

# Area Heterogeneity and the Adoption of “Green” Building Certifications

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# Overview

- 1 What is this about?
- 2 Why should we care?
- 3 What do we already know?
- 4 How will we do this?
- 5 What's next?

# What is this about?

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*Research Question*

# Project Focus

## Research Question

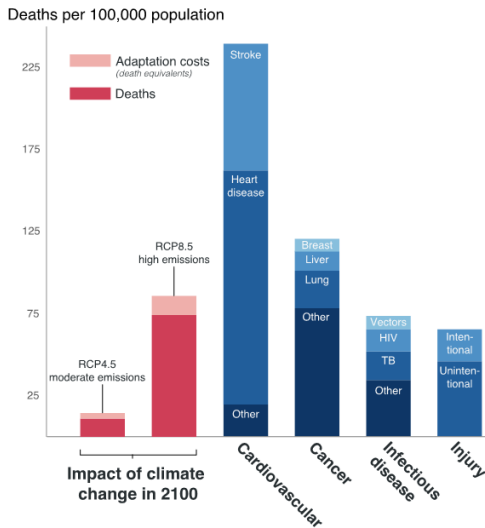
What places attract energy-efficient buildings? How do neighborhood and area characteristics relate to the number of certified energy-efficient buildings?

# Why should we care?

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*Motivation*

# Figure 1: Climate Change Mortalities



Credit: Carleton et al. (2020)

# Why Buildings?

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# Why Buildings?

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- Energy Efficiency is an apparent Win-Win
- It's timely – the American Jobs Plan includes:
  - ▶ \$213 Billion to Housing
  - ▶ More funding to the Weatherization Assistance Program

# What do we already know?

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*Literature Review*

# The Energy-Efficiency Gap

## Definition (Energy-Efficiency Gap)

“The wedge between the cost-minimizing level of energy efficiency and the level actually realized.” (Allcott and Greenstone, 2012)

Common Explanations (Gerarden et al., 2017):

- Modeling Flaws
- Behavioral Explanations
- Market Inefficiencies

# Certifications

Certifications can help reduce some market inefficiencies

Popular Energy-Efficient Building Certifications:

- Energy Star Program
- Leadership in Energy and Environmental Design (LEED)
- Home Energy Rating System (HERS) Index

# How will we do this?

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*Data & Methodology*

# Data Sources

- LEED Project Directory
  - ▶ Address, Certification Date, Building Type for mostly Commercial buildings
  - ▶ Over 100,000 points
- Energy Star Certified Buildings Registry
  - ▶ Address, Certification Date, Building Type for Commercial buildings and Multifamily Housing
  - ▶ Over 30,000 points
- Create counts at the census tract level

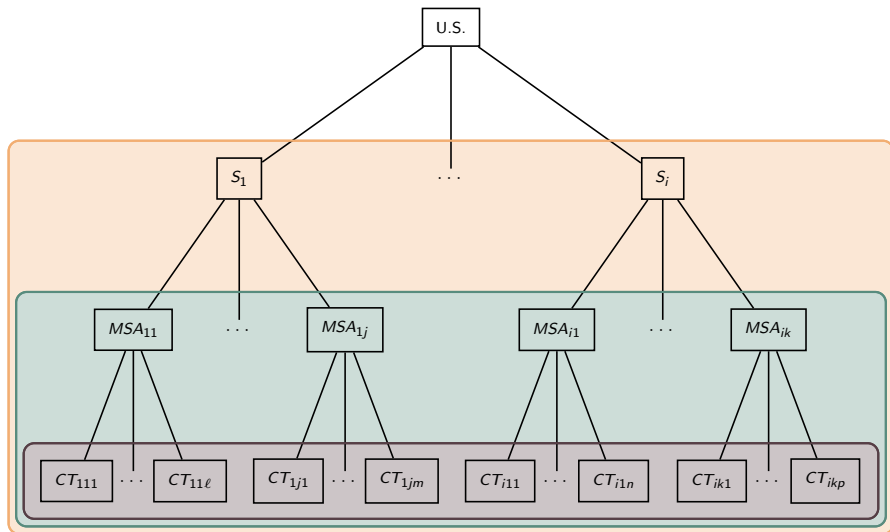
# Data Structure

State/Region: Area Data e.g. Climate

MSA: Area Data e.g. Utility Costs, Housing Stock

Census Tract: LEED Directory, Energy Star Registry

Figure 2: A Multilevel Modeling Framework





What's next?



