



University of
Strathclyde
Glasgow

NPF 4 Policy 2 Workshop - 13/11/25

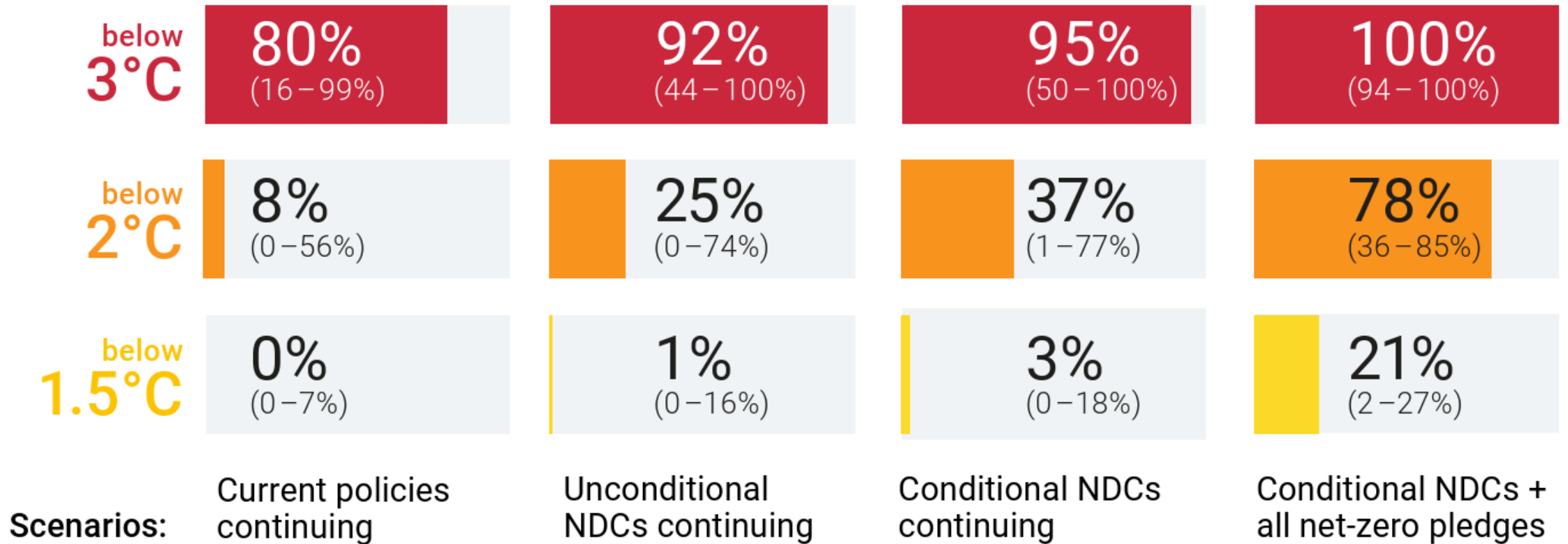
International insights

Dr Jannik Gieseckam

Department of Civil & Environmental Engineering
