



Evaluating the Impact of Power Outages on Occupancy Patterns During the 2021 Texas Power Crisis

Andy Berres¹, Baldwin Nsonga², Caitlyn Clark¹, Robert Jeffers¹,
Hans Hagen³, and Gerek Scheuermann²

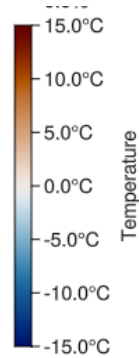
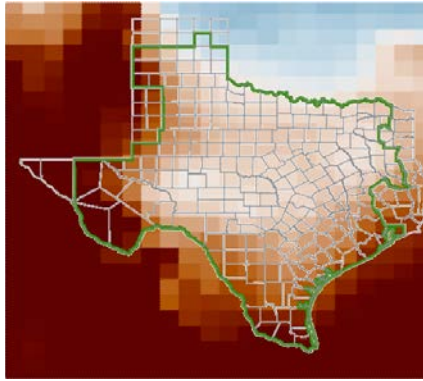
1: National Renewable Energy Laboratory (USA)

2: University of Leipzig (Germany)

3: University of Kaiserslautern-Landau (Germany)



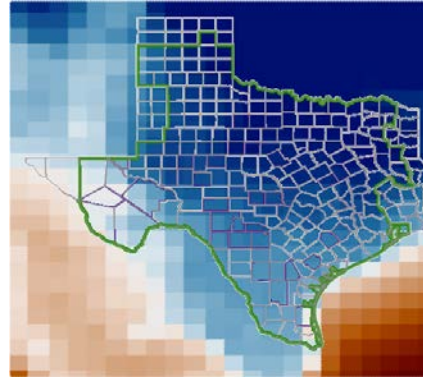
Winter Storm Uri



Just before
the storm



Coldest part
of the storm



In February 2021, Winter Storm Uri swept across the United States

- Texas was hit hard with
 - up to 50°F/25°C below typical winter temperatures.
 - widespread outages.

How do extreme events and power outages change human behavior?

- Do people prepare for an extreme event?
- Where do people go when the power is out?
- Where do people go as everything goes back to normal?

Austin, Texas →
Buildings colored by POI type



Points of Interest vs Buildings

- POI data based on cellphone GPS
- GPS precision is good but not perfect
- Public data (at scale)
 - ✓ building geometries
 - ✗ geometries for individual units
- Multiple POIs in buildings
- How do we decide Building Type?



