When Operations Met Materials: An Emissions Story

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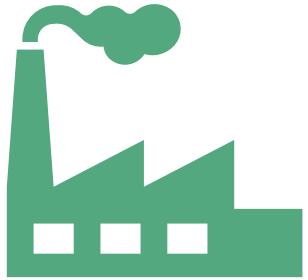
Background: Decarbonization

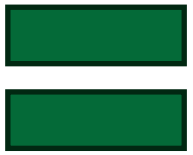
Variable



Decreased Operational Emissions (OCE)

Fixed

Low Embodied *Carbon Emissions (ECE)*



Accelerated Decarbonization

Background: Embodied Carbon Emissions

EXTRACTION → TRANSPORTATION → MANUFACTURING

($kgCO_2e$)

Background: Can we do more?

In 2017, buildings were responsible for **49%** of global emissions[1]

28% Operation Carbon Emissions (OCE)

➥ *We are doing good here!*

21% Embodied Carbon Emissions (ECE)

➥ ***We've been ignoring these!***

[1] https://nehers.org/Data/Sites/1/media/training/webinars/presentations/embodied-carbon-2020.pdf

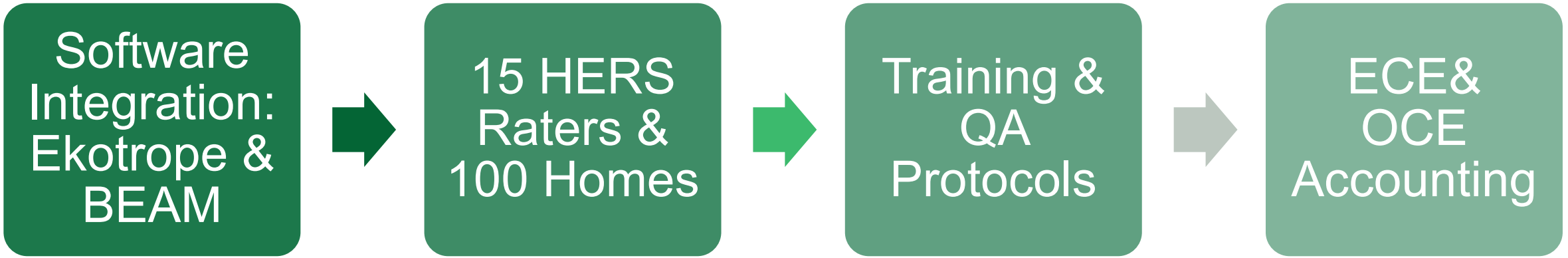
The Problem: Can We Implement & Improve

Feasibility: Can we add embodied carbon into existing data collection?

