RESNET 1550: Unlocking Embodied Carbon for Raters

Chris Magwood

RMI, Manager, Carbon Free Buildings

Matthew Cooper

PEG LLC, Senior Vice President and Chief Operating Officer

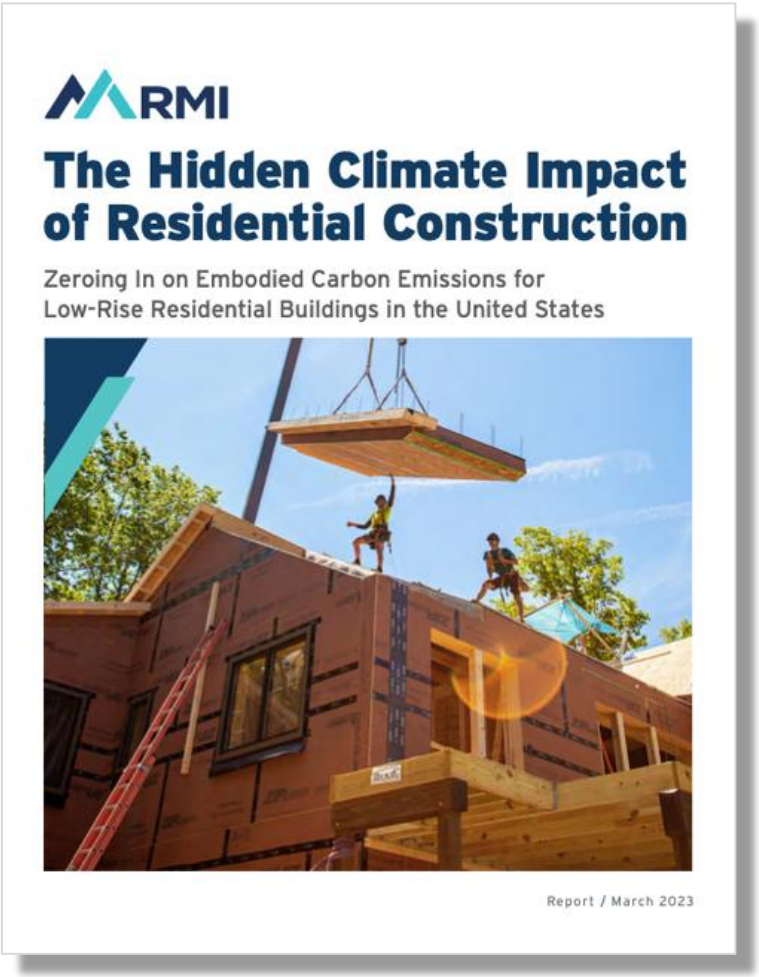
Why should we care about embodied carbon?

Initial studies of ~1,000 new homes

lb CO_2e / ft^2

45

avg. single family house



https://rmi.org/insight/hidden-climate-impact-of-residential-construction/

Why should we care about embodied carbon?

Initial studies of ~1,000 new homes

lb CO2e / ft^2

45

avg. single family house

lb CO2e / ft^2

18

for MEP, paint & other products

lb CO2e / ft^2

63

total avg. single family house

Why should we care about embodied carbon?

Initial studies of ~1,000 new homes

* US Census Bureau, American Housing Survey, 2021.

Why should we care about embodied carbon?

Extent of emissions from annual new home construction:

million metric tons

53

annual emissions

Entire country emissions

Mt CO2e fossil emissions in 2021**

Austria	66.0
Greece	53.4
Hungary	50.7
Norway	42.3

** https://data.jrc.ec.europa.eu

Why should we care about embodied carbon?

This will increase significantly if new home construction ramps up.