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3. *What do we already know?*

There is an apparent energy-efficiency gap and certifications help close it

4. *How will we do this?*

Use data to estimate a multilevel model

# Next Steps

- Continue the hunt for residential data
- Start cleaning data
- Read more papers:
  - ▶ Investigate the theory behind the energy-efficiency gap
  - ▶ **Allcott, Hunt and Michael Greenstone**, “Is there an energy efficiency gap?,” *Journal of Economic Perspectives*, 2012, 26 (1), 3–28.

Questions?



# References I

- Allcott, Hunt and Michael Greenstone**, “Is there an energy efficiency gap?,” *Journal of Economic Perspectives*, 2012, 26 (1), 3–28.
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- Dunlap, Lauren and James Round**, “US carbon emissions at a glance,” 2021.
- Fowlie, Meredith, Michael Greenstone, and Catherine Wolfram**, “Do energy efficiency investments deliver? Evidence from the weatherization assistance program,” *The Quarterly Journal of Economics*, 2018, 133 (3), 1597–1644.
- Gerarden, Todd D, Richard G Newell, and Robert N Stavins**, “Assessing the energy-efficiency gap,” *Journal of Economic Literature*, 2017, 55 (4), 1486–1525.



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**IPCC**, “Climate change 2014: Synthesis report. Contribution of working groups I, II and III to the fifth assessment report of the intergovernmental panel on climate change,” 2014.

**OECD**, *The Economic Consequences of Climate Change*, OECD Publishing, 2015.

**WHO**, “Climate change and health,” 2021.

# Figure 3: U.S. GHG Emissions by Sector

NO. 207 | SUMMER 2021 | US carbon emissions at a glance

## US Greenhouse Gas Emissions by Sector

To find strategies and solutions for reducing greenhouse gas emissions in the US economy, we first need to identify the sources and quantities of those emissions.

### Agriculture\* 11%



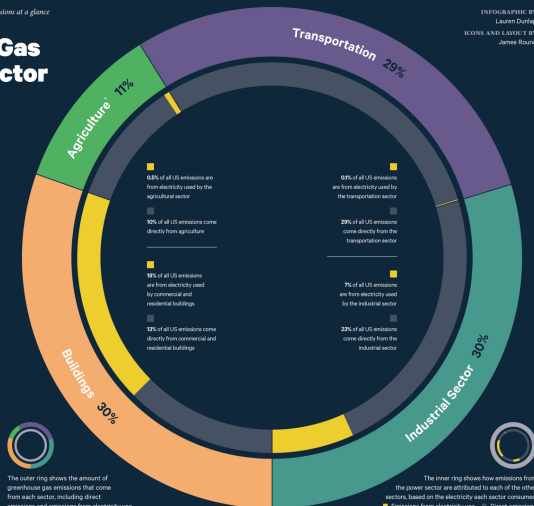
Discover strategies for reducing these emissions on page 44.

### Buildings 30%



Discover strategies for reducing these emissions on page 38.

\* Land use and forestry remove carbon from the atmosphere (serve as a carbon sink)



INFOGRAPHIC BY  
Lauren Dunlap  
ICONS AND LAYOUT BY  
James Round

### Power Sector

Power sector emissions come primarily from the combustion (burning) of natural gas and coal to generate electricity.



Discover strategies for reducing these emissions on page 18.

### Transportation 29%



Discover strategies for reducing these emissions on page 24.

### Industrial Sector 30%



Discover strategies for reducing these emissions on page 32.

\*\* Hydrofluorocarbons

Credit: Dunlap and Round (2021)

## Table 1: Data Sources

Data Source	Data Level
LEED Project Directory	Point
Energy Star Certified Buildings Registry	Point
American Community Survey (ACS)	Census Tract
Utility Rate Database (URDB)	Zip Code
American Housing Survey (AHS)	MSA
Energy Star Program Indicators	State
Commercial Building Energy Consumption Survey (CBECS)	Regional