ITSS4351 PRESENTATION

GROUP 12

QUICK QUESTION.

ELECTRIC VEHICLE (EV) ADOPTION IS RAPIDLY INCREASING IN THE DALLAS–FORT WORTH REGION.

HOWEVER, CHARGING INFRASTRUCTURE HAS NOT GROWN AT THE SAME PACE.

RESULT: HIGHER CONGESTION AT STATIONS, RISING COMPLAINTS, AND POOR USER EXPERIENCE.

GOAL : IDENTIFY GAPS, PATTERNS, AND OPPURTUNITIES TO ENCHANCE EV CHARGING ACCESSIBILITY IN DFW



SPARK SIGHT

HEMANTH JAMMIGUMPALA

OPTIMIZING



EV



CHARGING INFRASTRUCTURE



IN



THE DALLAS-FORT WORTH





METROPLEXIPSUM

DATASETS USED

1. ALT FUEL STATIONS (KAGGLE)

- EV CHARGER LOCATIONS (LAT/LONG)
- CITY, ZIP, STATION & ACCESS TYPE
- USED TO MAP CURRENT CHARGER DISTRIBUTION

2. DALLAS 311 EV-RELATED COMPLAINTS

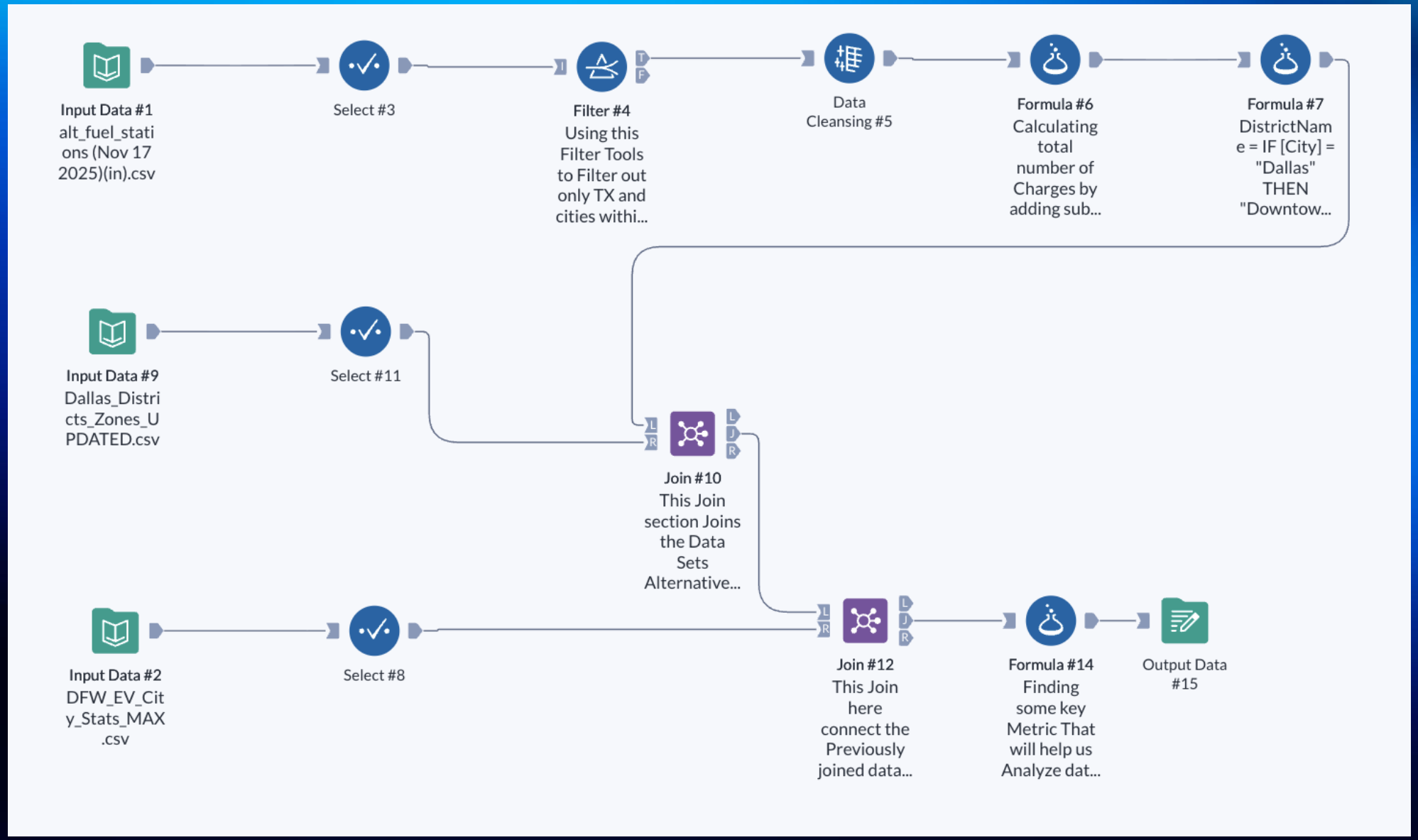
- COMPLAINT TYPE & SEVERITY
- DATE/TIME + LOCATION
- USED TO IDENTIFY ISSUE HOTSPOTS & MAINTENANCE GAPS

