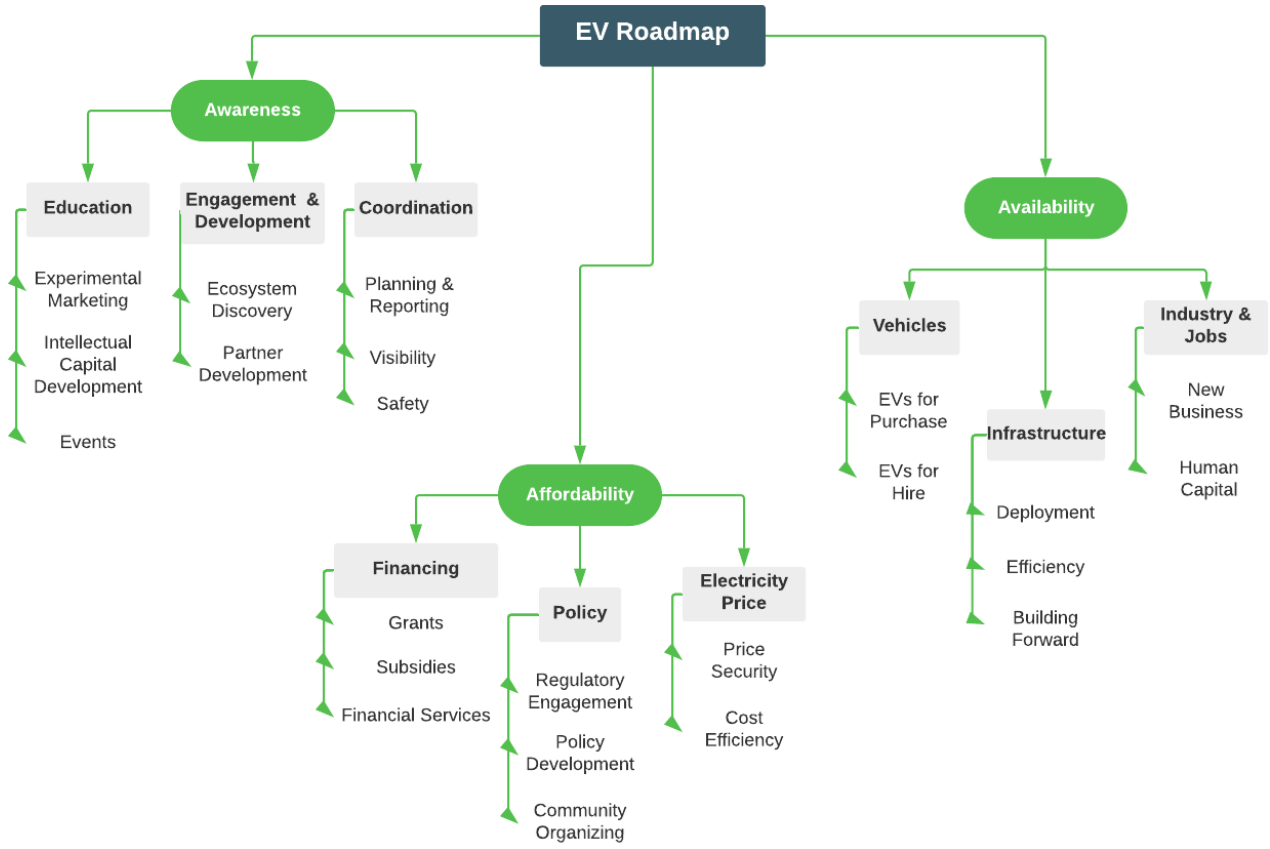
Evolve Houston (ctn.)

GOAL

Evolve Houston targets regional EV sales to reach a 50% share of annual new car sales by 2030 **(50% by 2030)**

How are we working to achieve this goal?

Ride and Drive events are a critical program designed to help achieve this goal



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Electric Vehicles 101

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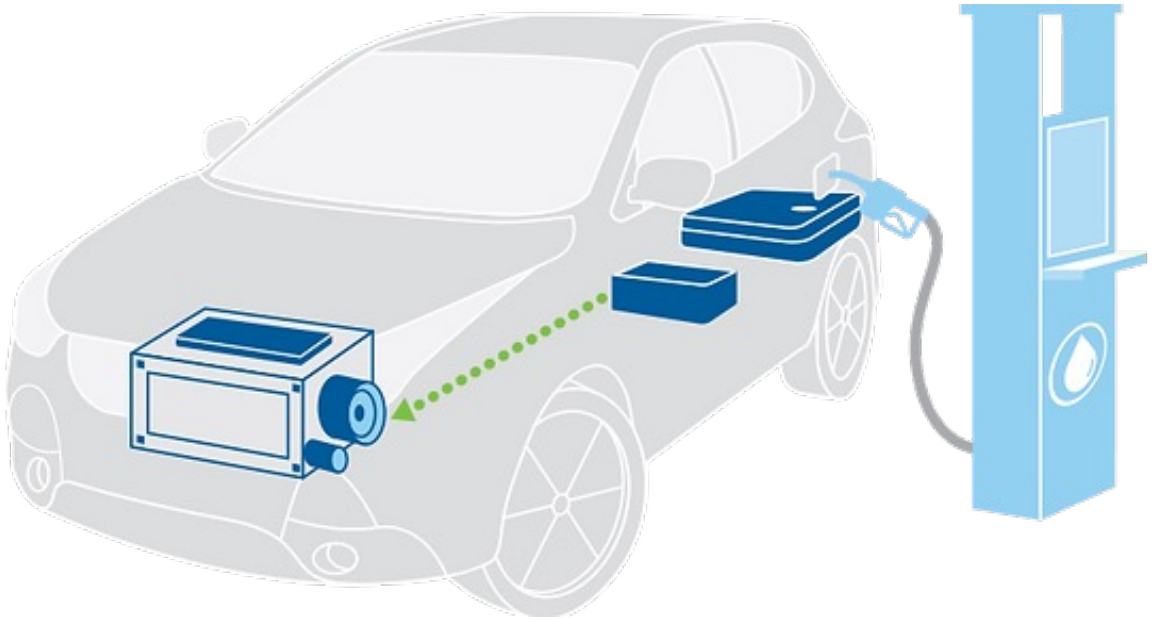
What is an EV?