jannik.gieseckam@strath.ac.uk

Latest warming projections

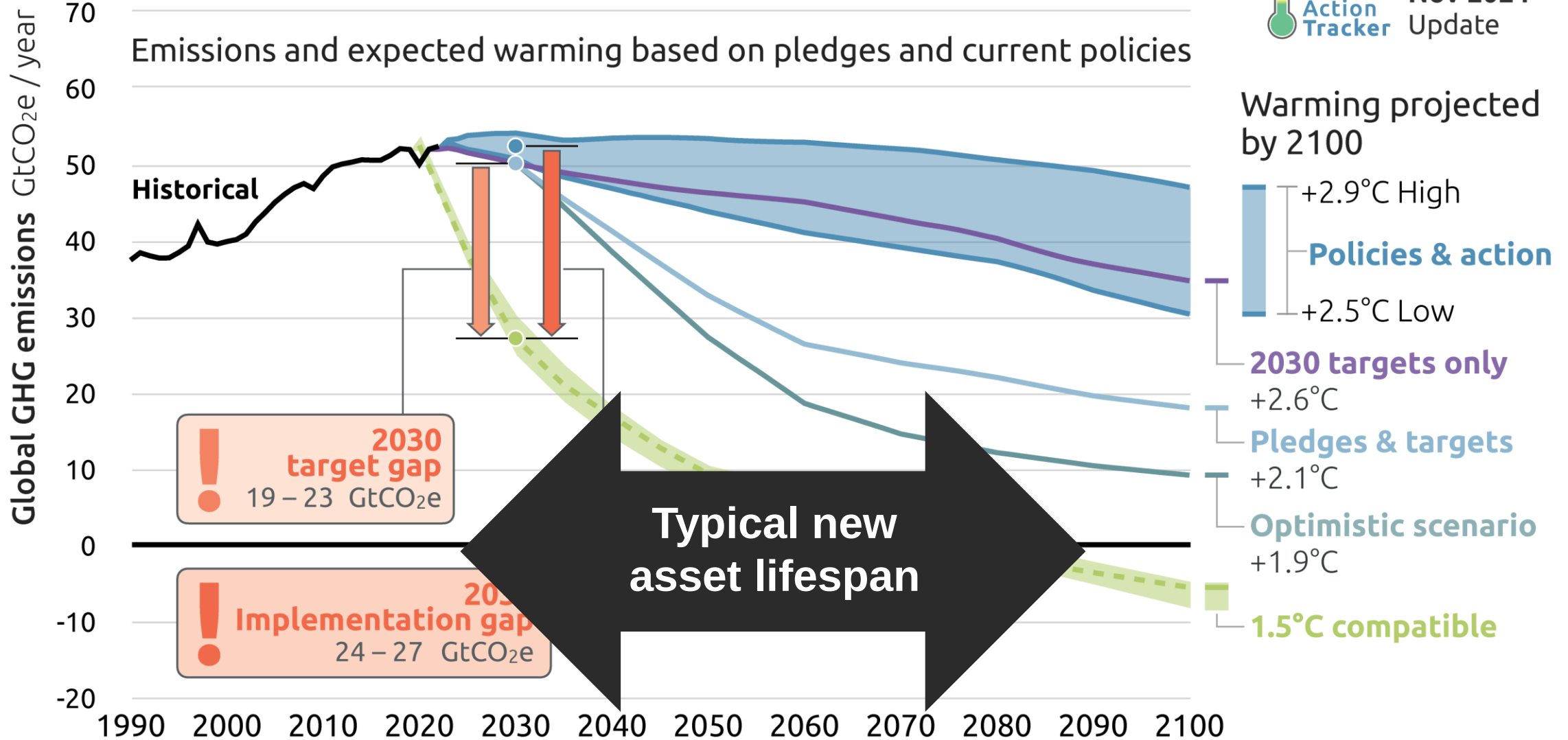
Likelihood of limiting warming below a specific temperature limit (%) over the twenty-first century



