

# Impacts of Closure Periods on BU CO<sub>2</sub> Emissions and Local CO<sub>2</sub> Concentrations

## Amid coronavirus pandemic, air pollution declines in Boston and elsewhere

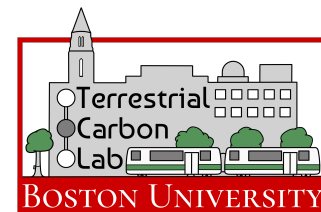
Air pollution has dropped significantly as travel, economic activity ground to a halt

By [David Abel](#) Globe Staff, Updated March 28, 2020, 4:47 p.m.



A man sits under a star magnolia tree in the Public Garden in Boston during the coronavirus state of emergency. CRAIG F. WALKER/GLOBE STAFF/THE BOSTON GLOBE

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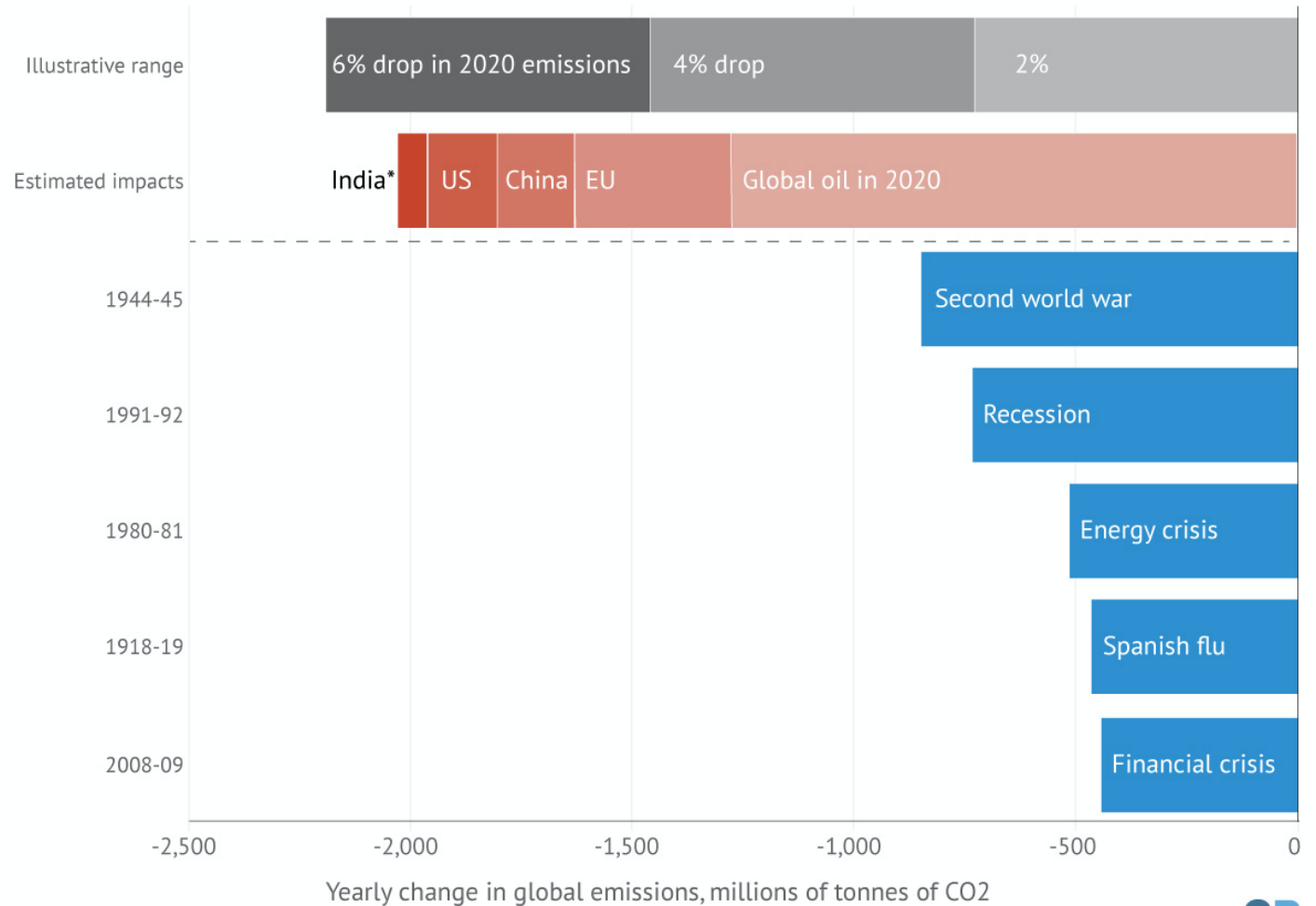