Hybrid Electric Vehicle (HEV)

Hybrid electric vehicles are powered by a gasoline/diesel engine and an electric motor that uses energy stored in a battery. The battery is charged by the internal combustion engine (ICE) and through regenerative braking. The vehicle cannot be plugged in to charge.



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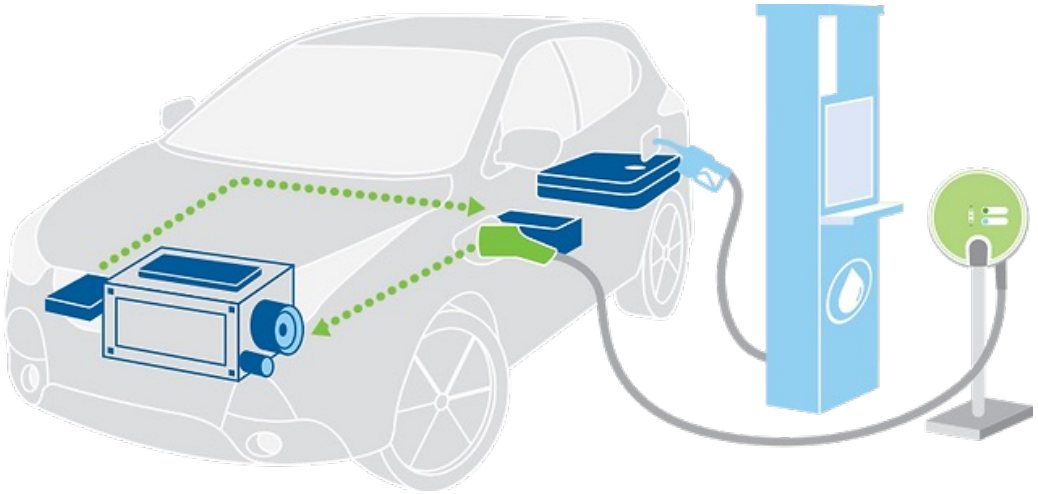
What is an EV?



Plug-in Hybrid Electric Vehicle (PHEV)

PHEVs have a larger battery that provides a better range. The battery can be charged by plugging into an electric power source, through regenerative braking, and by the ICE. Unlike all-electric vehicles, PHEVs don’t need to be plugged in and can be fueled solely with gasoline, like an HEV. Plugging in is recommended to achieve maximum fuel economy and to experience all the benefits of the all-electric capabilities.

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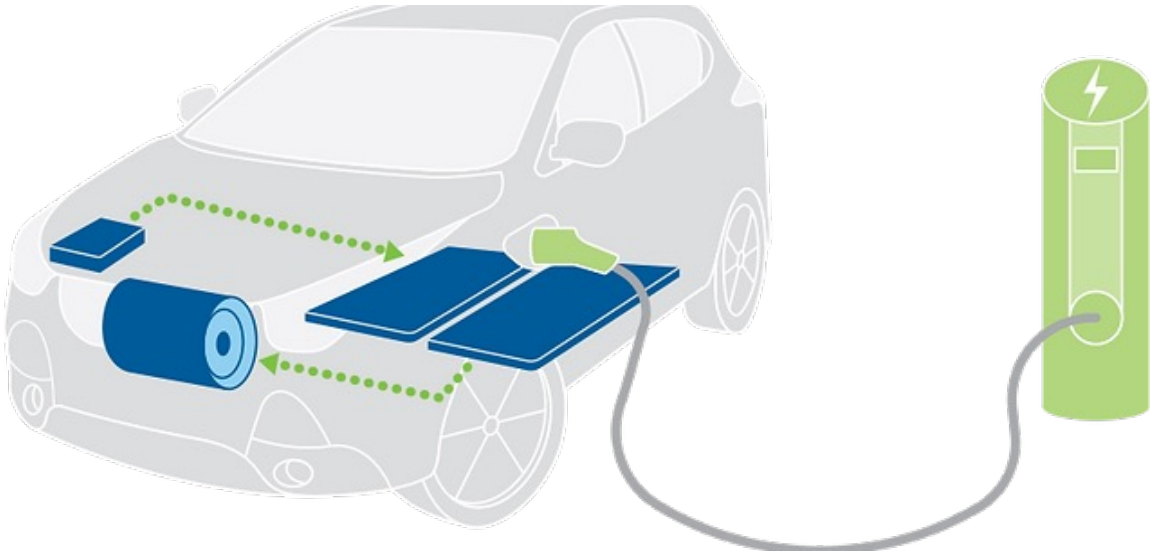
What is an EV?