million metric tons

53

annual emissions

million metric tons

106

annual emissions

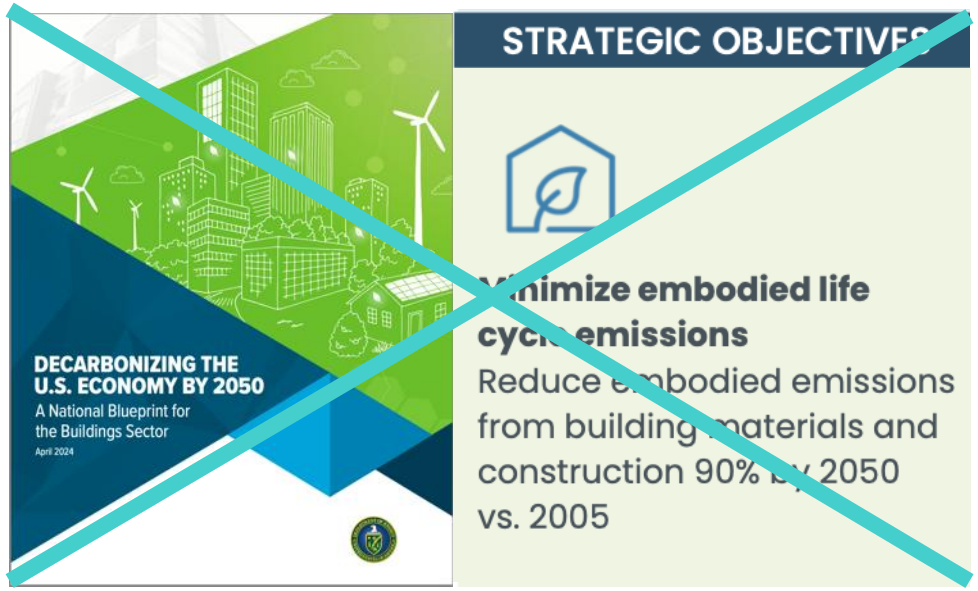
~1 million homes per year

~2 million homes per year

** https://data.jrc.ec.europa.eu

Forthcoming regulations

Federal



States

with regulations or proposals:

California
Colorado
Massachusetts
Washington
Vermont
Oregon

Utility Incentives

Mass Save

Codes

with embodied carbon proposals/committees:

IBC
IRC
IECC

Other drivers:

Investors

- Morgan Stanley reports that 77% of investors in the U.S. are focusing on environmental issues, with 57% confirming that their interest has grown over the past two years—irrespective of election outcomes*
- Homebuilding companies based outside the US that view their US homebuilding as Scope 3 emissions (eg. Sekisui House & Daiwa House, Japan & Mattamy Homes, Canada)

Recruiting talent

- Purpose-driven work is now attracting and retaining top-performing professionals at all levels, especially within Millennial and Gen Z individuals*

Home buyers

- Homebuyers across all demographics—especially younger generations—now expect homes to meet established sustainability standards*
- Embodied carbon can be a low- or no-cost differentiator

*From Greenbuilder, Jan. 23, 2025. https://www.greenbuildermedia.com/blog/2025-the-year-sustainability-becomes-transactional