3. DFW DISTRICT / NEIGHBORHOOD BOUNDARIES + EV CITY STATS

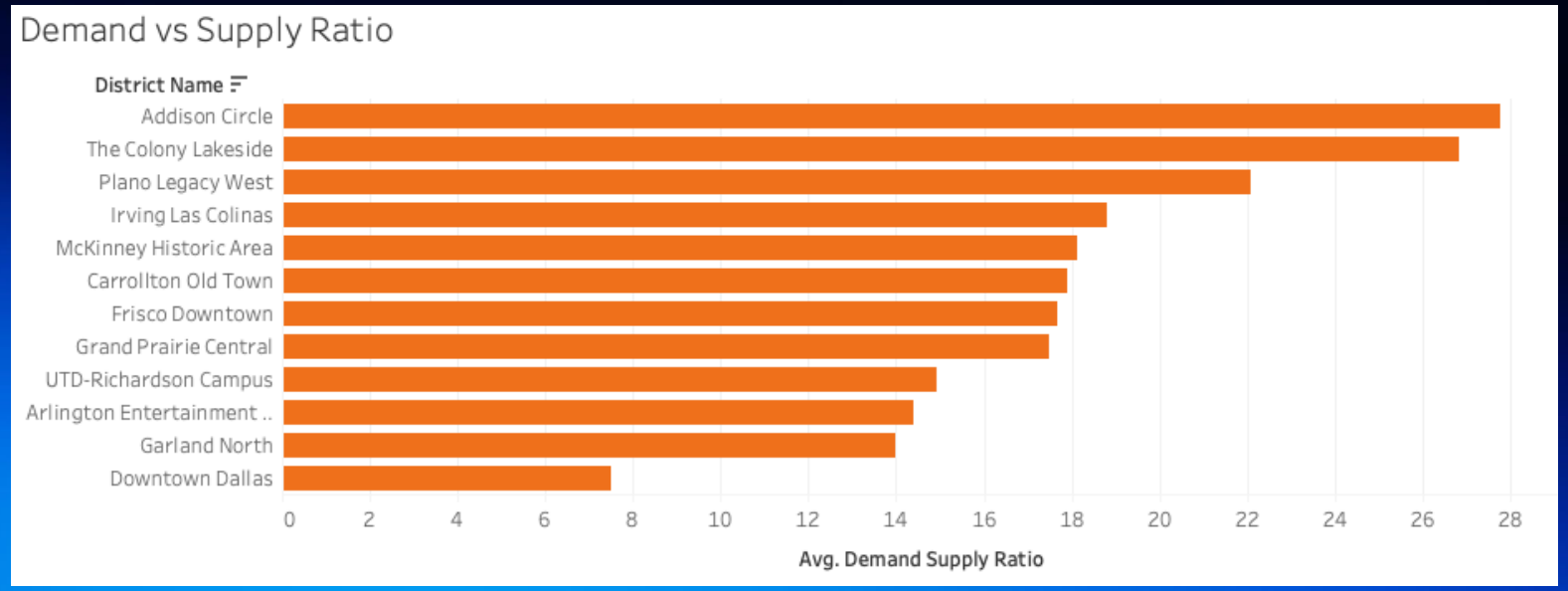
- DISTRICT/ZONE SHAPEFILES
- EV COUNTS & CHARGER TYPES
- USED FOR ZONE-LEVEL COMPARISON & DEMAND VS. SUPPLY ANALYSIS

HOW WE PROCESSED THE RAW DATA ?