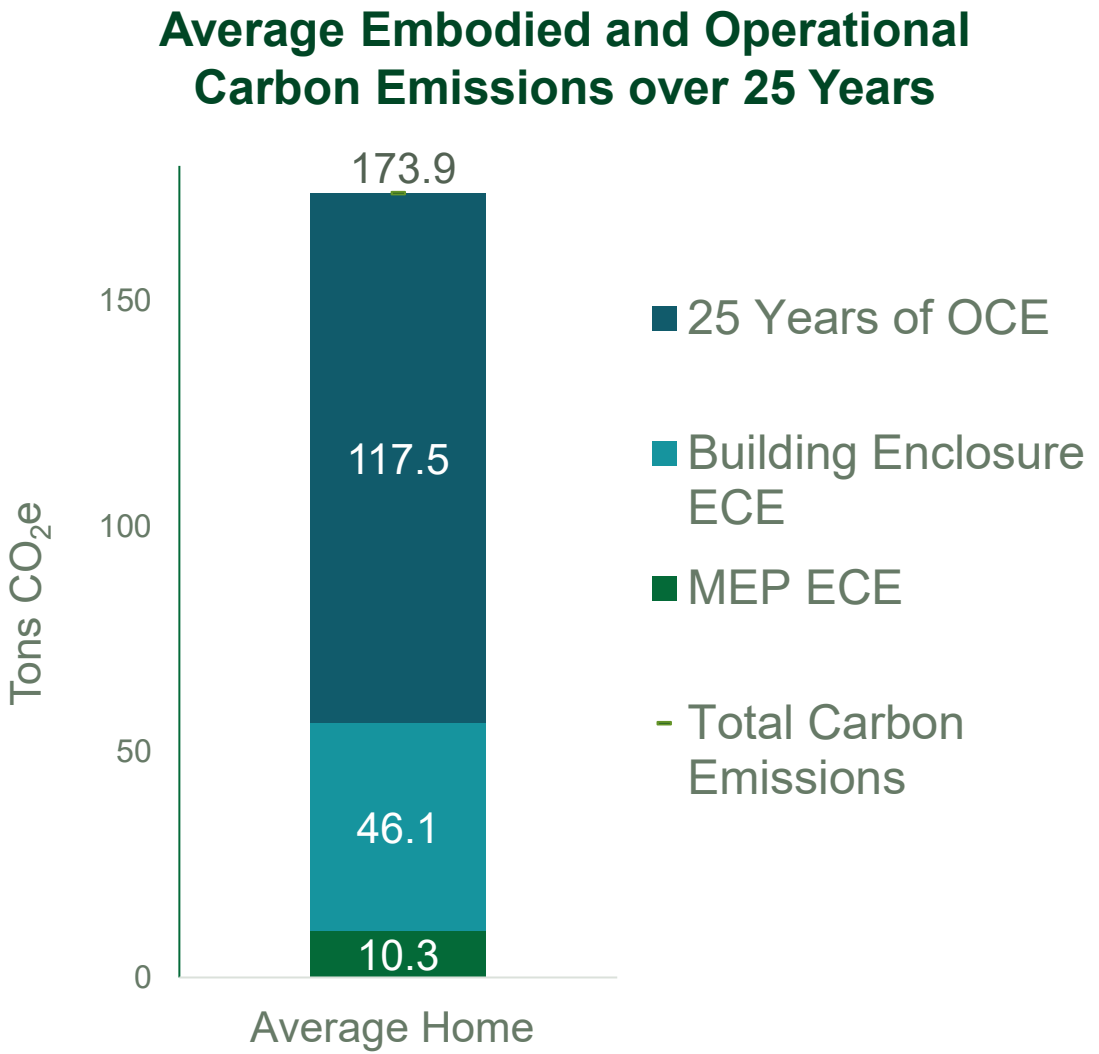
Practicality: How will this affect workflow for the rater?

Actionable Outcomes: Can we combine OCE & ECE for the greatest outcome?

Approach


Software Integration: Ekotrope & BEAM
15 HERS Raters & 100 Homes
Training & QA Protocols
ECE& OCE Accounting