EMISSIONS PATHWAYS TO 2100

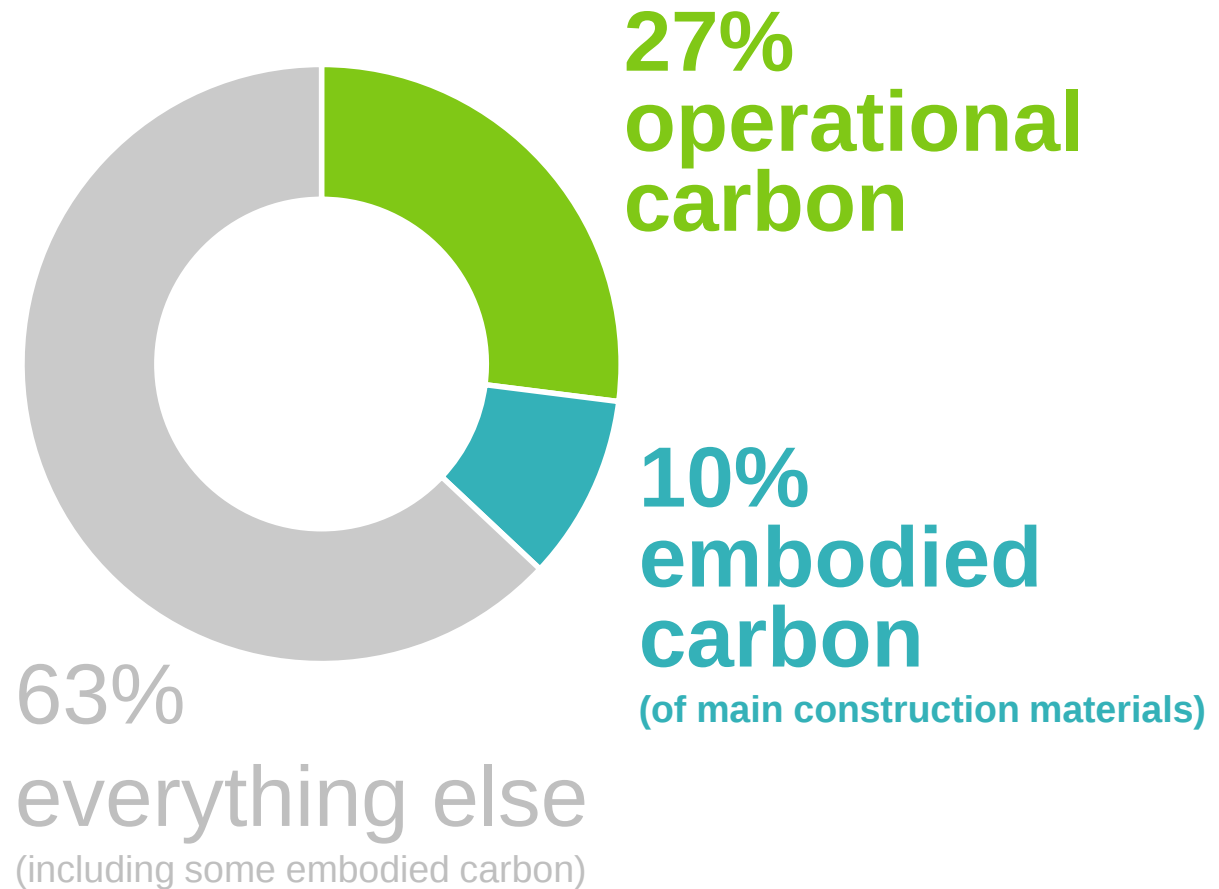
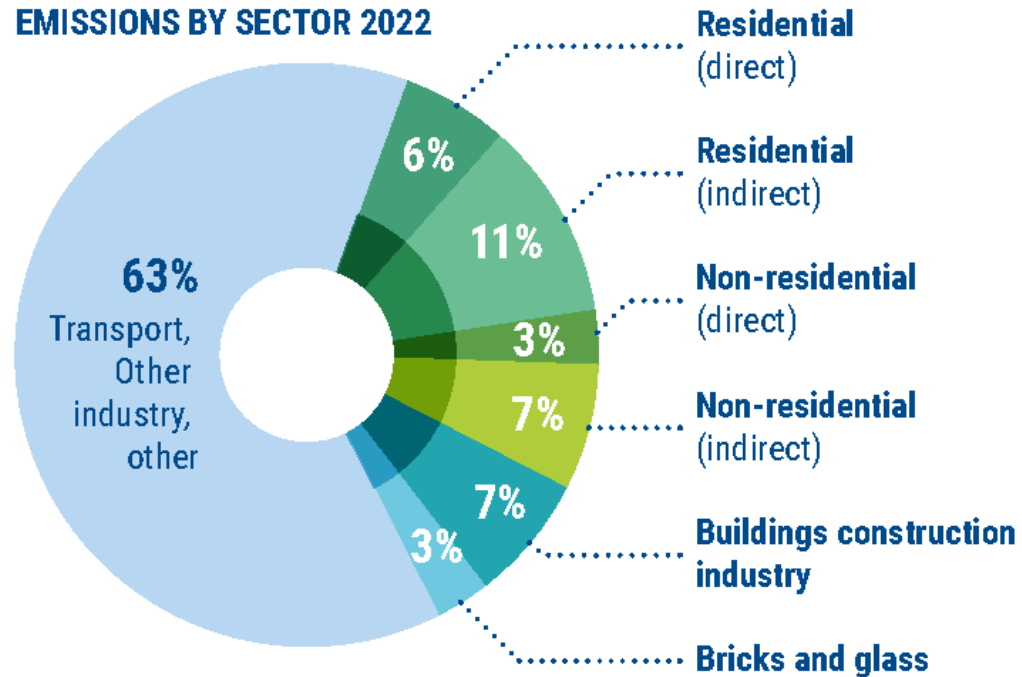
Emissions and expected warming based on pledges and current policies