Building Types



Macro groups

POI Type

Micro groups



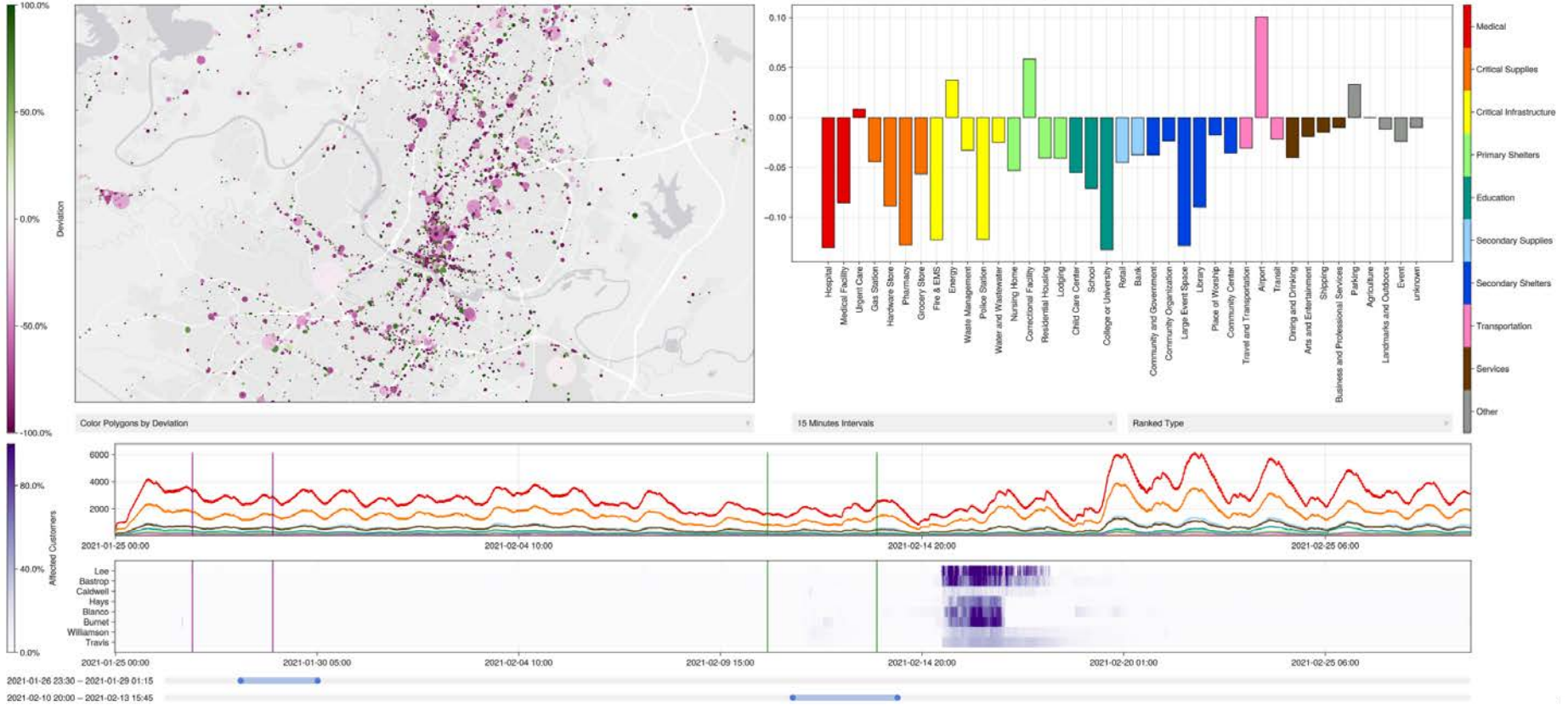
- Hospital
- Medical Facility
- Urgent Care
- Gas Station
- Hardware Store
- Pharmacy
- Grocery Store
- Fire & EMS
- Energy
- Waste Management
- Police Station
- Water and Wastewater
- Nursing Home
- Correctional Facility
- Residential Housing
- Lodging
- Child Care Center
- School
- College or University
- Retail
- Bank
- Community and Government