Embodied vs Operational



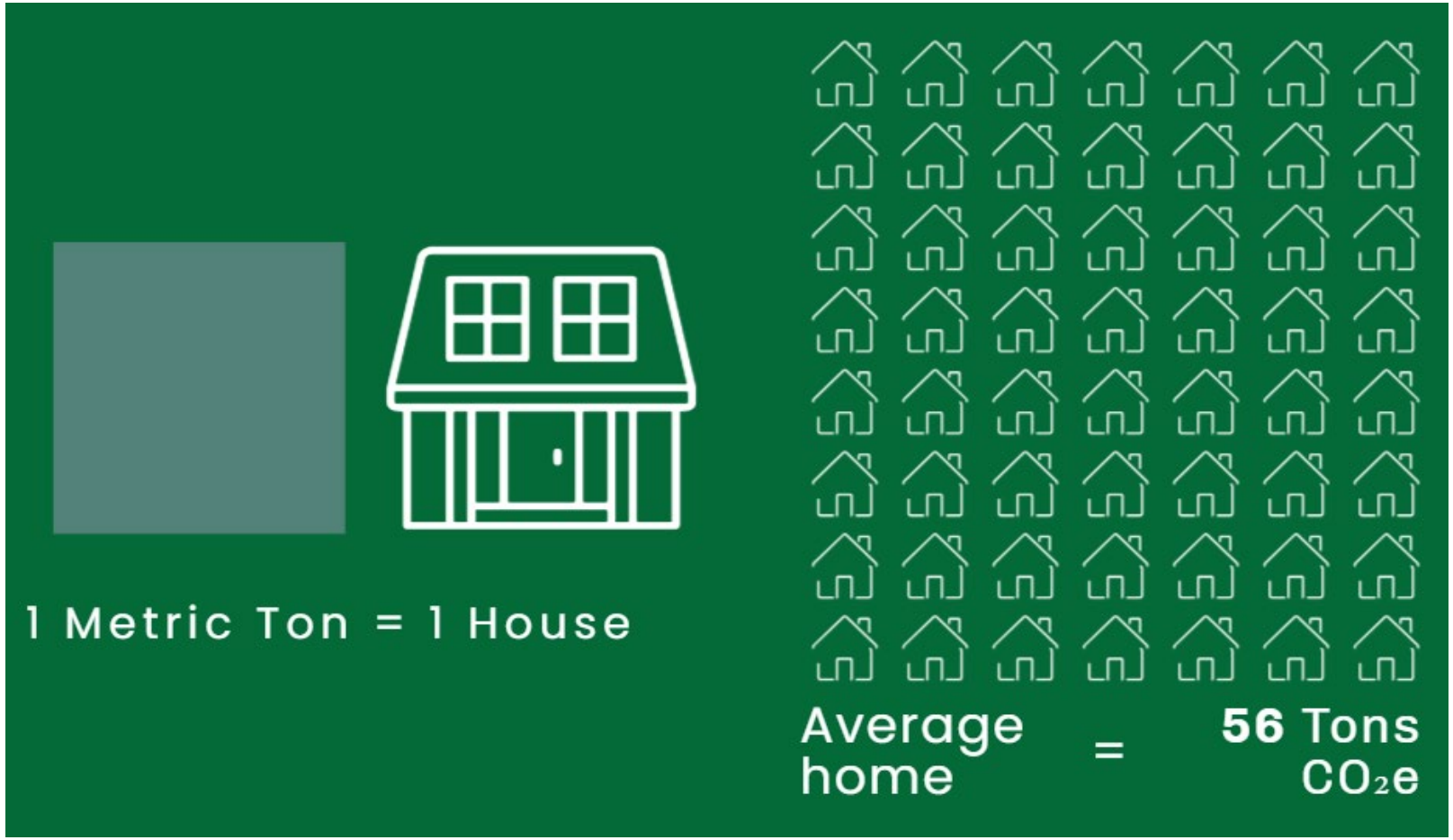
32% of emissions are embodied carbon

26% = Building enclosure

6% = MEP systems (mechanical, electric, & plumbing)