Battery Electric Vehicle (BEV)

BEVs run on electricity alone. They are powered by an electric motor that uses energy stored in a battery (larger than the batteries in an HEV or PHEV). EV batteries are charged by plugging the vehicle into an electric power source and through regenerative braking.



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What is an Electric Vehicle?

HYBRID (HEV)

Gasoline-powered

Primarily powered by an ICE.

Charges battery through regenerative braking and engine.

PLUG-IN HYBRID (PHEV)

Some models use gasoline only after battery charge is depleted, while other models use both electric and gasoline power at the same time.

Charges battery through plugging in, regenerative braking, and the engine.

BATTERY (BEV)

Powered solely by electric power stored in a battery.

No ICE or gas stations trips!

***traditional gas burning vehicles run on an internal combustion engine (ICE)**

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DRIVE ELECTRIC

SAVE MONEY

Reduced Fueling Costs & Maintenance
Affordable Options

BETTER RIDE

High Performance & Fast Acceleration

CLEANER AIR

Reduce Tailpipe Emissions for Public Health & Sustainability

ENERGY INDEPENDENCE

Reduce Reliance on Imported Fuels

2022 Kia Niro EV $39,990 | 239 miles

2022 Chevrolet Bolt $31,000 | 259 miles

YES, IT'S STILL BETTER

Source: Union of Concerned Scientists

77002 | MAKE | MODEL | YEAR | CLEAR FILTERS

GASOLINE-ONLY

Conventional cars run on gasoline and tend to be dirtier and more expensive to fuel than EVs.

381 GRAMS OF CO_2e PER MILE

AVERAGE EMISSIONS IN 77002

PLUG-IN HYBRID ELECTRIC

Plug-in hybrids use both gasoline and electricity and can be recharged from an outlet.

219 GRAMS OF CO_2e PER MILE

BATTERY ELECTRIC

Battery electric vehicles run on electricity and are some the cleanest and cheapest cars to drive.

141 GRAMS OF CO_2e PER MILE

SOME of the electric options on the market

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EV Market Outlook

EV OWNERSHIP (HTX)

- 2022: Through May, there have been 10,005 new and 4,564 used EVs registered in the Houston area, including over 4,250 BEVs. This is a 30% increase over the same time period in 2021.
- 2021: 20,546 new and 9,094 used BEVs registered in the Houston area, including 8,042 BEVs.
- EVs' share of total vehicle registrations have increased year-over-year, accounting for 7.6% of all vehicles registered in the Houston area this year (through May) and had a single-month peak of 8.32% in April.
- Since Evolve Houston's inception, there have been nearly 75,000 EVs registered in the Houston area.

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EV Market Outlook

- Largest barriers to EV adoption for non-EV owners were (1) vehicle price (2) charging station availability, and (3) lifestyle.

- We expect that these barriers will continue to be broken down as vehicle prices decrease (and grants/incentives increase), charging infrastructure deployment increases (largely through IIJA/NEVI funding), and EVs of more vehicle types become available (and EVs become more widespread).

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EV Market Outlook

EV OWNERSHIP (TX)

- 134,072 electric vehicles are registered in the state of Texas as of July 5, 2022
- EVs are registered in 233/254 counties across Texas
- Non-Tesla vehicle models make up nearly half of all EVs registered across the state
- Since 2020, the total number of electric vehicles across Texas has nearly tripled
- The Electric Reliability Council of Texas (ERCOT) estimates there will be 1 million electric vehicles on the road in Texas by 2028.