- Community Organization
- Large Event Space
- Library
- Place of Worship
- Community Center
- Travel and Transportation
- Airport
- Transit
- Dining and Drinking
- Arts and Entertainment
- Shipping
- Business and Professional Services
- Parking
- Agriculture
- Landmarks and Outdoors
- Event
- unknown



Building Type

- Assign by majority
- Assign by ranking

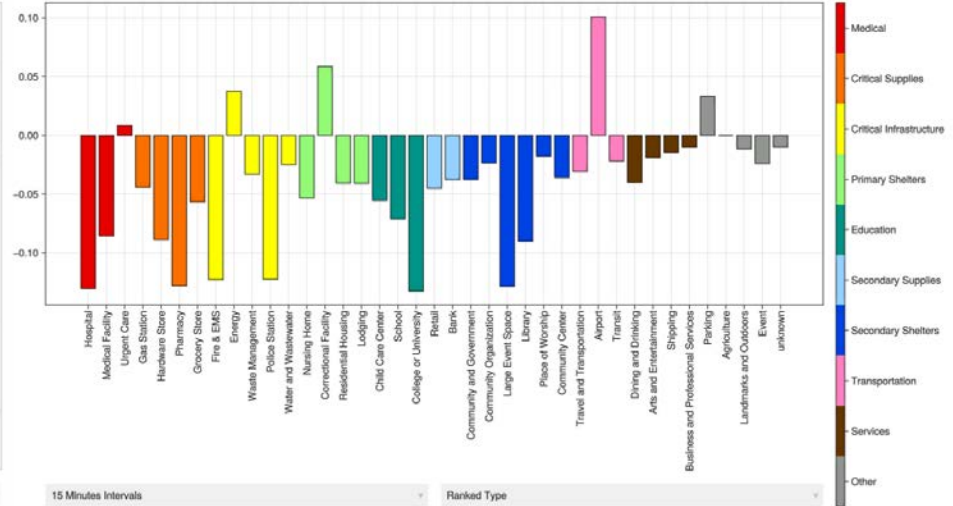
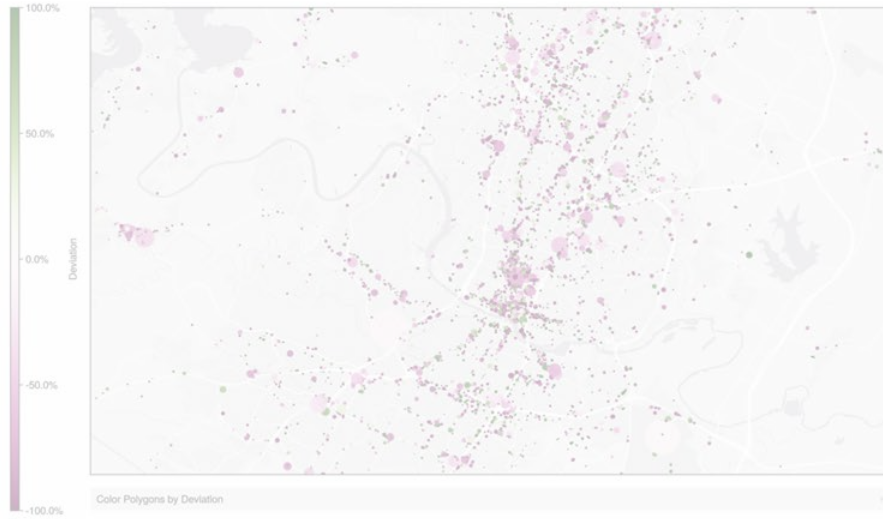
Overview



