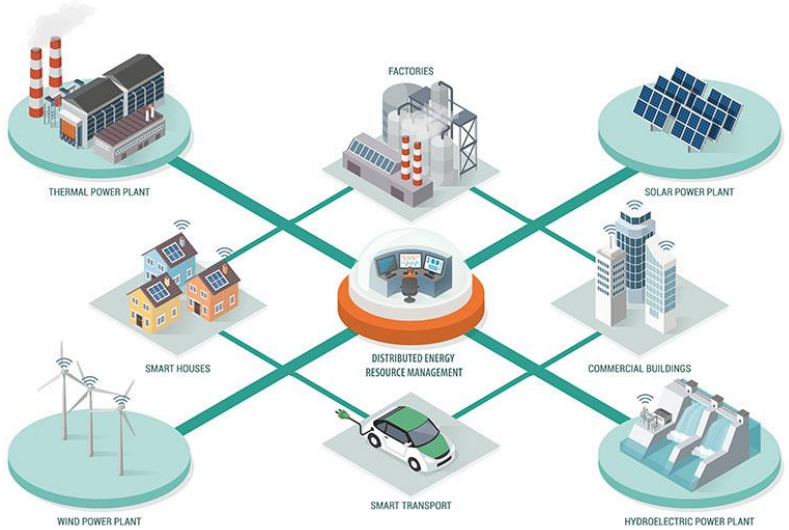
Project 2: CLIMB: Connecticut's Low-carbon, Innovative, and Modernized electric grid for Better resilience – **Caiwen Ding**

UCONN TECH PARK

Challenges:

The intermittency of Distributed Energy Resources (DERs) -> difficulties of meeting future demand.

The increase of severe weather events -> challenging in managing power systems



Motivation:

assess how the Connecticut's electric grid of the future could be resilient to an increase in frequency and intensity of severe weather events and increased demand from new sectors (e.g. transportation), given

- decommissioning of traditional generators
- high penetration of renewable energy resources
- presence of storage technologies

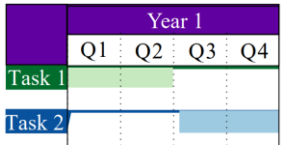
Goal:

Task 1 Enhanced Demand Prediction

- 1- to 24-hour ahead future demand based on historical demand data, day of the week, and weather conditions
- Simulate hourly level demand changes in 1 to 20 years, through the consideration of future trends (e.g. EV adoption, batteries, price level changes) which may affect the demand curve (e.g. deepening of the duck curve).

Task 2 Adding Spatial Scale

- Adding spatial location information through graph neural network



Deliverable.

(1) Technical reports or published articles describing the details of the developed method and the evaluation data/results;

(2) Open-source implementation of the proposed methods in Github upon approval.

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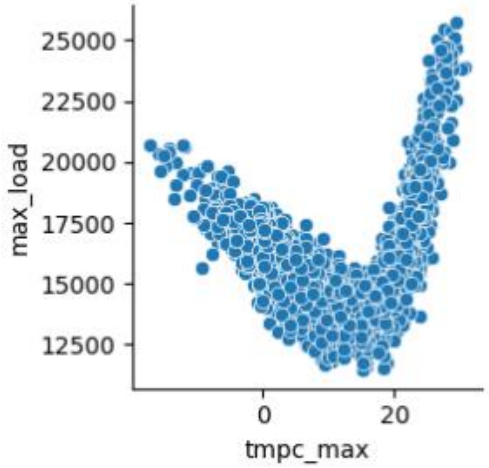


Figure: Relationship between max tempC vs. demand for 2010s

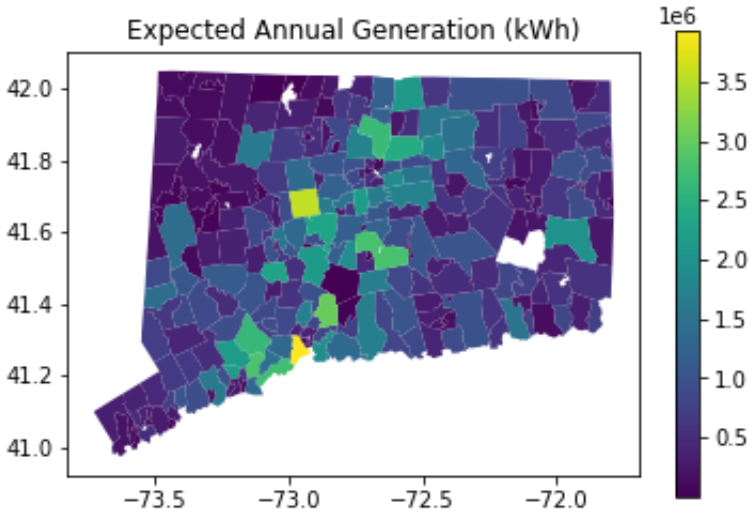


Figure: Cumulative PV generation in CT by town (to be included in future models)