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EV Market Outlook

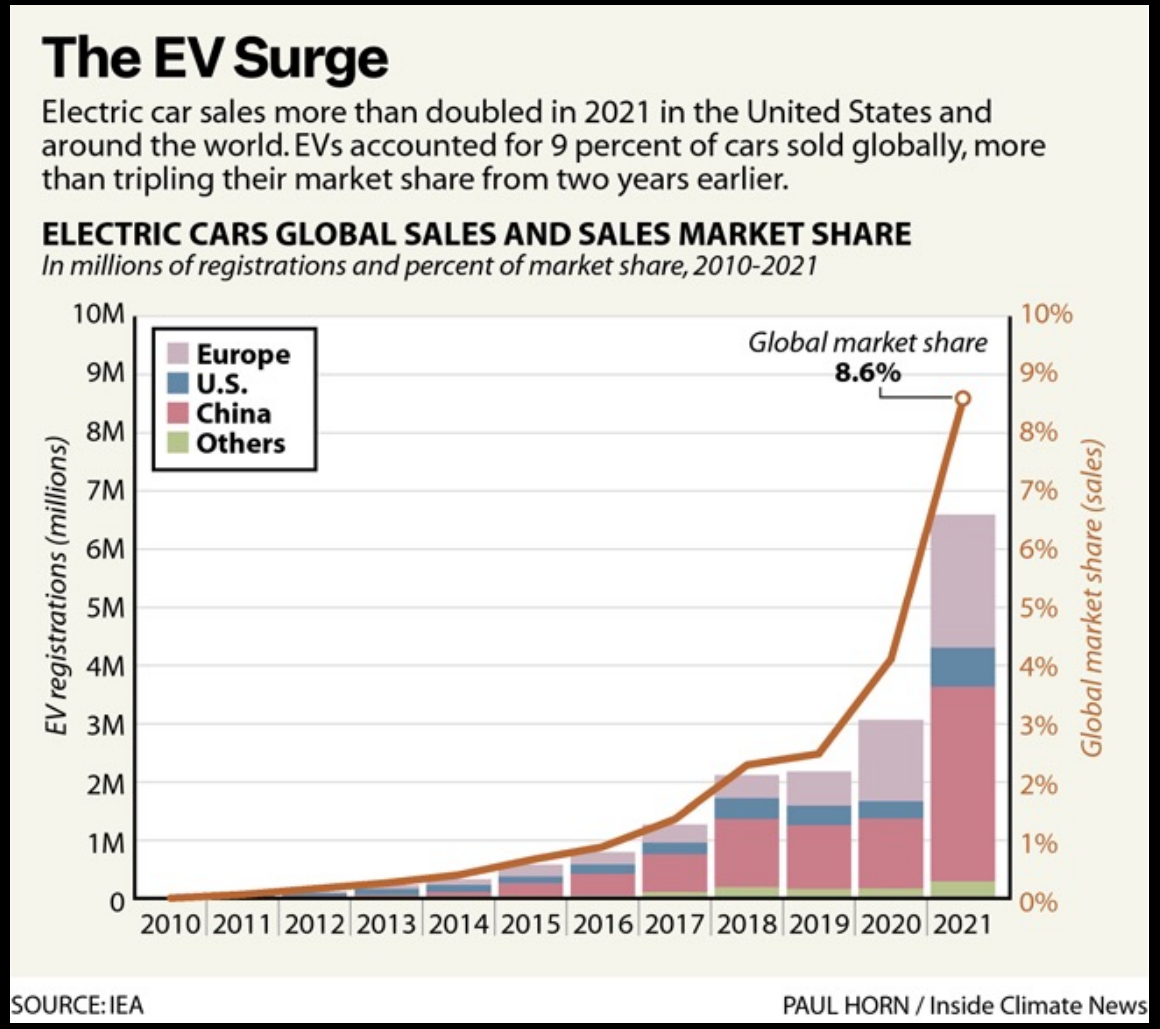
EV OWNERSHIP (US & GLOBAL)

Could EVs make the US vulnerable?

- Nickel, a core metal used in EV batteries saw a 50% price increase from 2021 to 2022
- This could raise vehicle MSRP by $2k
- 1% of nickel is produced in the US and needs to be processed in Canada
- Russia is the source for 20% of the world's nickel

Is there a solution?

- Lithium iron phosphate (LFP) batteries
- Biden administration roadmap calls to eliminate nickel-cobalt in lithium batteries
  - $5 billion to be administered to develop a more diverse and secure supply chain of raw materials



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EV Market Outlook

THE INDUSTRY IS GOING ELECTRIC

Car manufacturers, including the Big Three have committed billions of investment dollars to electrify their product line-up.

HOUSTON EV SALES ARE RISING

Between 2020 to 2021, Houston BEV sales increased by 120% and Houston HEV/PHEV/BEV sales increased by 138%, while overall new vehicles sales increased by 2.6%.

FEDERAL FUNDING BOOSTS ELECTRIFICATION

Nearly $ 100 billion will be invested in the nation's electric grid, zero- or low-emissions buses, and expanding the EV charging network by 400,000 stations by 2030. Texas will receive $400 million of that funding.

GLOBAL EV MARKET IS GROWING

The EV global market opportunity between today and 2030 is worth $7 trillion, and $46 trillion between today and 2050. By 2030, there will be at least 125 million plug-in vehicles on the roads, compared to just 10 million today.

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Incentives

FEDERAL TAX CREDIT

BEVs: Up to $7,500
PHEVs: Up to $4,500
*New Vehicles Only

Texas Commission on Environmental Quality (TCEQ) Light-Duty Motor Vehicle Purchase or Lease Incentive Program (LDPLIP)

BEVs and PHEVs: Up to $2,500

REFER TO OUR GRANTS TRACKER:
https://evolvehouston.org/grants-incentives

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Electrifying Houston’s Fleets

INTRODUCTION TO THE EVH FLEET STUDY PROGRAM

Evolve Houston began its Fleet Study Program in 2020 to bolster electrification planning across major public and private regional fleets. The studies are backed by the data platform of elQ Mobility and funded in part by the Energy Foundation.