- STANDARDIZED INCONSISTENT FIELDS BY CLEANING CITY NAMES, ZIP CODES, AND ADDRESS FORMATS FOR BOTH DATASETS.
- REMOVED NULL AND DUPLICATE RECORDS TO ENSURE ACCURATE STATION COUNTS AND COMPLAINT TOTALS.
- PARSED AND FORMATTED DATE/TIME FIELDS TO SUPPORT TREND ANALYSIS AND TIME-BASED FILTERING IN TABLEAU.
- GEOCODED MISSING COORDINATES AND VALIDATED LATITUDE/LONGITUDE TO ALIGN BOTH DATASETS SPATIALLY.
- JOINED COMPLAINT DATA WITH CHARGING STATION DATA USING SPATIAL JOIN AND ZIP-LEVEL MATCHING.
- CREATED CALCULATED METRICS SUCH AS DEMAND–SUPPLY RATIO, SUITABILITY SCORE, AND COMPLAINT DENSITY FOR DEEPER INSIGHTS.1


Input Data #1
alt_fuel_stations (Nov 17 2025)(in).csv
Select #3
Filter #4
Using this Filter Tools to Filter out only TX and cities withi...
Data Cleansing #5
Formula #6
Calculating total number of Charges by adding sub...
Formula #7
DistrictName = IF [City] = "Dallas" THEN "Downtow...
Input Data #9
Dallas_Districts_Zones_UPDATED.csv
Select #11
Join #10
This Join section Joins the Data Sets Alternative...
Input Data #2
DFW_EV_City_Stats_MAX.csv
Select #8
Join #12
This Join here connect the Previously joined data...
Formula #14
Finding some key Metric That will help us Analyze dat...
Output Data #15

AVERAGE DEMAND VS SUPPLY RATIO ACROSS DFW DISTRICTS

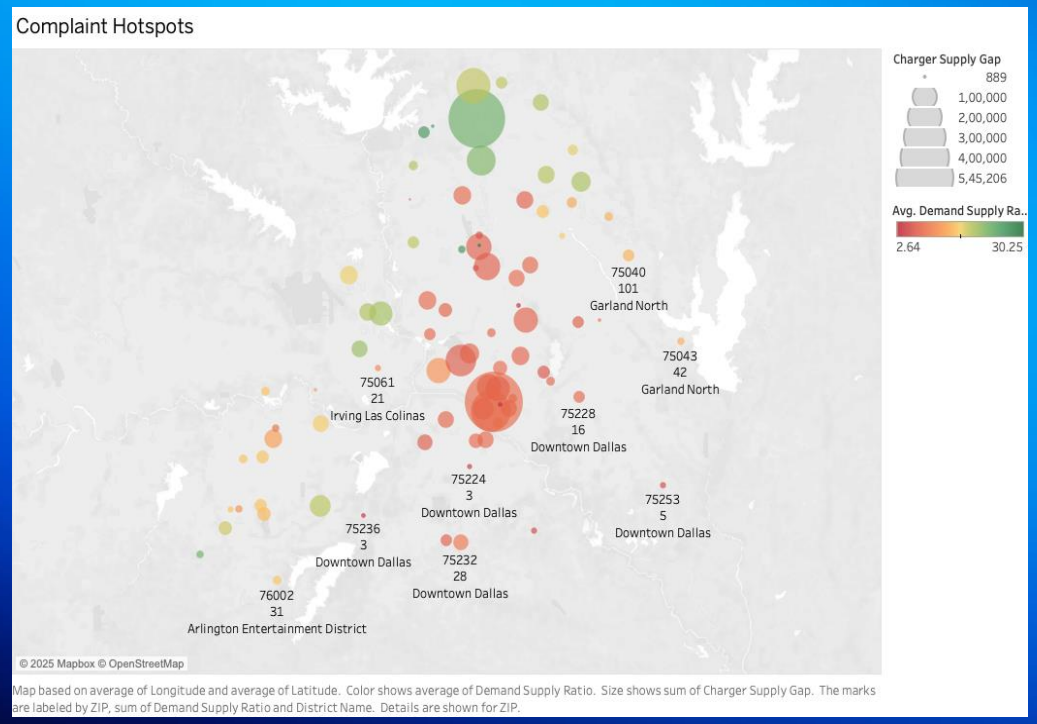


SHOWS HOW EV CHARGING DEMAND OUTWEIGHS SUPPLY ACROSS DFW DISTRICTS.