13.3 years of OCE = upfront ECE

Embodied Carbon Comparison



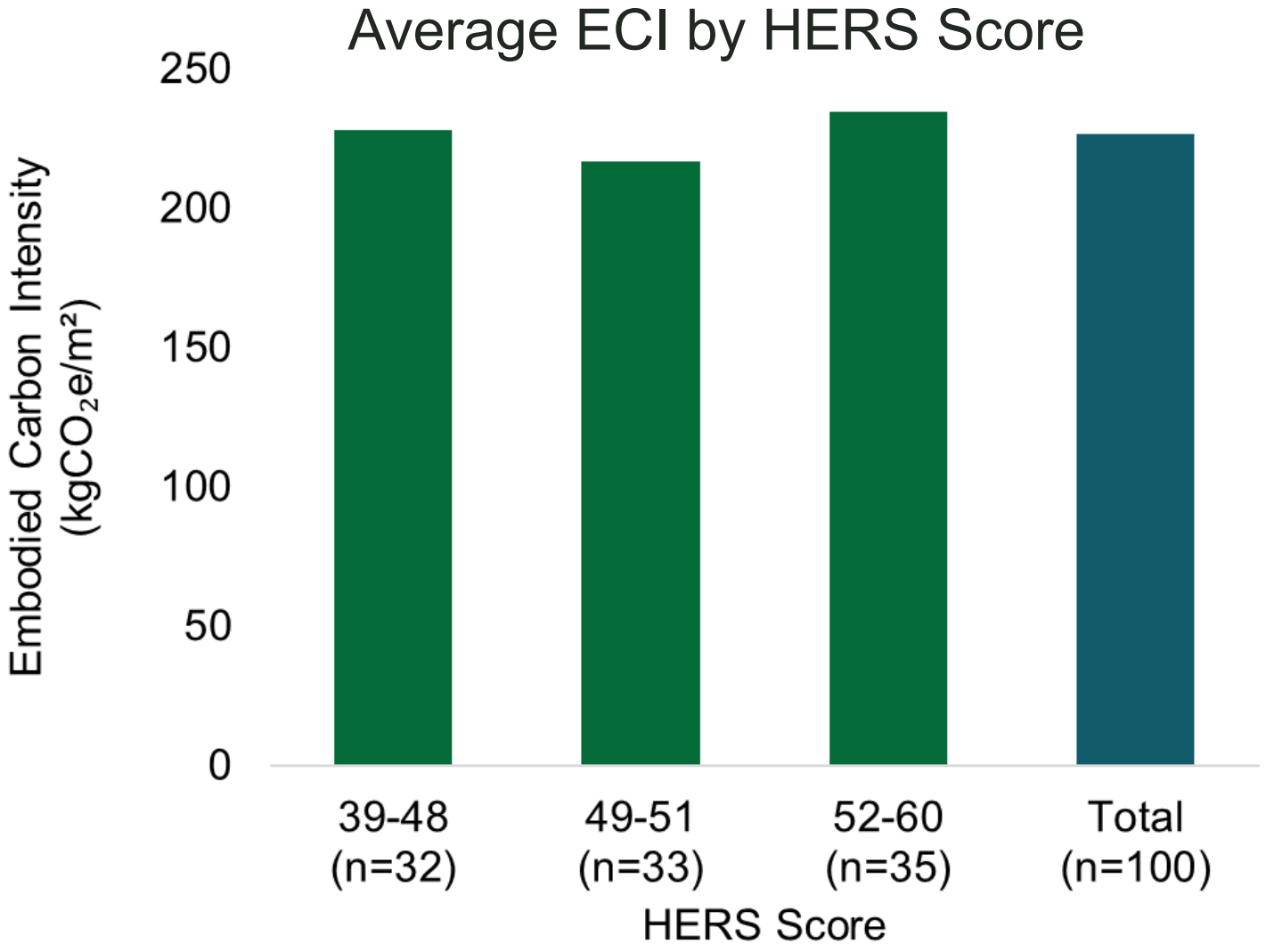
1 Metric Ton = Average size home

1 home emits enough carbon to fill 56 cape homes BEFORE living there

Embodied Carbon Intensity (ECI) vs Home Performance (HERS Score)