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elQ MOBILITY

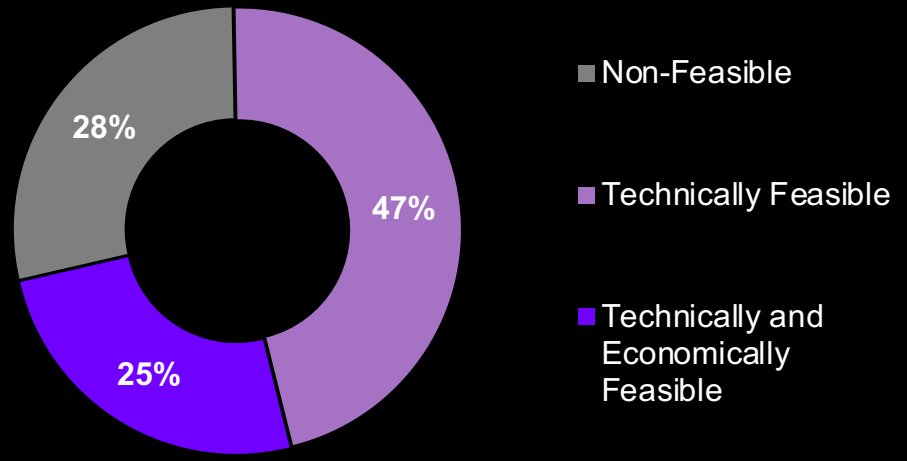
ENERGY FOUNDATION
building a new energy future

Participating Fleets Include:

Fleet Study Pilot Program

As part of the initial 5-fleet Assessment Pilot Program, Evolve Houston assessed nearly 15,000 vehicles, identifying over 10,000 technically feasible, and over 3,550 economically feasible EVs. This can result in up to $27.8MM in lifetime TCO savings and reduce annual CO2 emissions by as much as 17,365 metric tons.

Flet Study Program Results



CASE STUDY: CITY OF HOUSTON

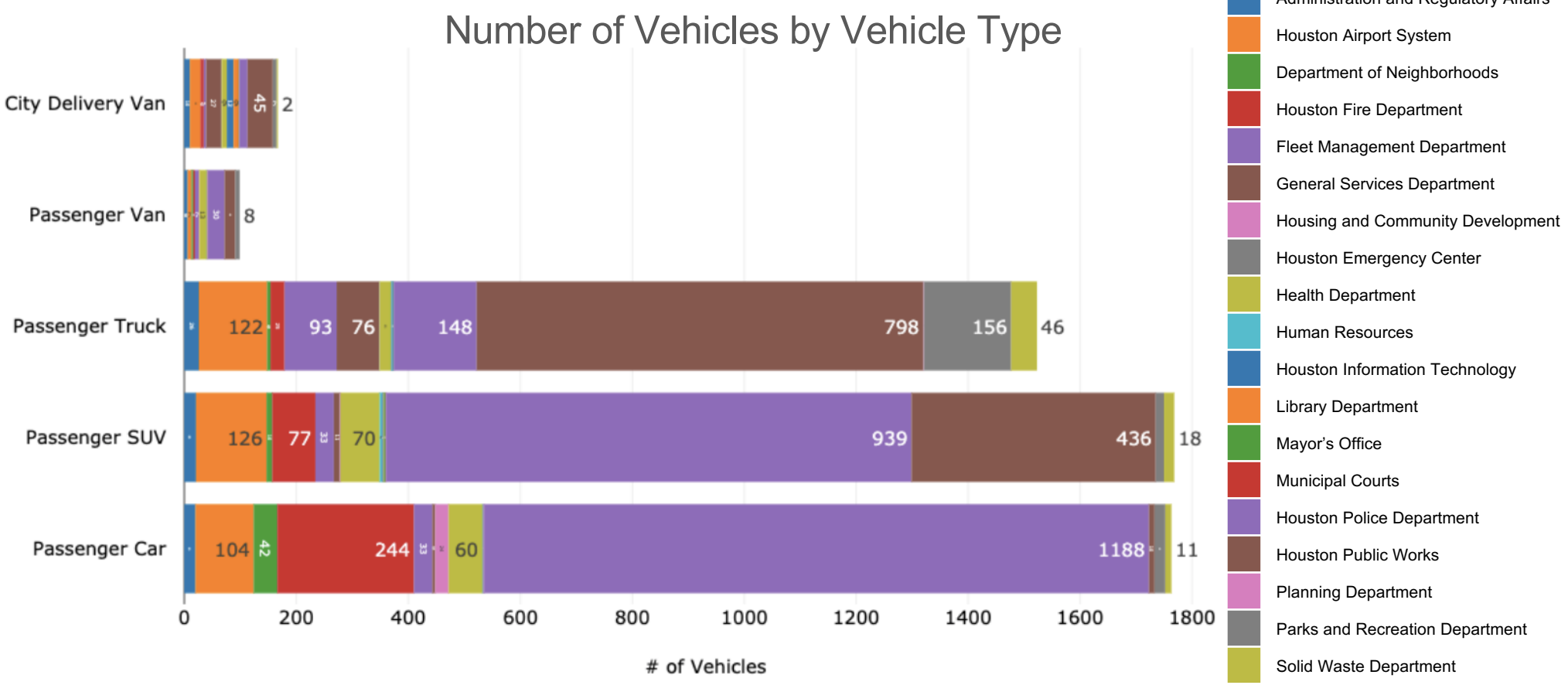
5,300
Vehicles
Existing ICE vehicles assessed across 19 City departments