Climate Action Tracker Nov 2024 Update

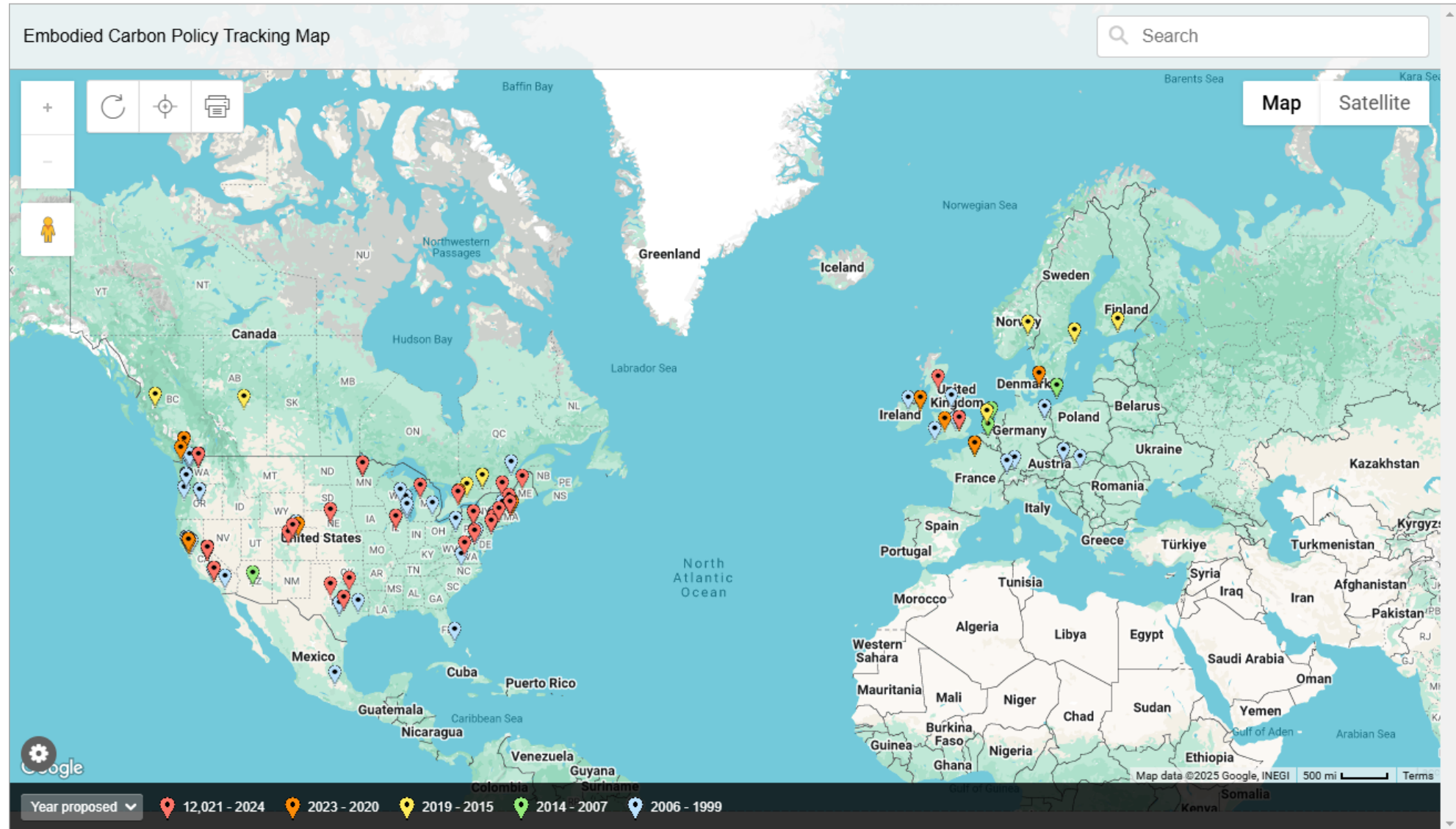


Global energy & process CO₂ emissions

EMISSIONS BY SECTOR 2022



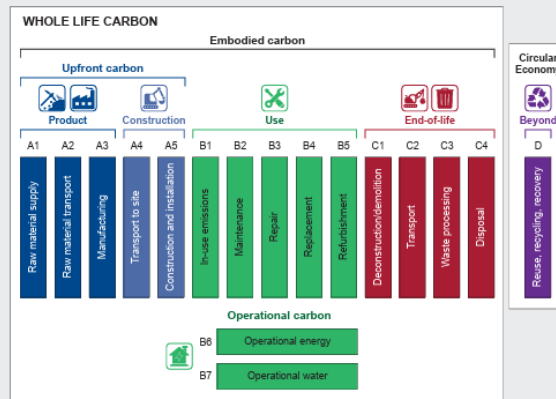
Emerging global policy trend



International policy reviews

International Survey of Mandatory Whole Life/Embodied Carbon Requirements in Building Codes and Regulations