# What are COVID shutdowns doing to CO<sub>2</sub> emission?

## Coronavirus could trigger the **largest ever annual fall** in CO<sub>2</sub> emissions

Pre-crisis GDP estimates suggested CO<sub>2</sub> would rise by more than 1% in 2020 (470MtCO<sub>2</sub>)

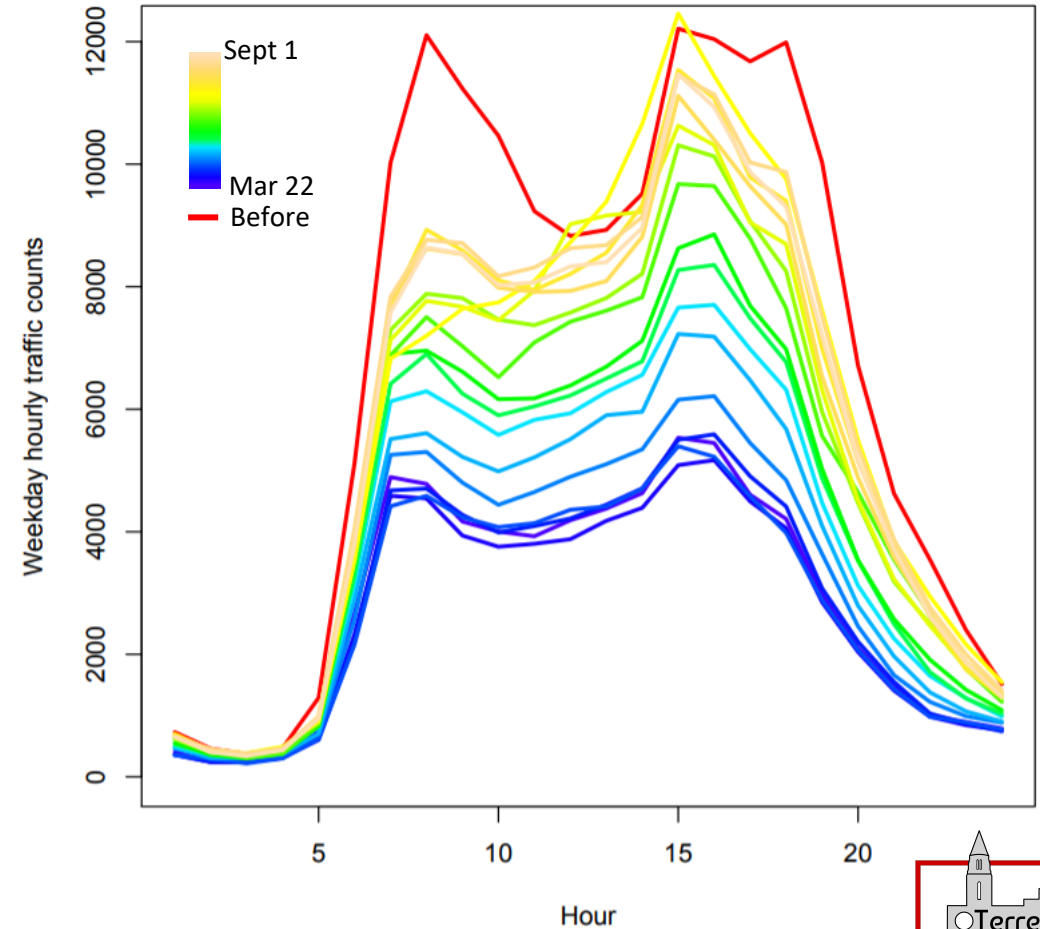