24 to 294
Miles
Daily mileages range

12
Hours
Average total daily operating hours

11
Main Depots
With additional secondary facilities

Our study evaluated the City's light-duty municipal fleet vehicles (LDVs)*



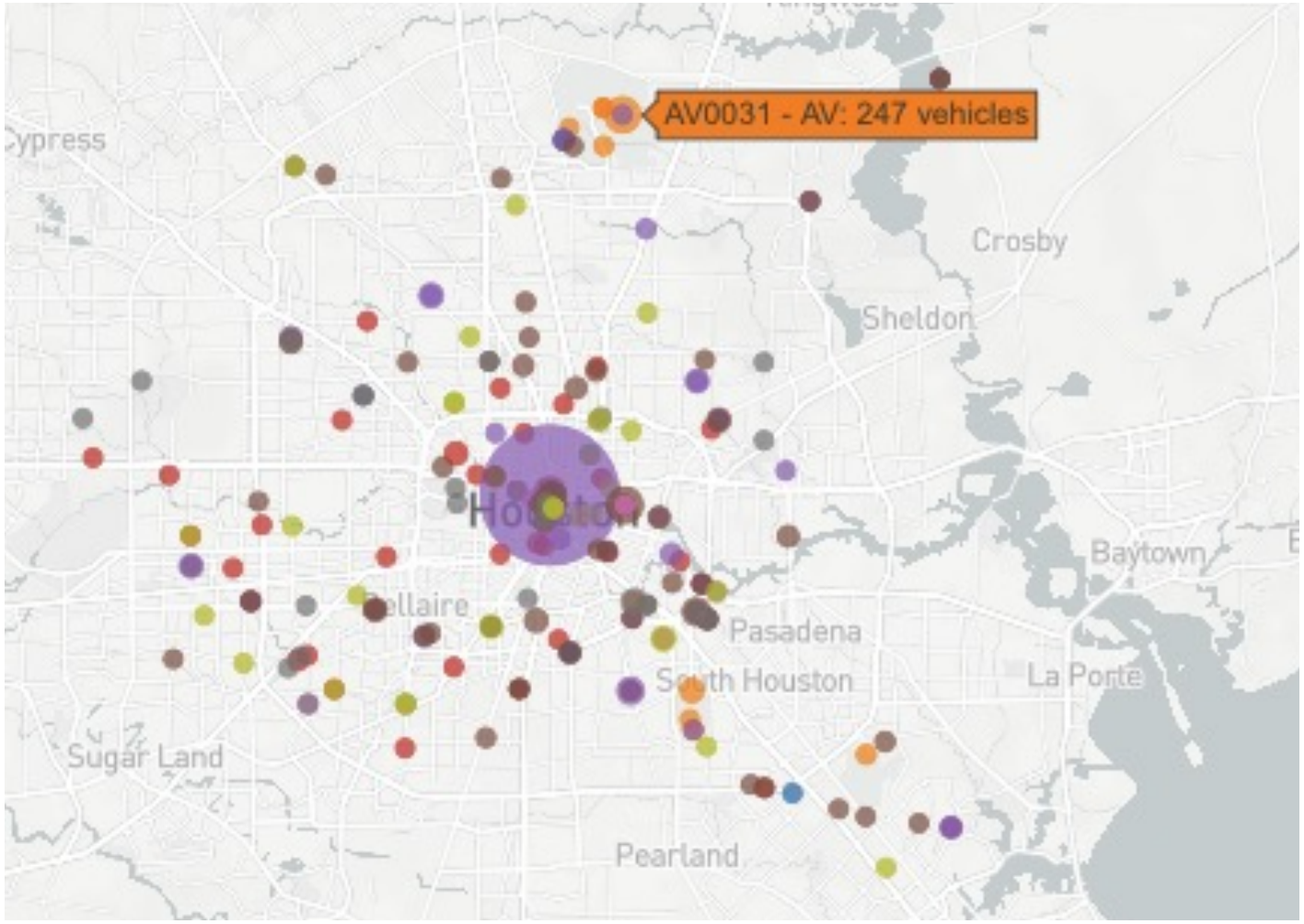
***As more EV models become available, EVH will be able to support other departments within the City's municipal fleet who operate medium- and heavy-duty vehicles.**

CASE STUDY: CITY OF HOUSTON

The Fleet Evaluation identified **11 Main Depots** with additional secondary facilities located throughout the Houston area.

Each circle on the map represents one City of Houston vehicle depot. The size of each circle represents the relative number of vehicles associated with that specific depot.