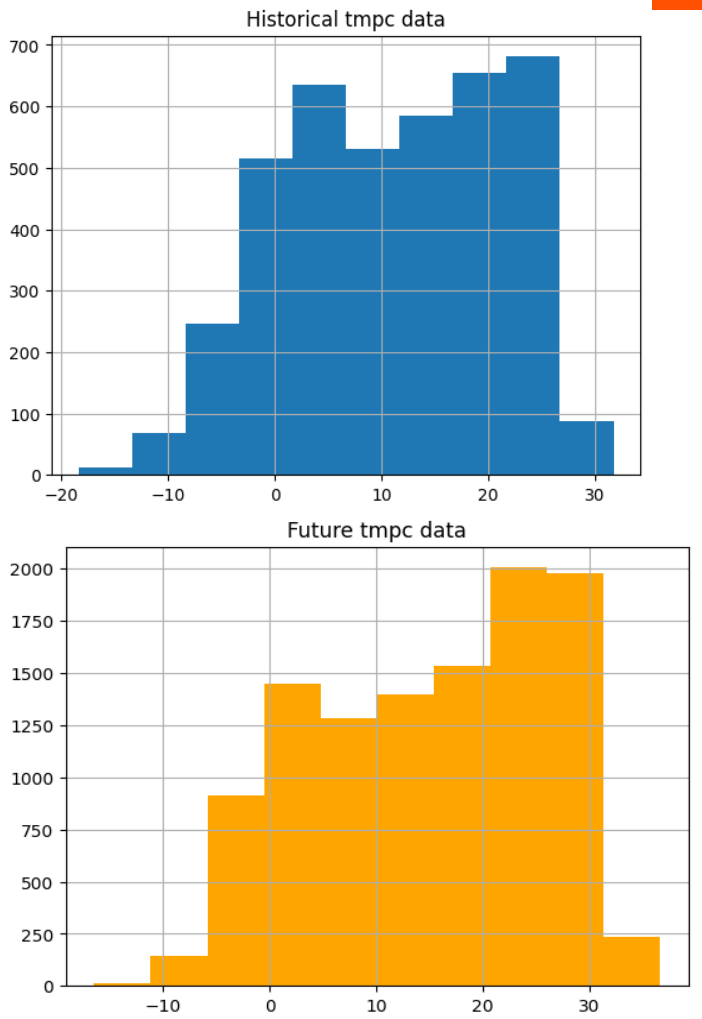
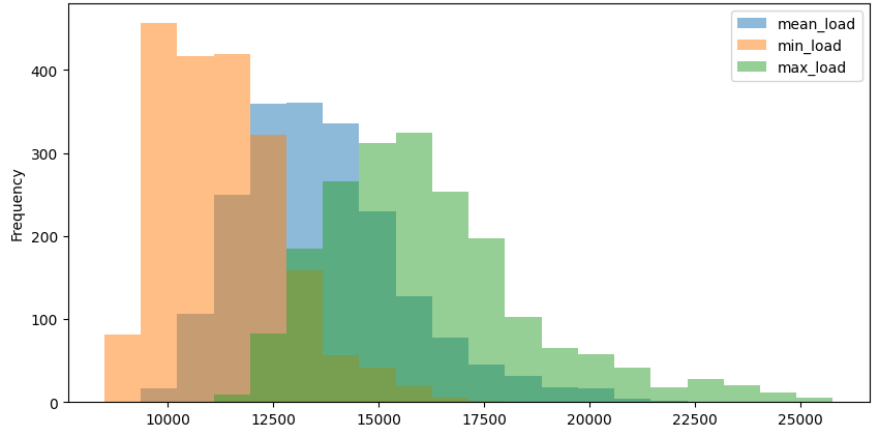


Figure: Distribution of actual daily max tempC data for 2010s (top) and 2030-2045 (tmp becomes warmer, skews more left in future)



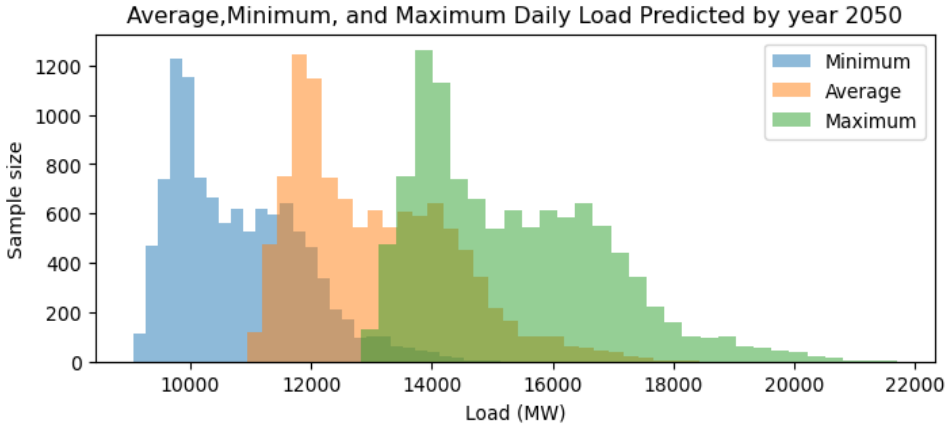


Figure: Distribution of actual daily min, mean and max energy data for 2010s (top) and 2030-2045