The University of Texas at Austin
Civil, Architectural and Environmental Engineering
Cockrell School of Engineering

Advanced Algorithms for Optimizing Electricity Demand of Electric Vehicle Fleets in Texas to Support the Grid and Local Communities

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Problem

By 2030, 40% of the vehicle miles travelled in Austin would be by EVs adding to the grid's demand.

New charging stations must be placed **strategically and equitably** for a just transition to sustainable transportation, while also considering **power flow** and **grid constraints**.

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Methods and Preliminary Results

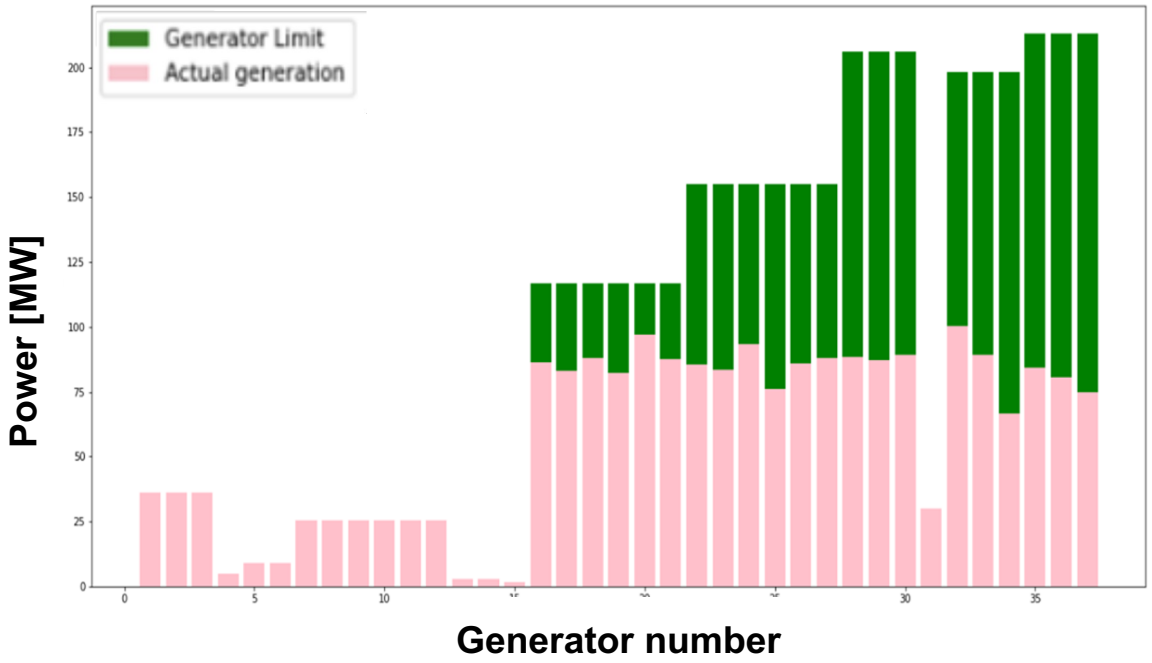
Thrust 1

Austin Electricity Grid

EV adoption [Present, 2030, 2050]

- Load projections
- Average EV charging curve
- DC-Optimal Power Flow

Testing performance



Remaining Generation Capacity - 2023

- Graph shows **current status** of electricity generation in Austin, with **green** areas depicting **remaining capacity**
- **More EVs** mean **more demand**, thus **increasing the generator's utilization**
- **Installed capacity can sustain 2030 EV predictions**
- **1.1M EVs expected** to hit Austin roads by 2050 - is our grid ready yet?

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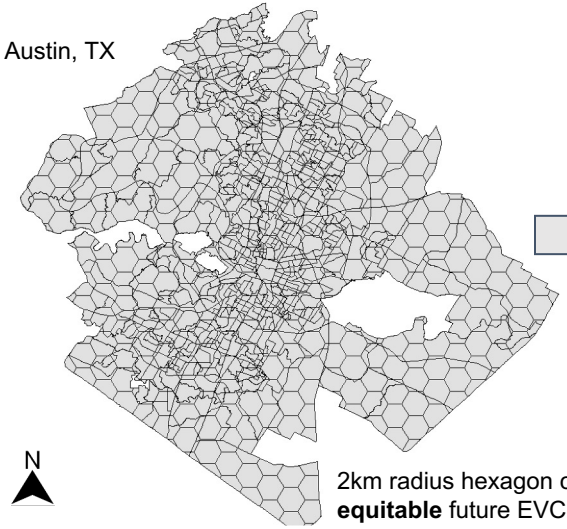
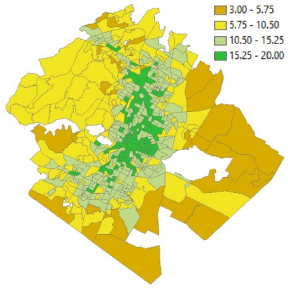
Data, Methods, and Preliminary Results



2km radius hexagon cells for **equitable** future EVCS placement

Evaluation process by additive weighting by hexagon cell

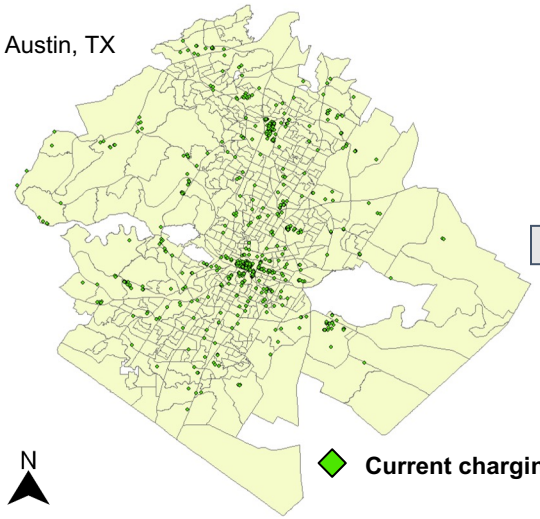


Walkability level by CBG

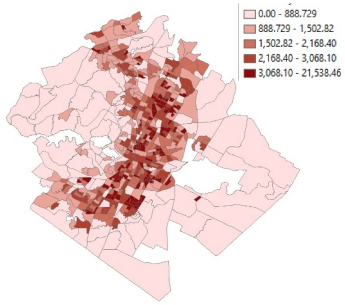
Number of:
- Residents
- Jobs
- Cars owned
- HH not owning a car
- Students
- Trips

… + more

Ranking of EV Charging Stations (EVCS) - future placement



Demographic and socioeconomic indicators and land use data



Population density by CBG

- Grid data
- Vehicles available
- Poverty
- Education
- Income
- HH size
- Employment rate
- Age between 25 and 45
- Distance to EVCS
- Traffic Impact

… + more

Quantitative spatial analysis to obtain EVCS Inequity index

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