Fleet Vehicles by Location

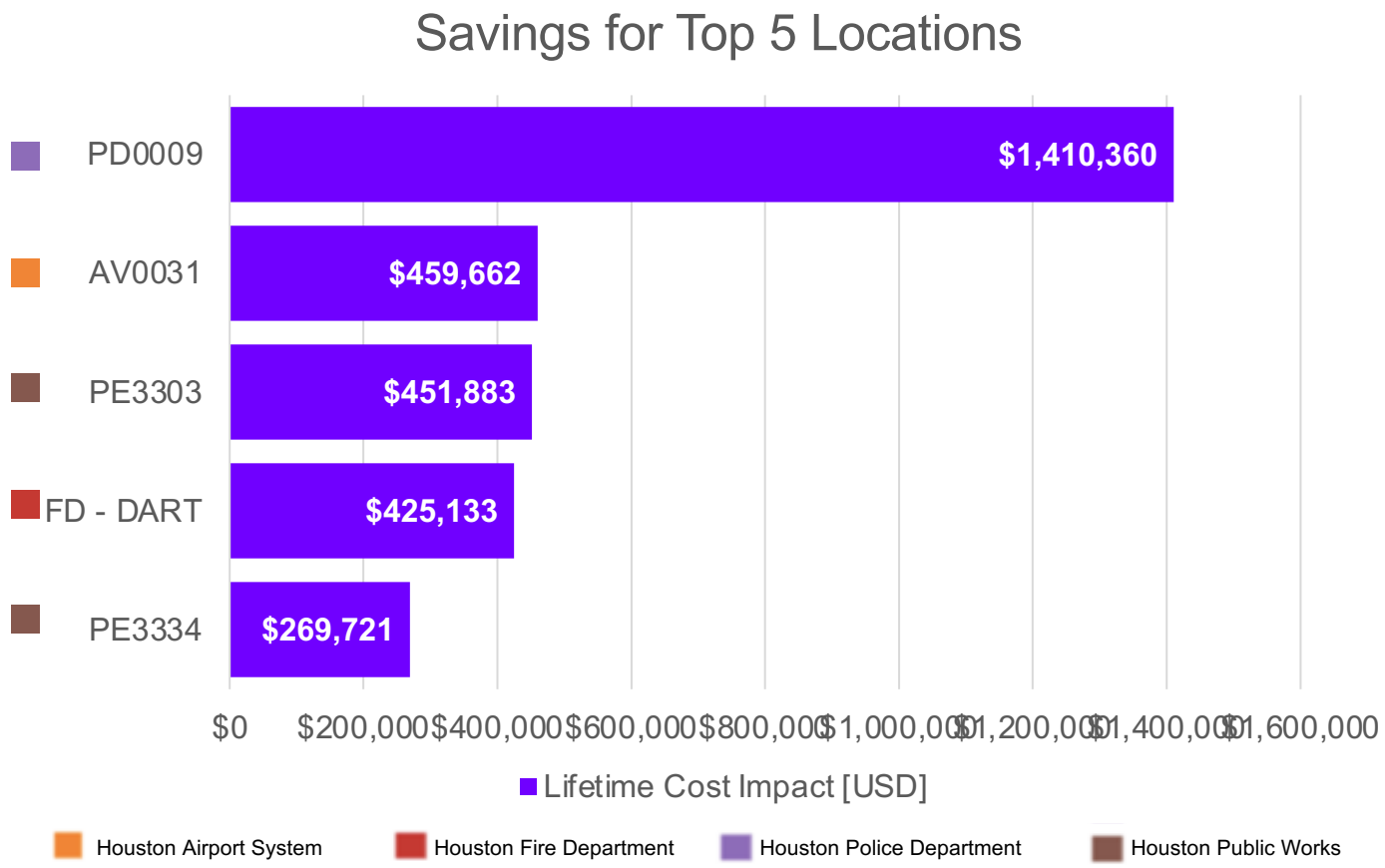


- Administration and Regulatory Affairs
- Houston Airport System
- Department of Neighborhoods
- Houston Fire Department
- Fleet Management Department
- General Services Department
- Housing and Community Development
- Houston Emergency Center
- Health Department
- Human Resources
- Houston Information Technology
- Library Department
- Mayor's Office
- Municipal Courts
- Houston Police Department
- Houston Public Works
- Planning Department
- Parks and Recreation Department
- Solid Waste Department

CASE STUDY: CITY OF HOUSTON

Of the 5,300 vehicles studied, **4,157** were technically feasible EVs, and **1,345** were economically feasible EVs* (**32% the total assessed fleet!**)

Of the top 5 locations analyzed, **681** vehicles out of 2,692 ICE vehicles have a feasible EV model option.