Fitting into the RESNET ecosystem

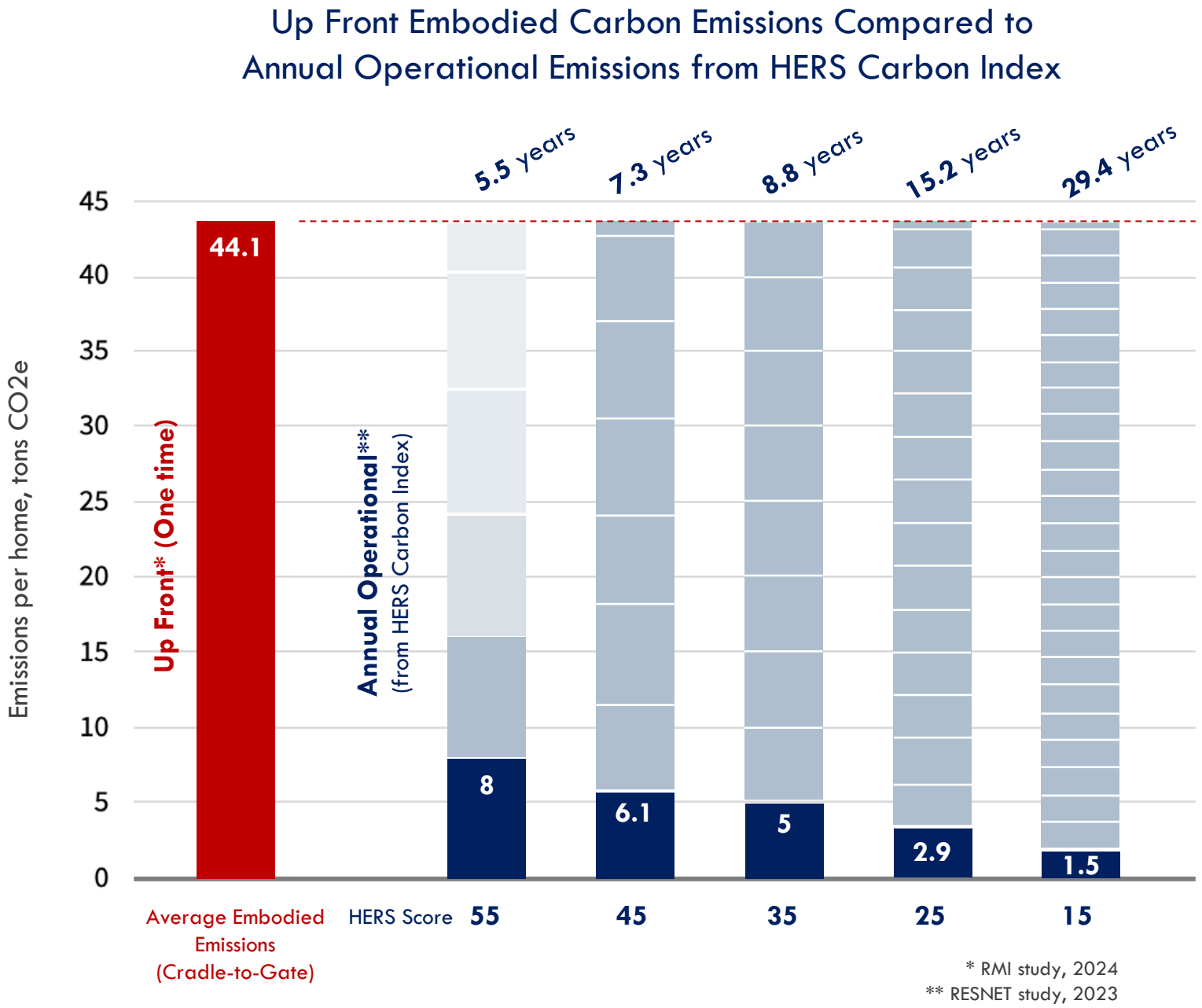
Fitting into the RESNET ecosystem

leverage existing modeling data

EMBODIED CARBON

EC-OC balance

HERS raters can help clients understand EC-OC balance and provide guidance for affordable decarbonization decisions



Software workflow

BEAM
BUILDING EMISSIONS ACCOUNTING FOR MATERIALS

ekotrope

Software connectivity

- Prototype of connectivity between HERS and embodied carbon software in MA

MASSACHUSETTS CLEAN ENERGY CENTER®
NEHERS
NORTHEAST HOME ENERGY RATING SYSTEM ALLIANCE
BUILDERS FOR CLIMATE ACTION

ASSESSING THE UPFRONT CARBON OF BUILDING MATERIALS IN HOMES

https://www.masscec.com/resources/assessing-upfront-carbon-building-materials-homes

Software workflow

MA 100-Homes Study

- Raters using prototype integration completing BEAM models in less than 2 hours

RESNET Standard 1550

Purpose & Scope:

“

1. Purpose

The provisions of this document establish a methodology for **quantifying and reporting embodied greenhouse gas emissions** associated with building products using data commonly gathered by energy raters and according to the system boundary and data sources defined in Section 5.