Low HERS scores ≠ consistent high ECI

High performance is possible with low ECI

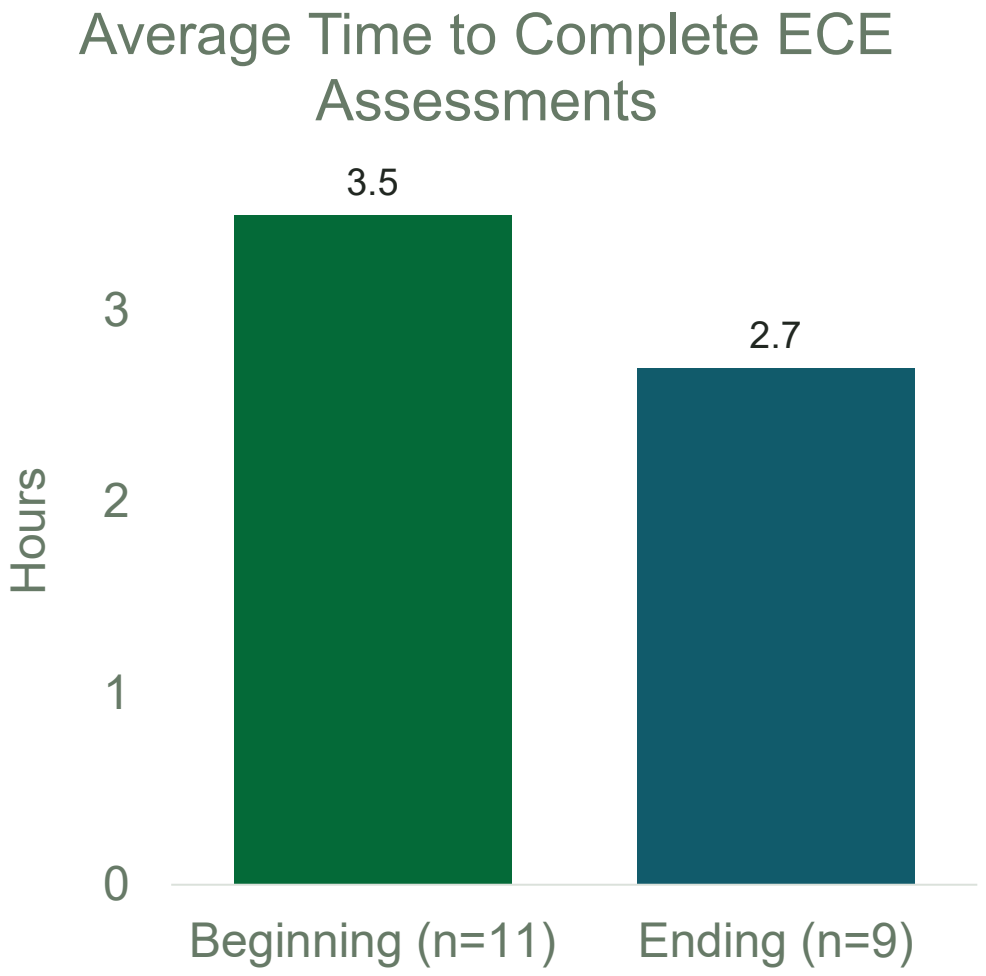


HERS Rater Feedback – Added Time

Average of 3.5 hours reduced to 2.7 after 5-10 completed projects

Over half reported completing the task in 2.5 hours or less

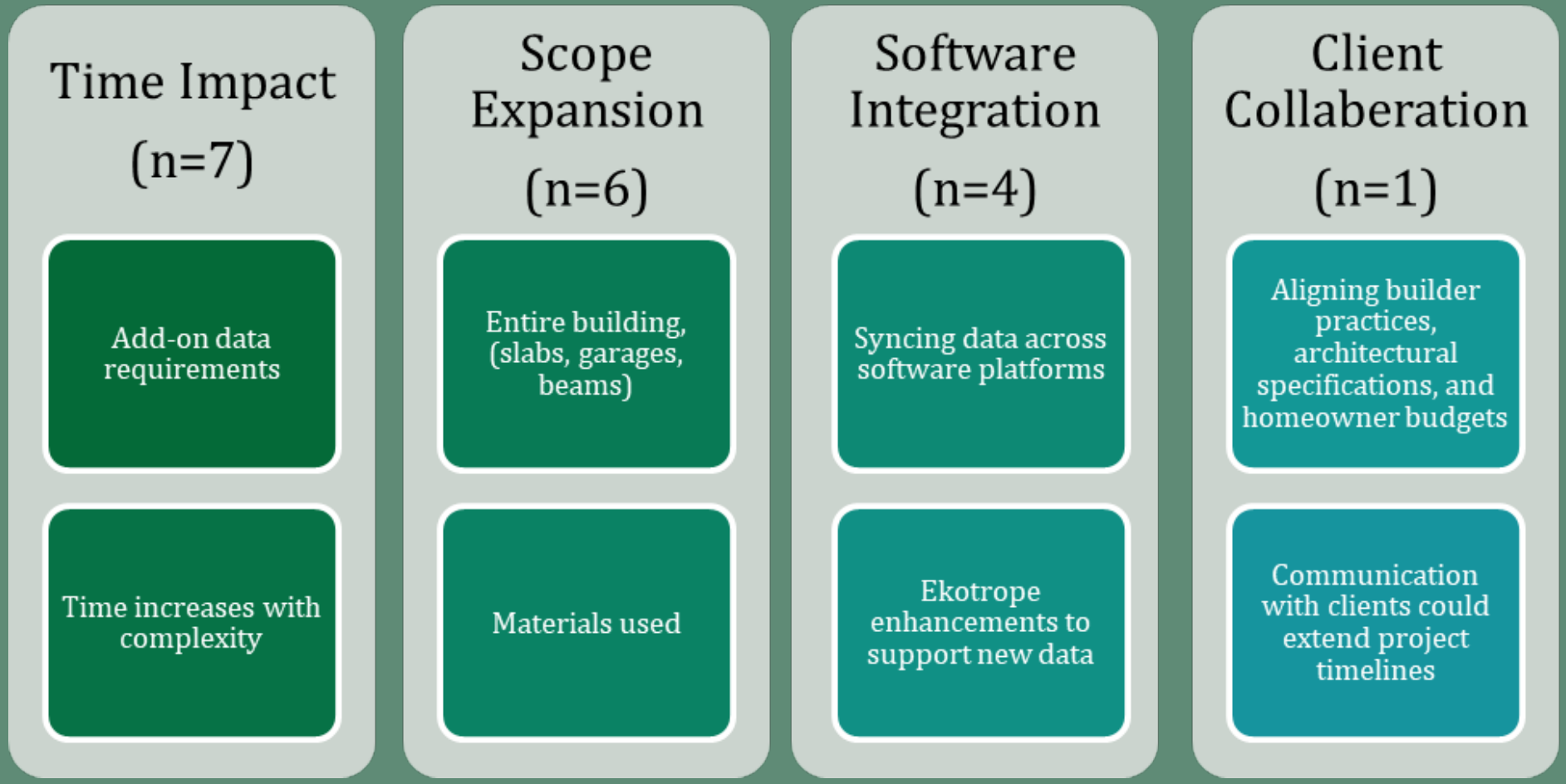
Respondents noted larger or more complex homes required additional time



HERS Rater Feedback – Workflow Impact

"Take-offs would be longer, since embodied carbon really expanded the scope of what information we need from plans. The HERS rating should be the same."

Affects to HERS Rater Workflow (n=12)



Main Take Aways & Recommendations

Embodied carbon is a significant share of a home's overall emissions

- Integrate embodied carbon into state & local climate policies
- Utility programs should incentivize low-carbon & carbon-storing materials

High-performance homes can, and should be, low-carbon homes.

- Incorporate embodied carbon into utility program frameworks and codes
- Develop builder-facing resources and guidance

Main Take Aways & Recommendations

HERS Raters are well positioned to support embodied carbon assessments

- Support workforce training and scope evolution
- Align early project collaboration to reduce both operational and embodied carbon.

Software integration is functional but needs more

- Advance software integration between operational and embodied carbon tools
- Continue baseline development through expanded sampling and longitudinal tracking

Keep an Eye Out

Coming Soon….

Massachusetts 100-Home Embodied Carbon Study

Thank You

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