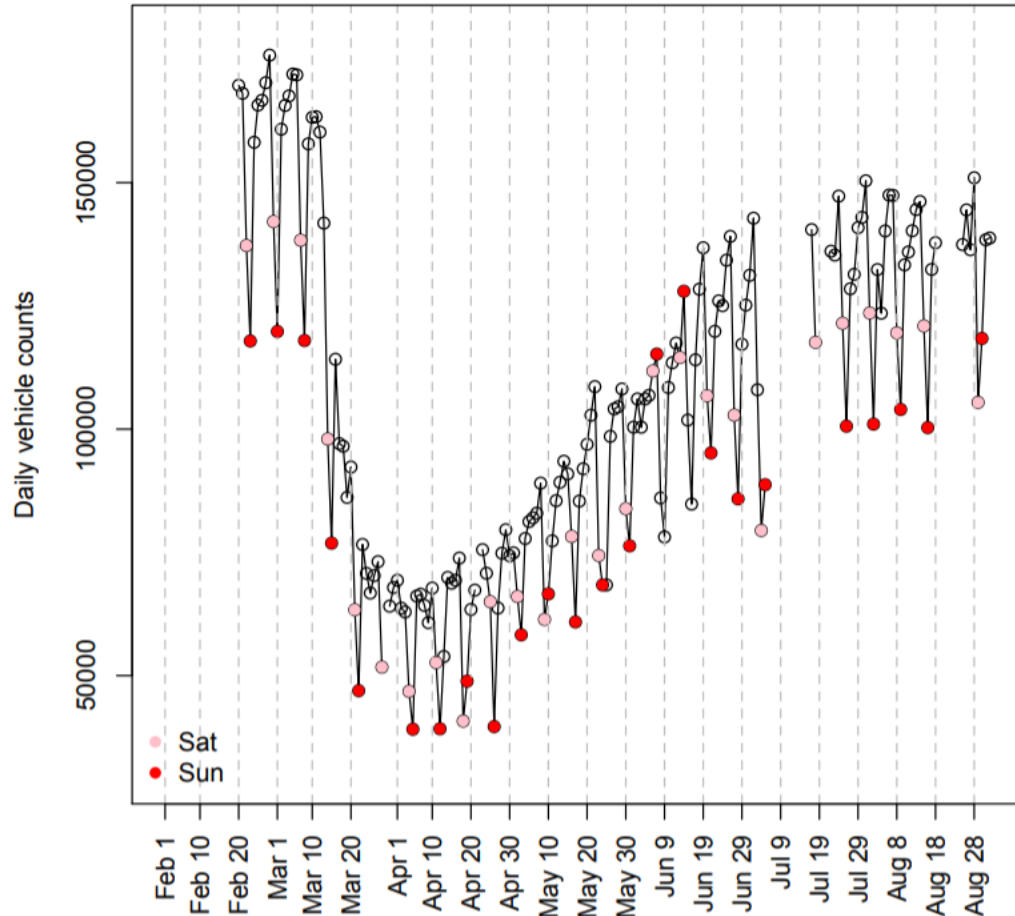
- **Early, tentative** estimate suggests declines of 6-8% in emissions relative to 2019, largest ever annual fall in CO<sub>2</sub> emissions.
- Analyses are actively ongoing, China's emissions have already rebounded and overshoot pre-COVID