2. Scope

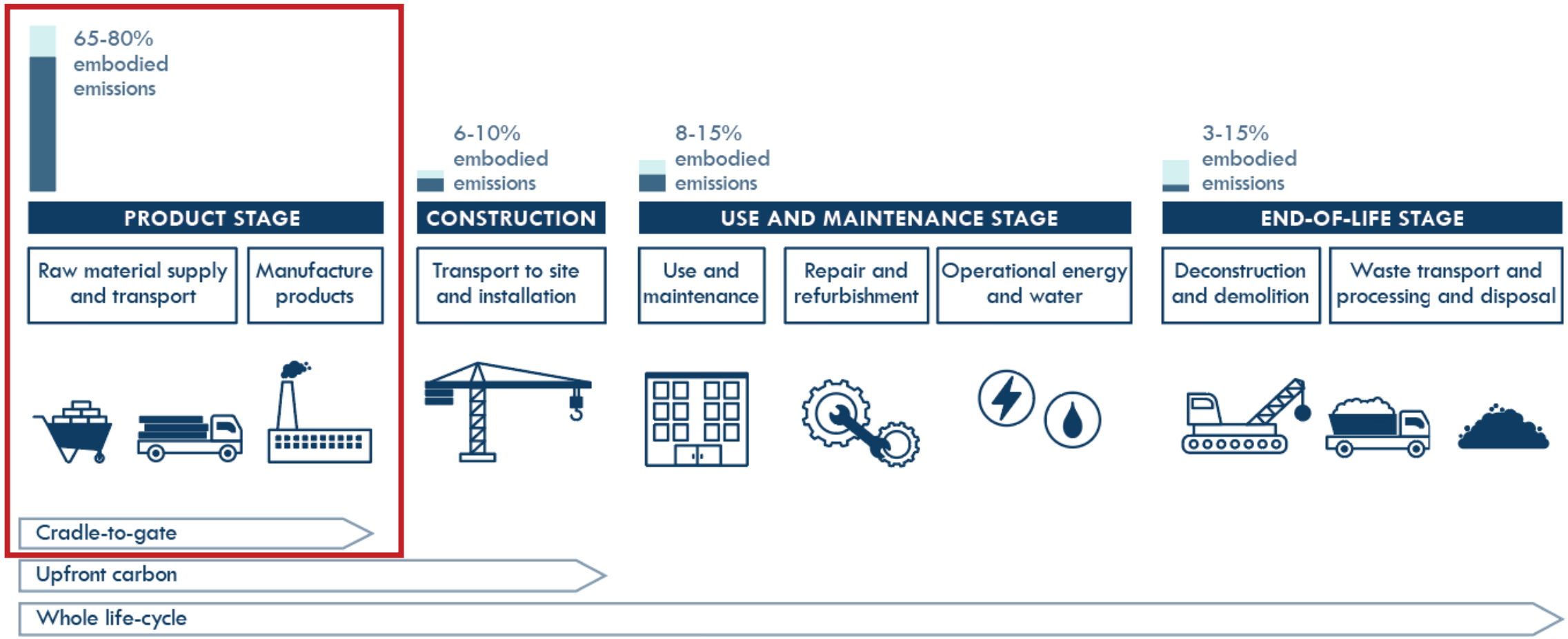
This standard is applicable to **buildings with Dwelling Units and Sleeping Units** in Residential or Commercial Buildings, excepting hotels and motels .

This standard **does not set benchmarks or establish levels of building performance**.

This standard shall not be used to circumvent any safety, health, or environmental requirements.

”

Life cycle stages A1-A3:



Basic embodied carbon math

Material quantity

From HERS models

- Area-based takeoffs

×

Emission factor

From EPDs or other approved data source

=

Product emissions

kg CO2e

per life cycle phase

Basic embodied carbon math

Material quantity

From HERS models

- Area-based takeoffs

TABLE 10.1.1

provides takeoff calculations

×

Emission factor

From EPDs or other approved data source

TABLE 5.3.2

provides data hierarchy

=

Product emissions

kg CO2e

per life cycle phase

Estimating material carbon emissions

Emission data sources

EPD – Product Impacts

Declared Unit: 1 m^3

Construction Material

Amount per Unit	
Global Warming Potential	450 $kgCO_2e$
Emitted	475 $kgCO_2e$
Sequestered	-25 $kgCO_2e$
Ozone Depletion	0.00 kgCFC11e
Acidification Potential	3.01 $kgSO_2e$
Eutrophication Potential	0.15 kgNe
Smog Formation	0.63 kgO_3e
Primary Energy Demand	3020 MJ
Non-renewable	3045 MJ
Renewable	25 MJ

An **Environmental Product Declaration** (EPD) "quantifies environmental information on the life cycle of a product to enable comparisons between products fulfilling the same function."

The EPD methodology follows ISO series 14040 requirements.

Reports in kg CO2e.