DISTRICTS LIKE ADDISON CIRCLE AND THE COLONY LAKESIDE HAVE THE HIGHEST DEMAND PRESSURE.

HIGHLIGHTS PRIORITY AREAS WHERE NEW CHARGERS ARE URGENTLY NEEDED.

EV COMPLAINT HOTSPOT MAP

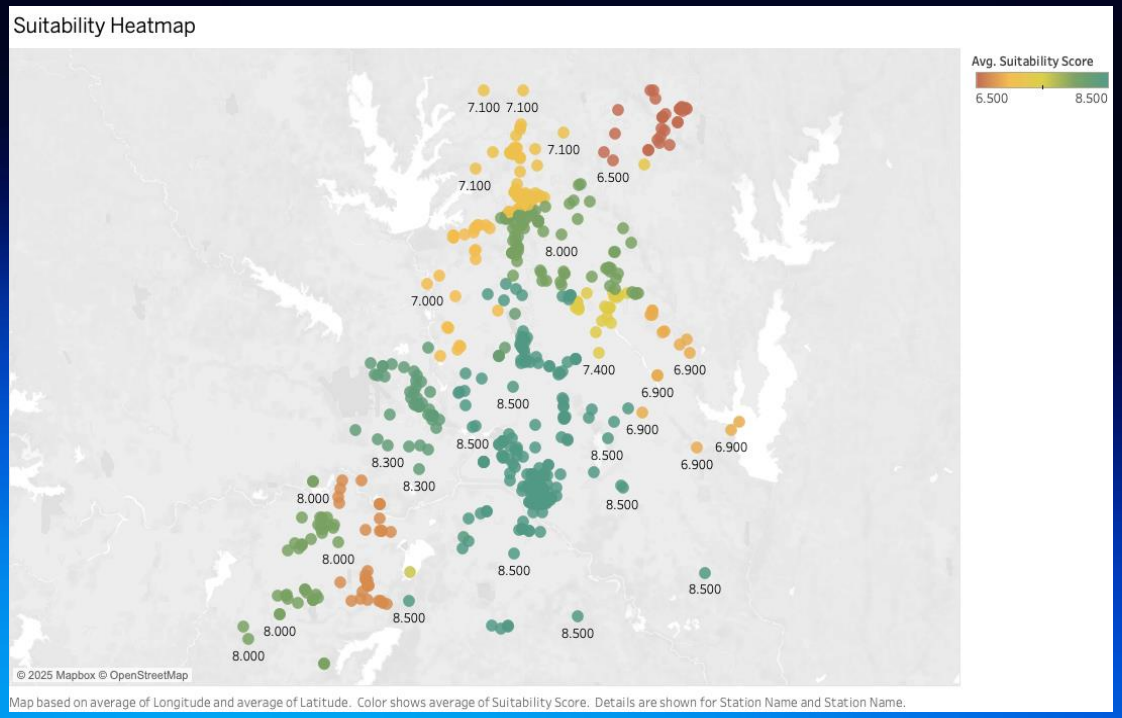


HOTSPOTS APPEAR IN DOWNTOWN DALLAS, IRVING/LAS COLINAS, AND ARLINGTON.

THE ROOT CAUSE OF COMPLAINTS IS INSUFFICIENT STATIONS, NOT POOR STATION QUALITY ALONE.

DFW NEEDS BALANCED GEOGRAPHIC DISTRIBUTION, NOT JUST MORE STATIONS.