# How about Boston?

While many office jobs are still remote, lots of emissions related activity has returned to near pre-pandemic levels

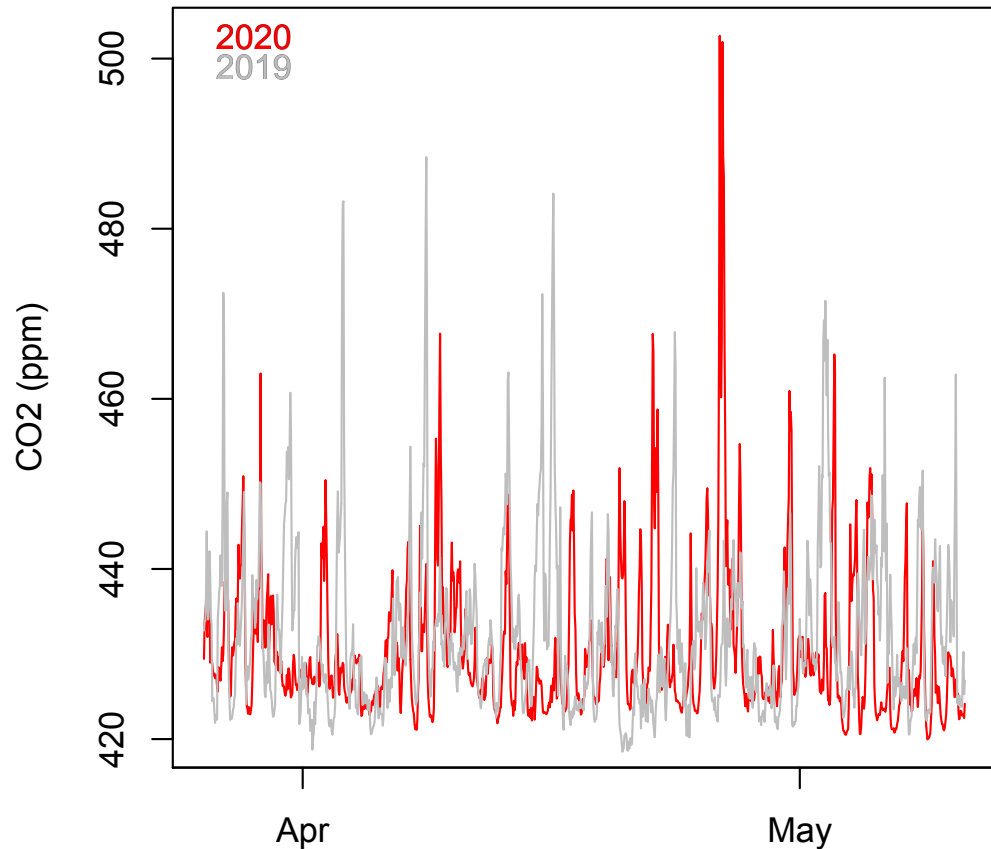