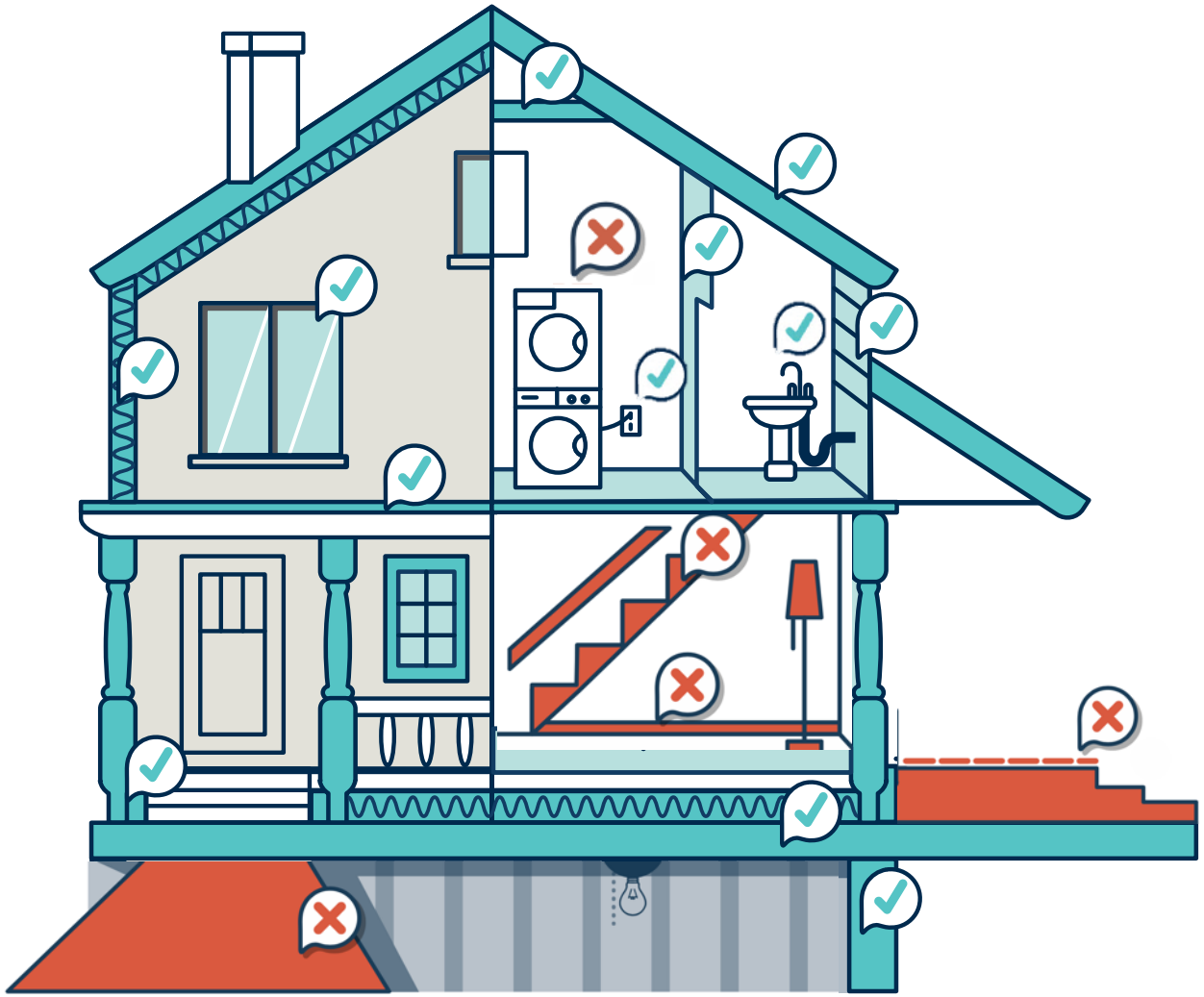
Building product categories

Taking a “drip-line in” approach

Table 5.4.1 lists inclusions

Table 10.4.1 lists exclusions

- Site work
- Driveways/hardscape
- Balconies/porches/decks
- Formwork
- Appliances
- Cabinetry/millwork
- Gutters/soffit/fascia
- Fasteners/connectors
- Controls/valves
- Light fixtures



Two types of assessment

Following HERS modeling method

Projected Assessment

Projected Assessments are generated prior to construction wherein the actual installed conditions, equipment, and systems are not yet completed or installed.

Confirmed Assessment

Confirmed Assessments are conducted, generated, and verified after completion of construction.

Verification

Following HERS verification method

Verification

A ***Certified Rater*** **shall complete all the tasks** and gather all the required verification documents specified in Table 10.3.1.

If inspection of the *assessed home* and/or verification documents results in variations from the *construction documents* used for calculations, all variations must be documented, and all required changes made to the dimensions and/or product selection used for the *embodied carbon* assessment.

Verification

Following HERS verification method

Verification procedure

- Measure & verify dimensions
- Determine & record sizes, specifications and brands
- Record with photos, receipts or other documents

Software

Following HERS software verification method

Software representatives

- Active participants in working groups
- Monitoring progress of standard
- Lag time between standard release and software availability

Training & certification

Following HERS software verification method

RESNET®
RESIDENTIAL ENERGY SERVICES NETWORK

HomebuildersCAN
CARBON ACTION NETWORK

Training & certification programs

- Entering development
- Timed to be available in conjunction with publication of standard

Public comment period

Open until January 21, 2025

https://www.resnet.us/about/standards/minhers/draft-pds-01-resnet-1550-embodied-carbon/