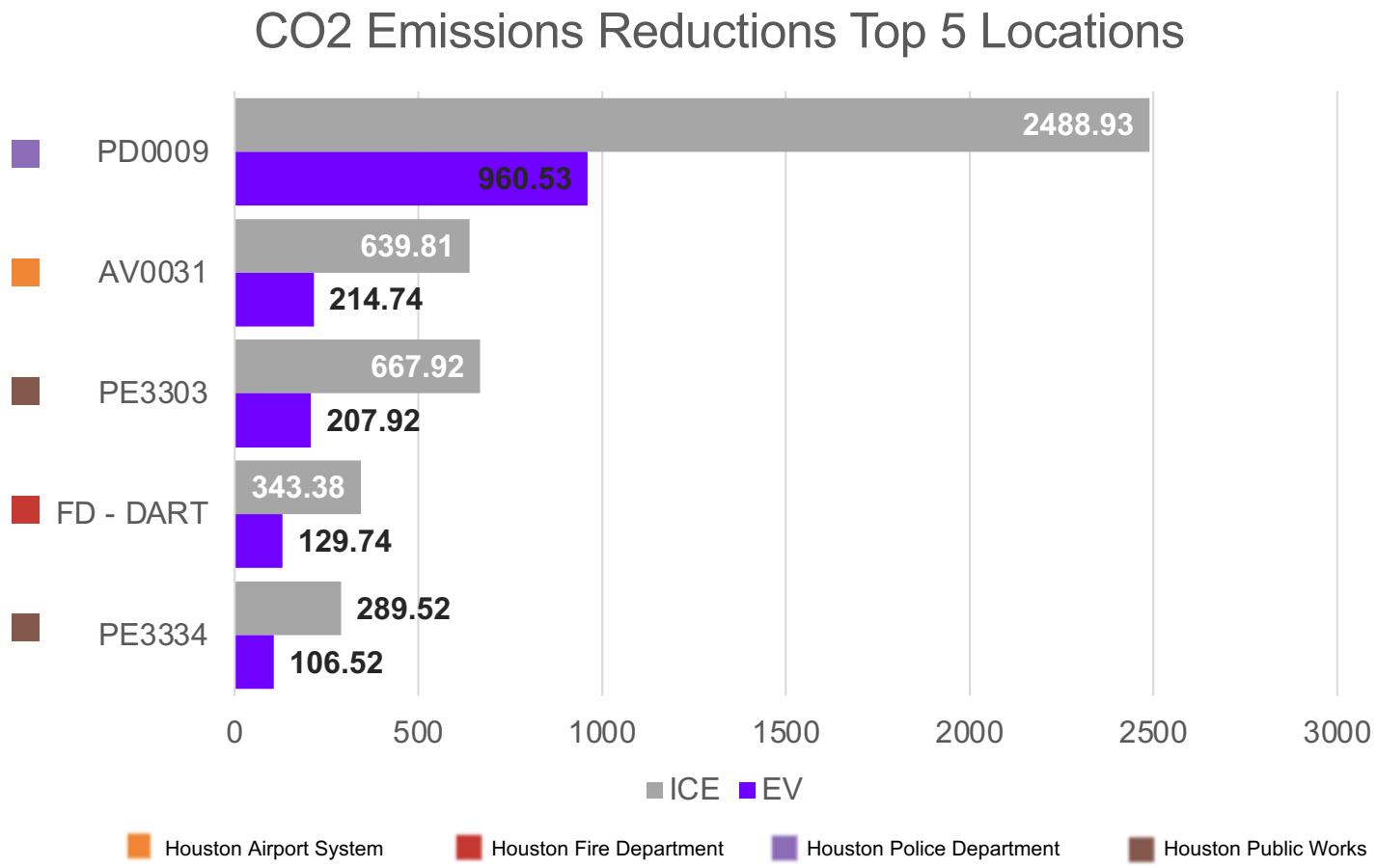


Note: Economic feasibility does NOT include available federal or state incentives.

CASE STUDY: CITY OF HOUSTON

Electrifying the 1,345 economically feasible vehicles alone could generate **$6.9 Million** in lifetime total cost of ownership (TCO) savings.

Converting all 4,157 technically feasible vehicles would reduce CO2 emissions by **13,577 metric tons annually**, equivalent to a 62% reduction for the selected vehicles.



NEXT STEPS FOR THE CITY OF HOUSTON

Action items following fleet study:

1. Following the results of the fleet study, the City of Houston order 97 EVs, nearly tripling the number of existing EVs within the municipal fleet. This is in line with the City's commitment to electrify all non-emergency LDV by 2030.

2. Mayor Sylvester Turner announced approval to purchase, install, and deploy Shell Recharge Solutions EVSE in various City facilities.

3. Evolve Houston evaluated an additional 4,273 municipal fleet vehicles in the Houston area, identifying 1,324 economically feasible vehicles which could result in nearly $13.5MM in TCO savings and 6,841 tons of CO_2 emissions reductions.

Questions to Consider:

Does your city have any existing sustainability goals?
How much do you know about your city's fleet?
What are the environmental and economic impacts of your city's existing fleet?
To what degree has your city thought about fleet electrification?
Who owns fleet electrification in your city?

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EV Charging Infrastructure

Electric Vehicle Charging

Level 1 chargers use standard 120V electrical outlets. 120V circuits are also used by most home electronics.

1 HOUR = 2-5 MILES

@ HOME

Level 2 chargers use 240V electrical circuits. 240V circuits are also used by electric dryers & electric stovetops

1 HOUR = 25 MILES

@ HOME, PUBLIC OR WORK

DC Fast Charging direct current fast chargers use ultra high-power 480V circuits at public charging stations.

10 MINUTES = 40 MILES

@ PUBLIC STATION

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TxDOT EV Charging Plan - Summary

$408M

Texas is set to receive nearly $408 million in federal funding over 5 years to build its portion of a national network of EV charging stations

August 1

Submit Texas Electric Vehicle Plan to FHWA

Fall 2022

Publish Solicitation

Winter 2022/2023

Evaluate Proposals

Spring 2023

Award Contracts for Stations on AFCs

- Over 3,400 centerline miles of interstate highways, and interstates represent the largest percentage of vehicle miles traveled in the state.
- TxDOT will be focusing EV charging infrastructure deployment along designated alternative fuel corridors (AFCs) before focusing on Texas' rural and urban communities.
  - Charging stations placed along AFCs will be no more than 50 miles apart, no more than one mile from highway exits/entrances, and provide at least 4 150kW charging stations
  - Charging stations in rural communities will be deployed in each County Seat, which are approximately 50 miles from one another.
- Within urban areas, Metropolitan Planning Organizations (MPOs) will assist in proposing charging station types and locations, drafting solicitations, and scoring responses.
- If all DC and Level II charging stations in the TxDOT plan were utilized at the same time at their max rate, they would consume 666.7 MW of electricity from the grid.
  - ERCOT hosts an assortment of dashboards displaying near real time grid conditions.
  - On May 3rd Operating Reserves ranged from 3,751 MW to 6,066 MW.

www.EvolveRelaunch.Eventbrite.com

AUGUST 18

EVOLVE RELAUNCH EVENT

GEORGE R BROWN CONVENTION CENTER

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