Location 4165: 16/95, 10 miles from BOS



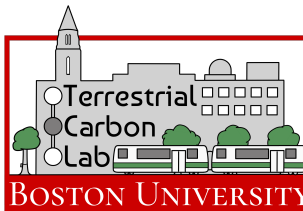
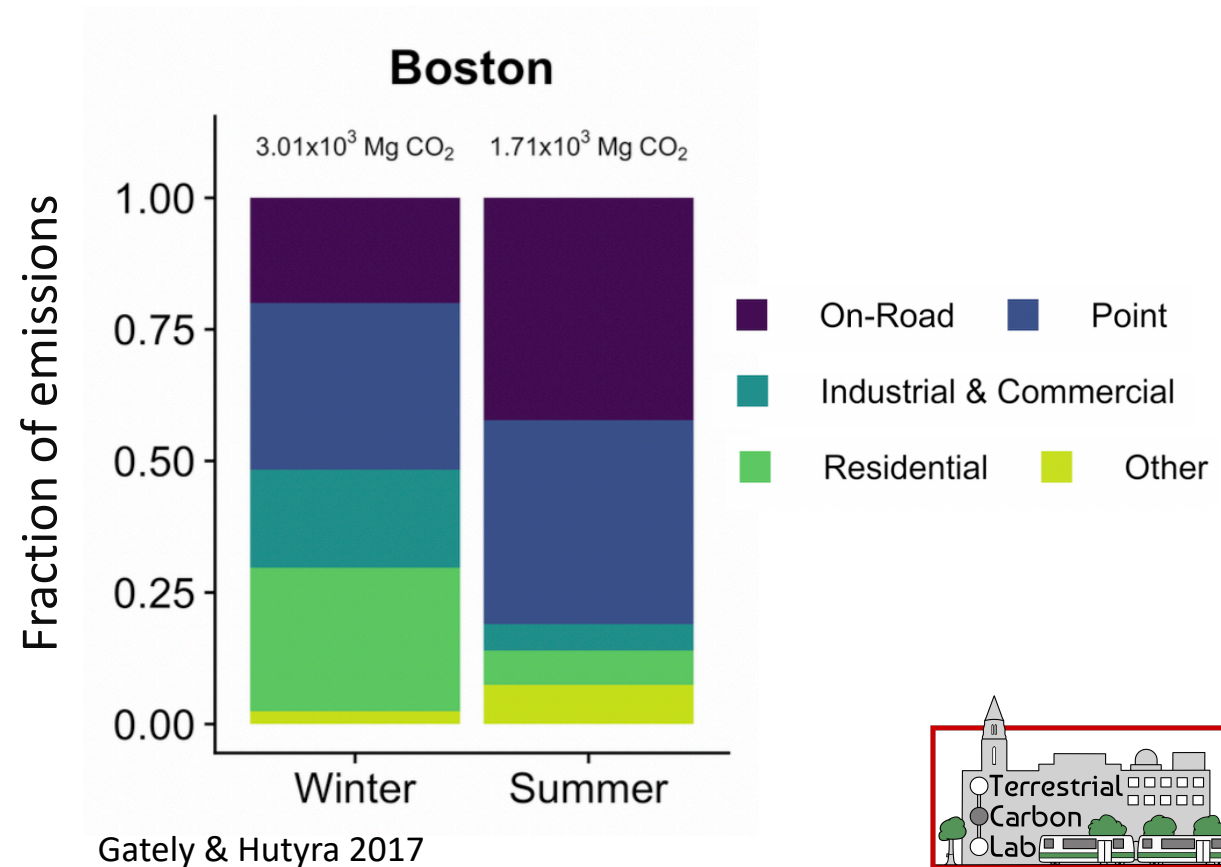
# Daily, seasonal, and yearly trends are visible in the record