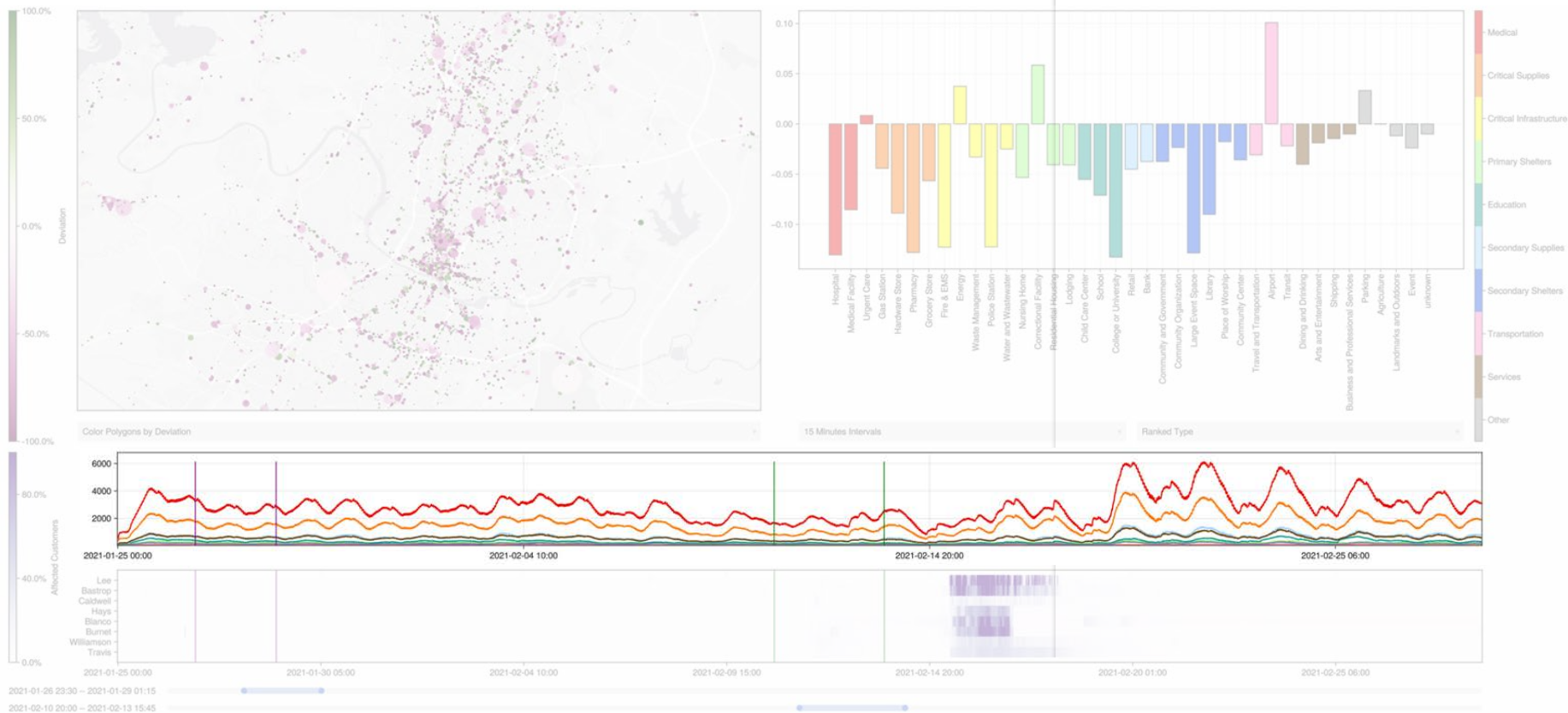
Map View



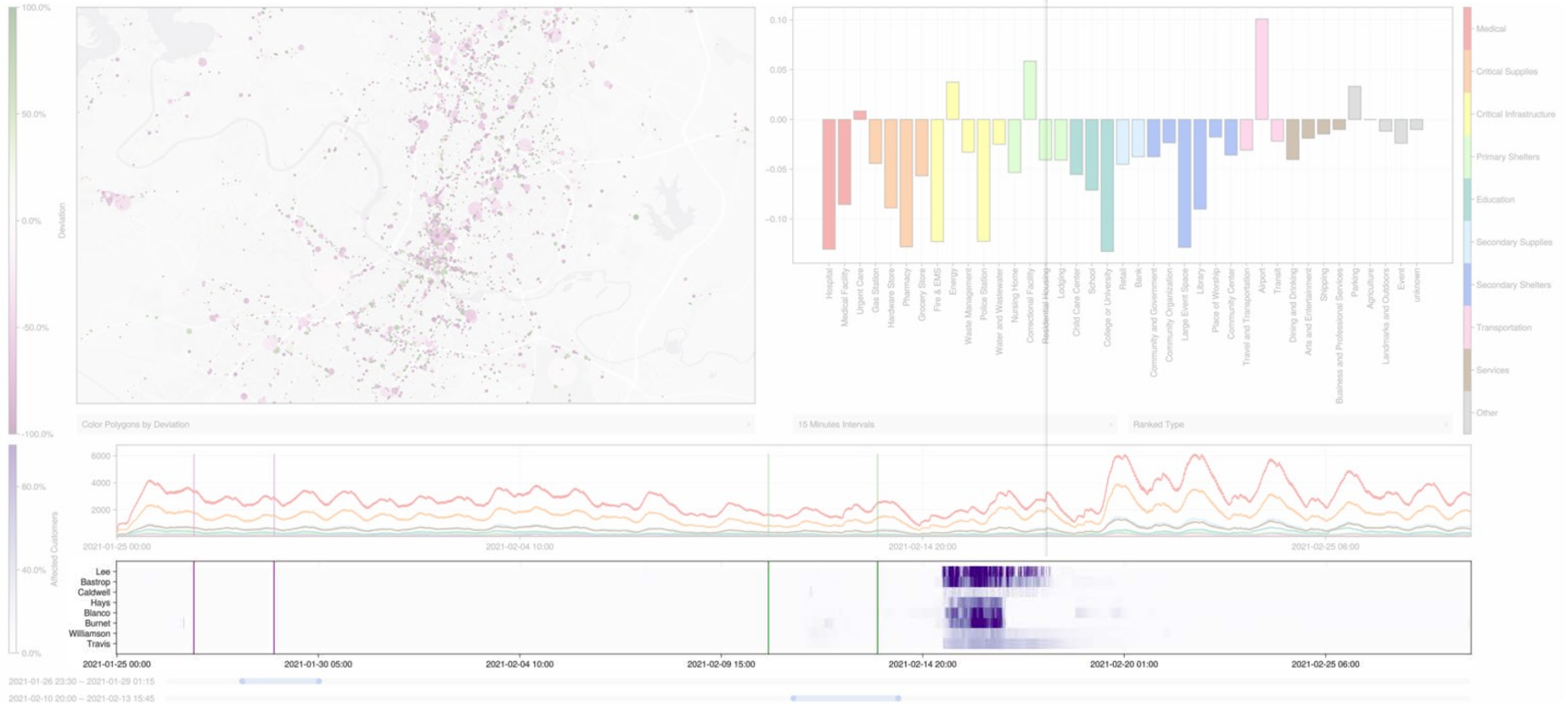
Change in Visits by Type