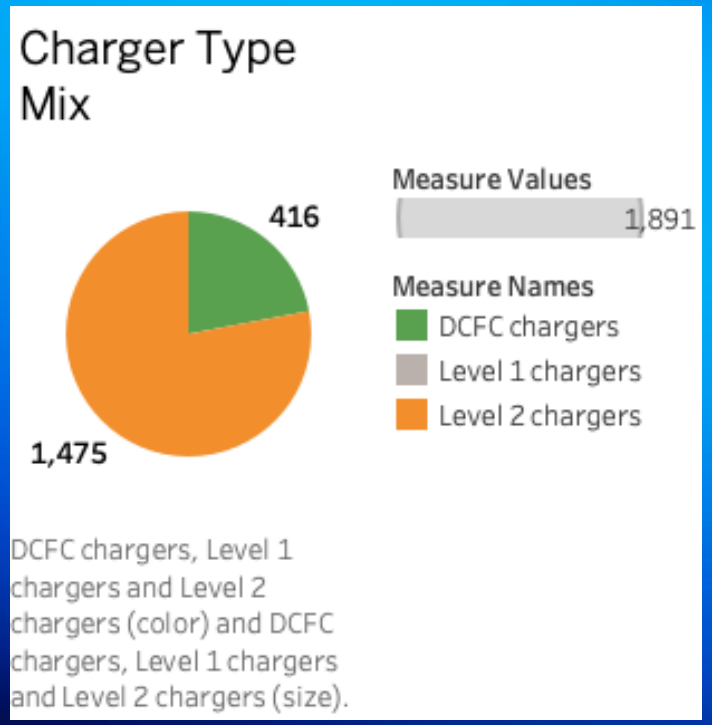
SUITABILITY HEATMAP



A SPATIAL MAP RANKING DFW LOCATIONS BY EV CHARGING SUITABILITY SCORES BASED ON DEMAND, ACCESSIBILITY, AND EXISTING INFRASTRUCTURE

HIGH-SUITABILITY ZONES (GREEN) HIGHLIGHT IDEAL LOCATIONS FOR NEW CHARGING STATIONS, WHILE LOW-SUITABILITY AREAS (ORANGE/RED) INDICATE REGIONS WHERE EXPANSION WOULD BE LESS EFFECTIVE.

CHARGER TYPE MIX



THE DISTRIBUTION OF CHARGER TYPES ACROSS DFW, COMPARING LEVEL 2 CHARGERS, LEVEL 1 CHARGERS, AND DC FAST CHARGERS.

LEVEL 2 CHARGERS DOMINATE THE NETWORK, WHILE FAST CHARGERS (DCFC) MAKE UP A MUCH SMALLER SHARE, HIGHLIGHTING A GAP IN HIGH-SPEED CHARGING OPTIONS WHERE DEMAND IS GROWING.

KEY METRICS AND WHAT THEY REVEAL

METRICS WE CALCULATED:

- TOTAL EV COMPLAINTS PER CITY
- STATIONS PER ZIP CODE
- COMPLAINT-TO-STATION RATIO
- HOTSPOT PROXIMITY DENSITY
- AVAILABILITY PER CAPITA (APPROX)

WHAT THE METRICS SHOW:

- DALLAS HAS THE **HIGHEST INFRASTRUCTURE PRESSURE**.
- IRVING AND ARLINGTON SHOW **EMERGING EV DEMAND BUT LIMITED INFRASTRUCTURE**.
- NORTH DALLAS / ADDISON AREAS SHOW **STRONG INFRASTRUCTURE BUT LOWER COMPLAINTS**.

SHORT-TERM (0–1 YEAR)

- INSTALL LEVEL 2 CHARGERS IN HIGH-TRAFFIC HOTSPOTS.
- IMPROVE SIGNAGE & ACCESSIBILITY IN CONGESTED AREAS.

MID-TERM (1–3 YEARS)

- EXPAND STATIONS IN DALLAS, IRVING, AND ARLINGTON — TOP 3 COMPLAINT ZONES.
- PARTNER WITH MALLS, OFFICES, AND CITY PROPERTIES FOR INSTALLATIONS.

BUILD PREDICTIVE LONG-TERM (3+ YEARS)

- EV INFRASTRUCTURE MODEL TO PLAN FUTURE CAPACITY.
- MAKE CONTINUOUS MONITORING DASHBOARDS FOR CITY EV PLANNING COMMITTEES.

OUR ANALYSIS SHOWS CLEAR INFRASTRUCTURE GAPS.

BY ALIGNING CHARGING STATION DEVELOPMENT WITH COMPLAINT TRENDS, DFW CAN IMPROVE EV ADOPTION AND USER SATISFACTION.

THANKYOU.