Heating use is declining while biology is starting to take up CO<sub>2</sub>

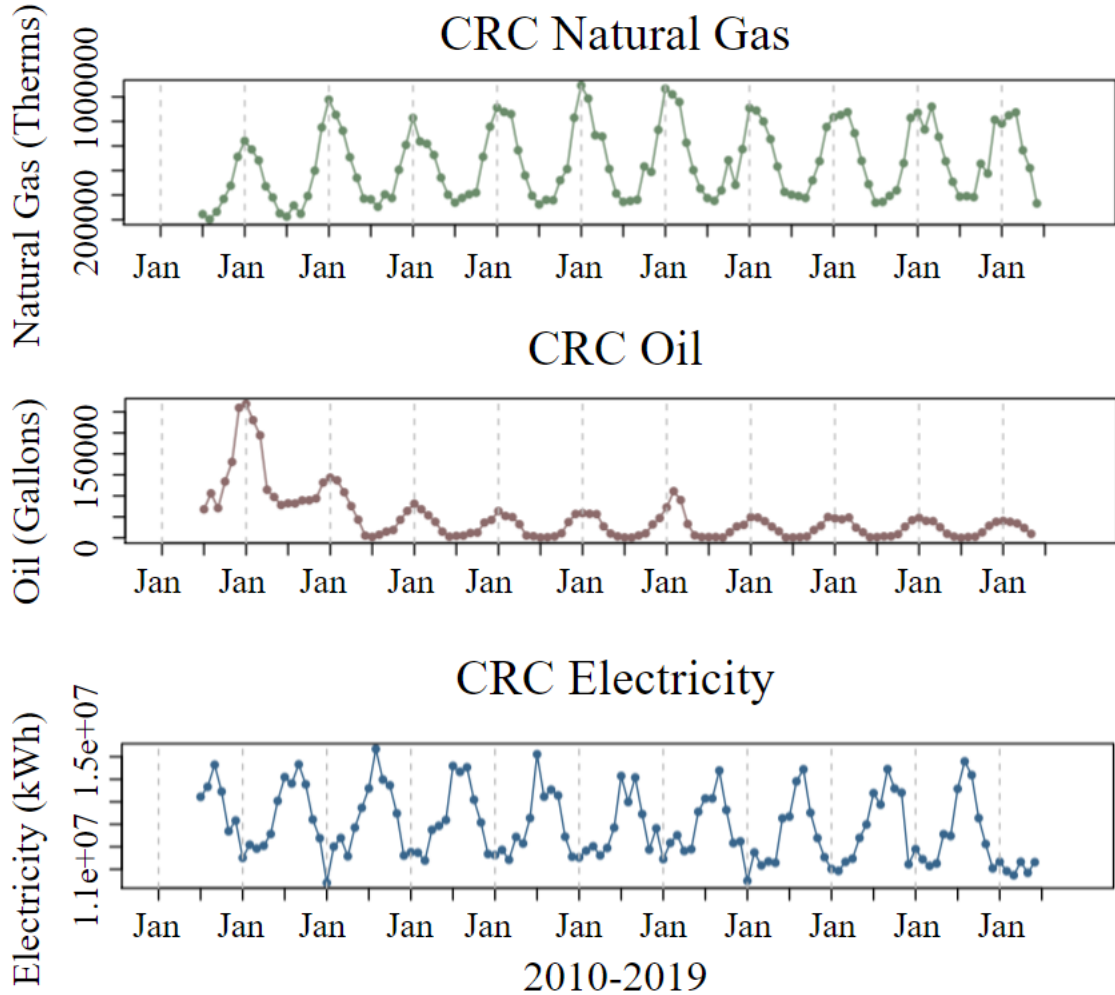
BU rooftop



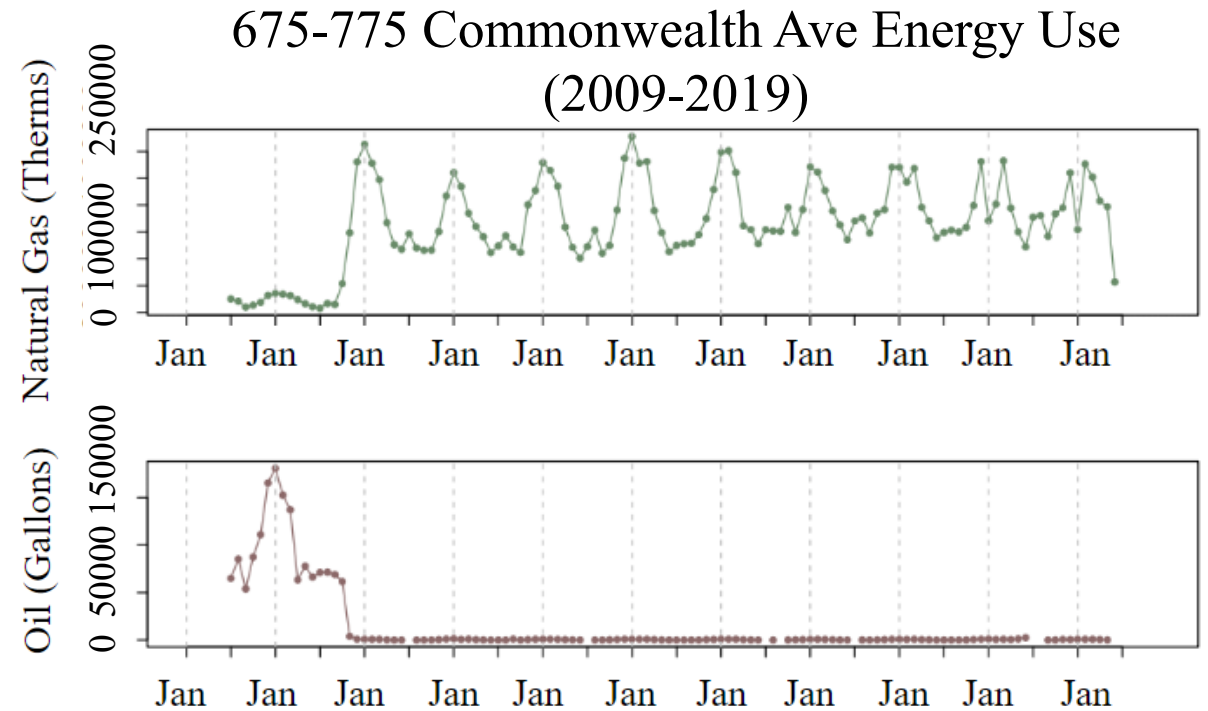
Sargent, Wofsy, Hutyra, et al. unpublished