Change in Visits Timeline



Outage Timeline

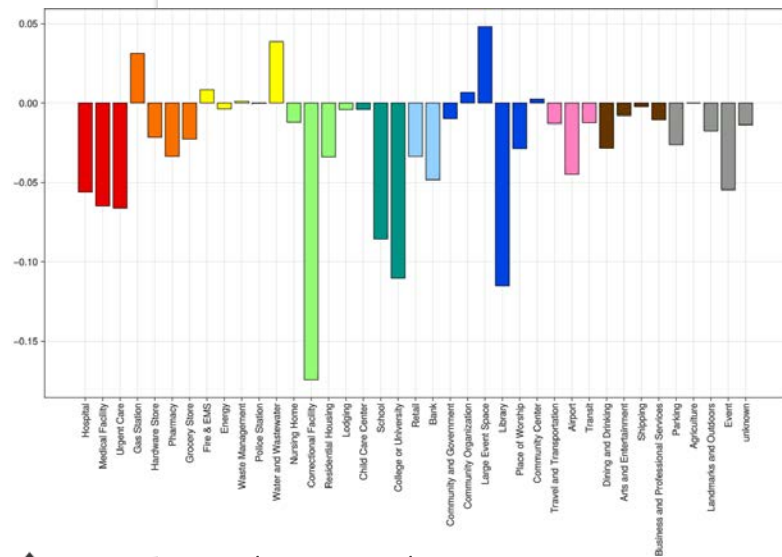
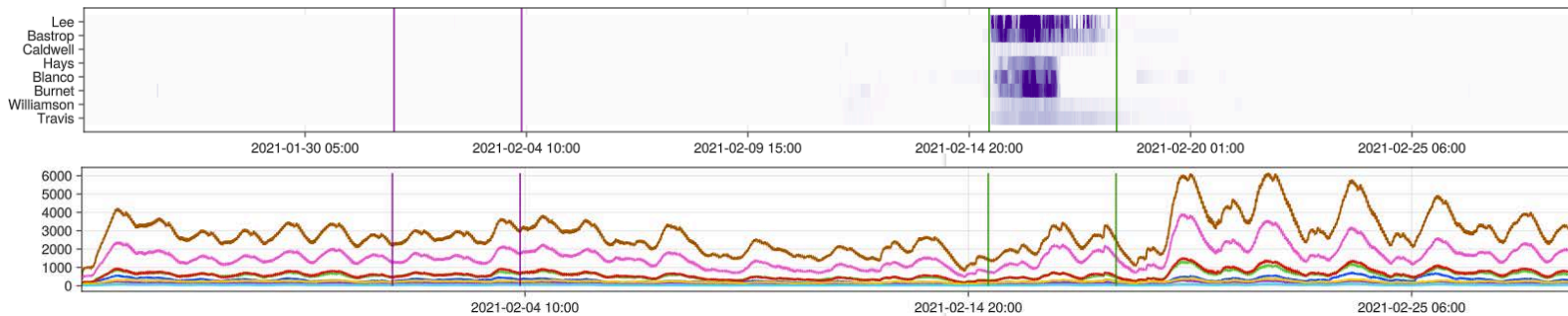


