BUILDINGS | BUILDING ENERGY CODES





Toward More Equitable Building Energy Codes

Diversity, Equity, and Inclusion in Building Energy Codes

Project number | 72220.3

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BACKGROUND

- Building energy codes and standards play a pivotal role in addressing energy burden experienced by households over the long term.
 - Houses built using the latest model energy codes are estimated to be 30% more efficient than those built a decade earlier
 - Upgrading older buildings with energy code-compliant building systems will help transition all buildings toward greater efficiency, reduced energy cost, improved occupant comfort, and resilience to extreme weather

IMPACT

- Findings from this research will:
 - Provide insights for including equity metrics in energy code evaluation.
 - Inform policy decisions to **improve energy code practices** in U.S. regions that are currently lagging in code adoption and implementation.

METHODS



CONCLUSION

Research enables DOE's goal of equitable transition to efficient codes by:

- Identifying key areas to address for equitable energy code adoption and implementation
- Developing methods to incorporate **affordability** into evaluation of energy codes
 - 2 Stakeholder Perspectives on Equitable Energy Codes (2024 – 2025)

FY24- Preliminary Findings:

- 1. Community engagement and goal setting are powerful tools and important to incorporate for equity considerations in energy codes
- 2. Key components to include in equity centered energy

- The Department of Energy's (DOE) plan for reducing carbon emissions from buildings focuses on a "people-first" approach to help scale up efforts across the U.S.
- However, it is not understood how energy codes can affect low-income or vulnerable communities. This research addresses this gap by:



1. Collecting and analyzing data on energy code compliance across U.S. and identifying trends in code compliance based on socio-demography and income

2. Conducting stakeholder interviews to identify factors that impact energy code adoption and compliance differences between jurisdictions

3. Developing metrics and methods to integrate equity considerations into energy code cost-effectiveness evaluation

Geo-location	Rural/Urban	US census data
Energy Efficiency Measure	Foundation Insulation	Field Study
	Wall Insulation	
	Roof Insulation	
	Lighting (Housing Units, Parking, Common spaces)	
	Window Performance	
Heating fuel	Electric, Gas	Field Study
IECC editions	IECC 2009, 2012, 2015, 2018	Field Study

Field Study

- Residential energy code compliance
- study
- Single family: 20 states
- Multifamily: 4 states
- Data collection: 2014 2022





County Type

Urban & Low-Income

Rural & Low-Income

Not Included in Study

Rural & NonLow-Income

Urban & NonLow-Income

codes process:

- Alignment with environmental justice priorities
- Meaningful engagement with communities, and
- iii. Identification of gaps and address with resources to minimize disparities

FY25 - Ongoing Study, Research Questions:

- What challenges do stakeholders face with energy codes?
- What opportunities are communities able to leverage through energy codes and how do these opportunities differ across jurisdictions?
- 3. How do perceptions toward energy code process and impacts differ across stakeholder groups?

Stakeholder types:

- Developers involved in local energy code development
- Enforcers code officials, plan checkers/reviewers, raters
- Practitioners builders, consultants, engineers, developers, design-build companies

Analysis plan: Mixed method approach using qualitative data from interviews and available data sources





KEY PRODUCTS

Publications:

- Falling Short: Are Building Energy Codes Equitable? Nambiar et.al., ACEEE Summer Study 2022
- Code and Communities: Opportunities to Incorporate Equity into Building Energy Codes, Van Boekhold et.al., ACEEE Summer Study 2024
- Integrating Equity in Residential Model Energy Code Cost-Effectiveness (to be published)
- Application of Energy Burden Index and Equity Considerations in Residential Energy Code Cost-Effectiveness (under review)

Multi-Family

- No statistically significant difference in compliance rate between market-rate and lowincome
- Non-compliance rate highest for Foundation Insulation & Parking Lights
- Largest compliance rate difference (Urban vs Rural) for Foundation Insulation & Parking Lights
- Gas dominates over electrical as heating fuel in low-income development

Single-Family

• Statistically significant difference between compliance rates in lowincome and non-low-income counties; with lower compliance in low-income counties

areas.

- Non-compliance rate highest for Below Grade Wall and Above Grade Wall Insulation
- Statistically significant difference in compliance rate between Rural & Urban for Duct Insulation and Lighting
- Gas heating dominates over electrical in low-income counties

3 – Energy Burden Index for Code Evaluation (2024 – 2025)



Energy Burden Index – a metric to incorporate equity in energy code evaluation

FY-2025 goal – establish use-case specific methods and data sources to incorporate EBI metric into energy code costeffectiveness



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