# Energy use data is complicated

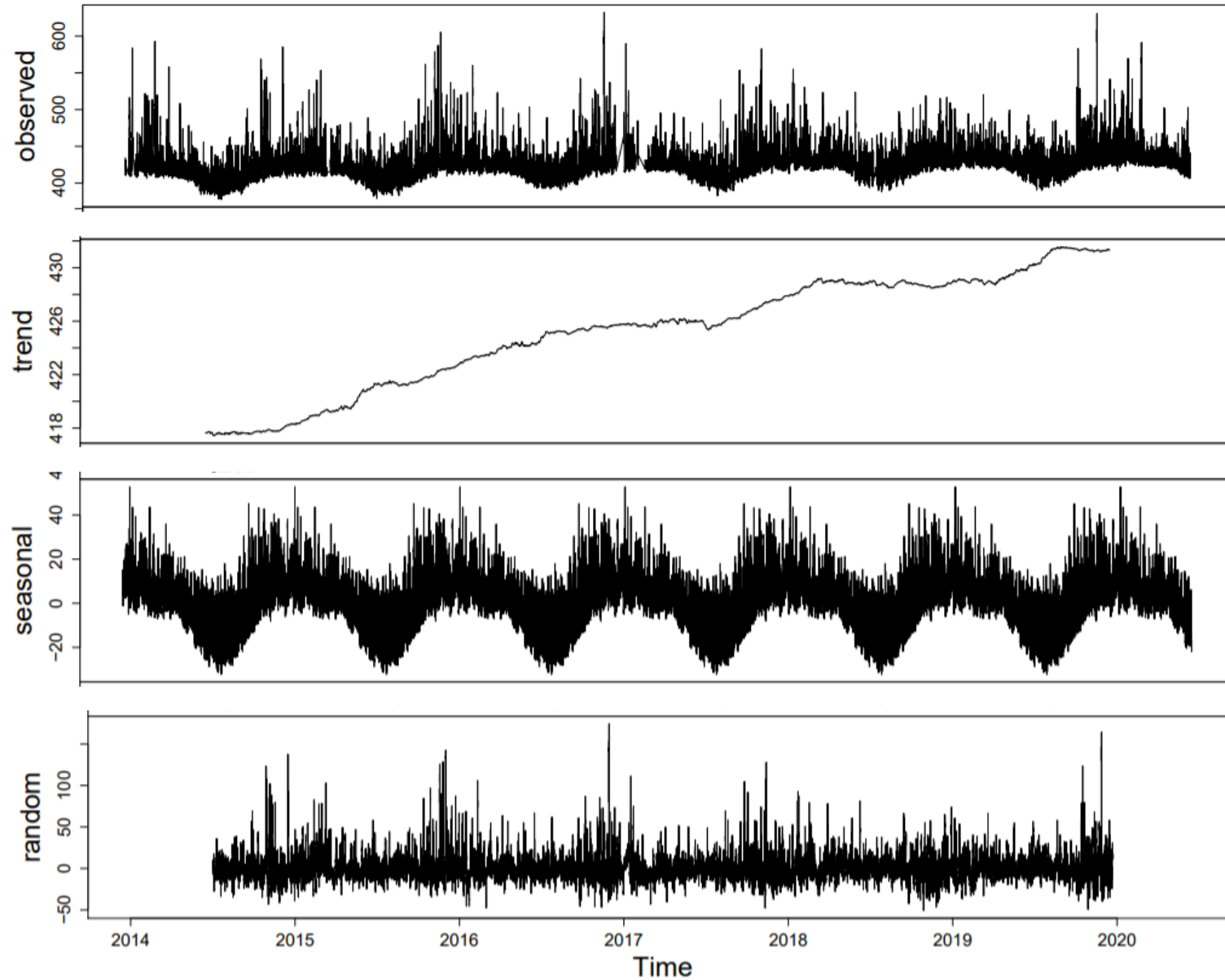


The electricity grid has 'greened' and BU energy profile has shifted over time. Weather, retrofits, new buildings, & campus growth are embedded throughout this signal.