Timeline Navigation



Analysis

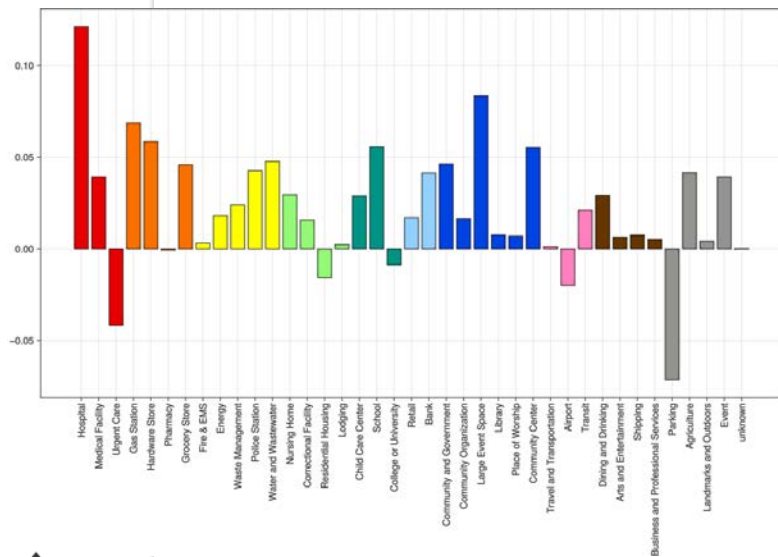
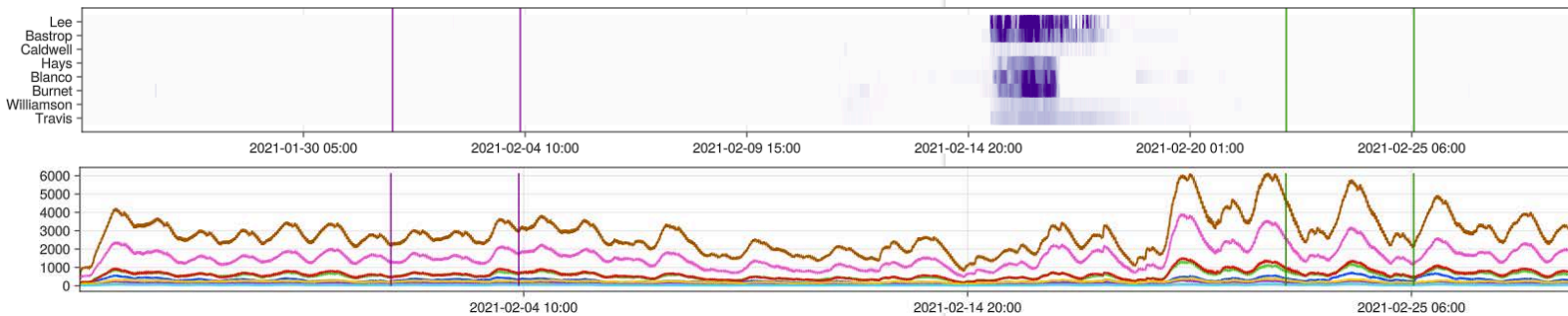
Before vs during



- ↑ Gas stations, Fire/EMS, Water/Wastewater, Community Organizations/Centers, Large Event Spaces
- ↓ Everything else. Notably: Correctional Facilities, Residential Housing

Analysis

Before vs after



↑ Almost everything.

↓ Urgent Care, Residential Housing, Colleges and Universities, Airports, Parking

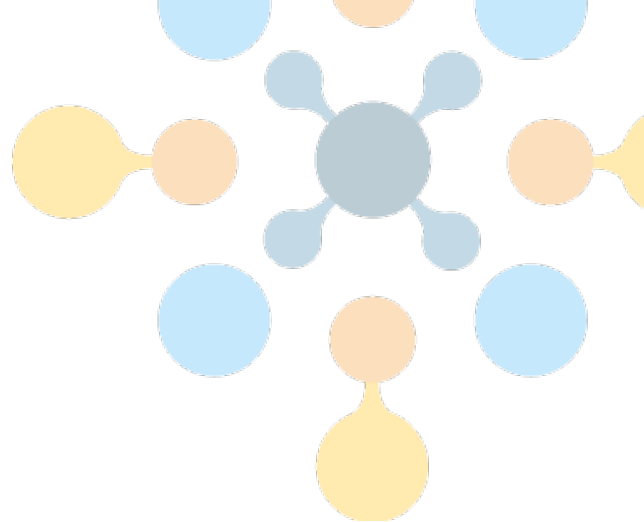
Reception and Next Steps

- Incorporate **weather**
 - See [Extreme Weather and the Power Grid: A Case Study of Winter Storm Uri](#)
- Analyze **Demographics**
 - Visit data has home location (Census block group level – 600-3000 population)

Project team

- Anthropology
- Public health
- Human geography
- Energy equity
- Environmental science
- Energy reliability/resilience
- Civil engineering
- Power engineering

Questions



- Want a live demo?
- Have more questions?
- Let's chat on Discord

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Data Sources