# CO<sub>2</sub> data was additively decomposed

## Decomposition of additive time series

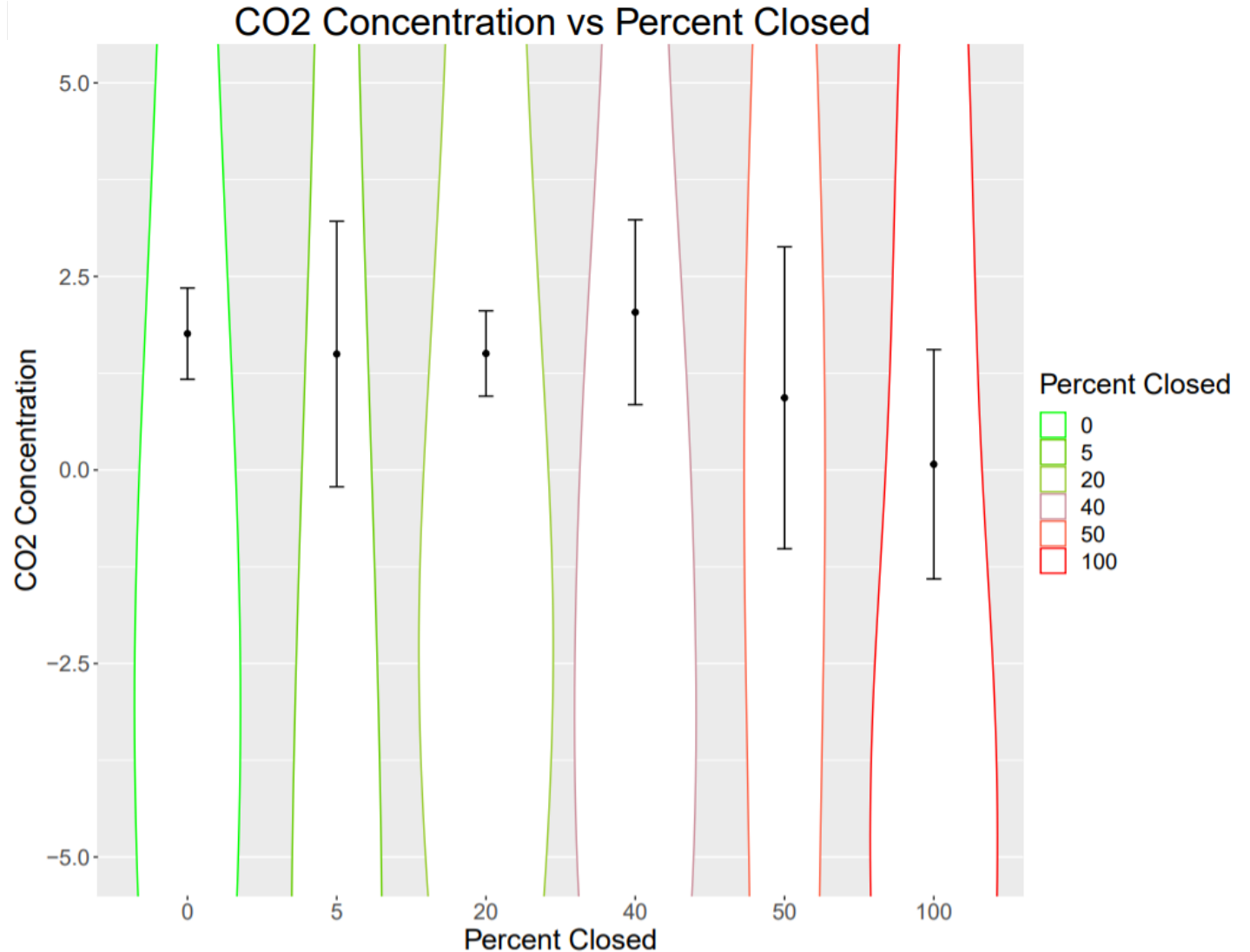


## Many episodes of campus closure

Closure	Percent Closed	Number of Closures (1/2014-8/2020)
Corona Virus	100	170
Holiday	100	46
Winter Holiday	100	62
Brookline Snow Day	50	10
Winter Break	50	128
Spring Break	40	63
Summer	40	226
Thanksgiving Break	40	35
Summer Classes	20	483
Finals	5	67
Study Period	5	49

# Analysis is at the early stages...

- Data is for weekday daytime hours for all seasons
- Mean and 95% confidence intervals are pictured
- Initial data is suggestive of a negative correlation between percent closed and CO<sub>2</sub> concentration, but the data is skewed, with wide confidence intervals





# Lessons and next steps

- The Boston University climate action plan has a goal to reach net zero direct emissions by 2040
- University energy use data acts as a baseline, and includes early efforts by the university to alter their energy sources
- Through further analysis of the CO<sub>2</sub> concentration and closure data, we hope to uncover opportunities for future emissions reductions



## RECOMMENDATIONS OF THE CLIMATE ACTION TASK FORCE FOR BOSTON UNIVERSITY'S CLIMATE ACTION PLAN

SYNTHESIS AND OVERVIEW  
December 2017