June 2025



One Click LCA

CONSTRUCTION CARBON REGULATIONS IN EUROPE REVIEW & BEST PRACTISES

OCTOBER 2022



One Click LCA
© 2022. All rights reserved

Made possible with support from:



Ympöristöministeriö
Miljöministeriet
Ministry of the Environment



Netherlands Enterprise Agency

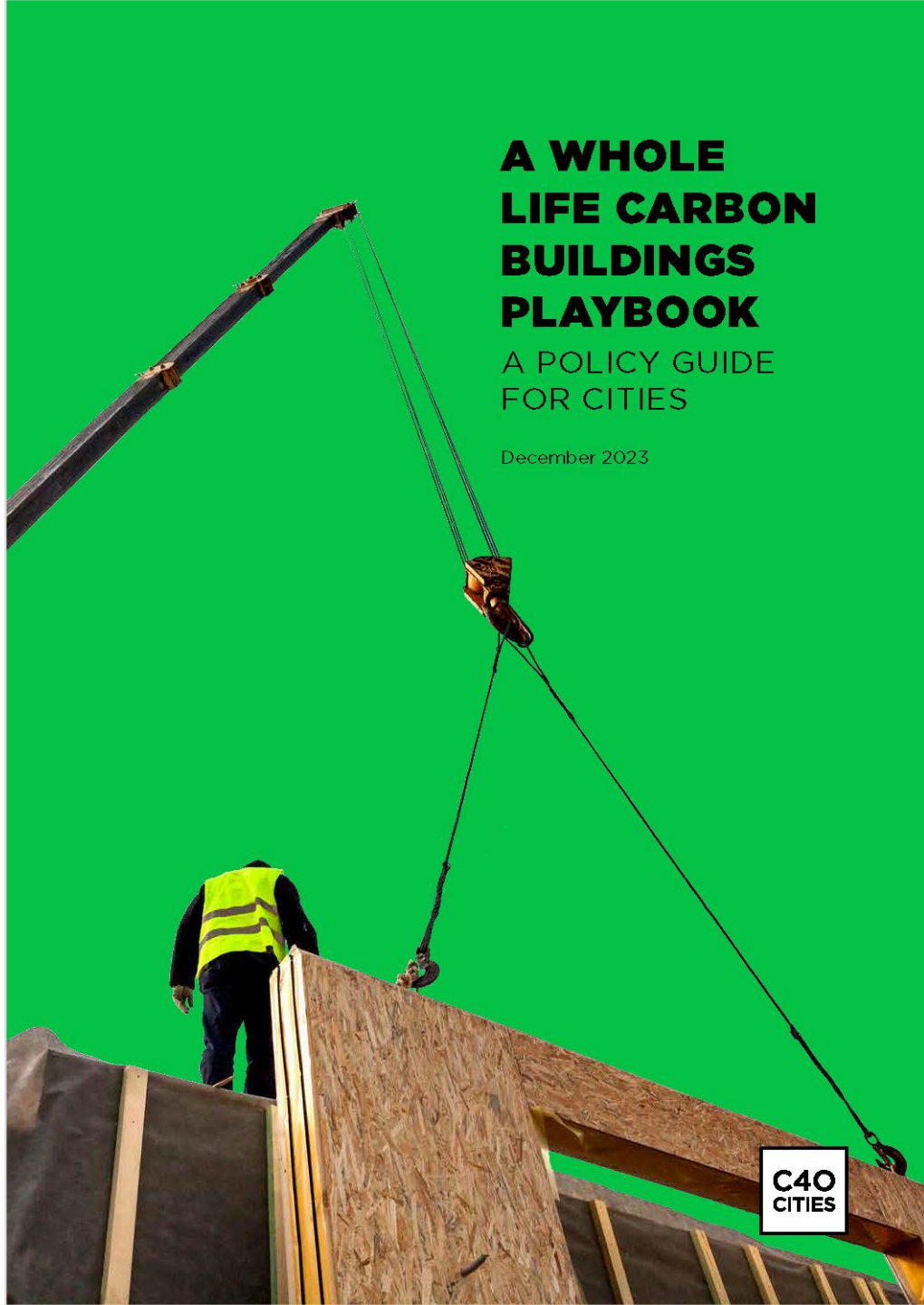
WORLD GREEN BUILDING COUNCIL

EPBD implementation case studies

How life cycle GWP measures are being implemented by governments

Measures taken in Denmark, France, Sweden and London

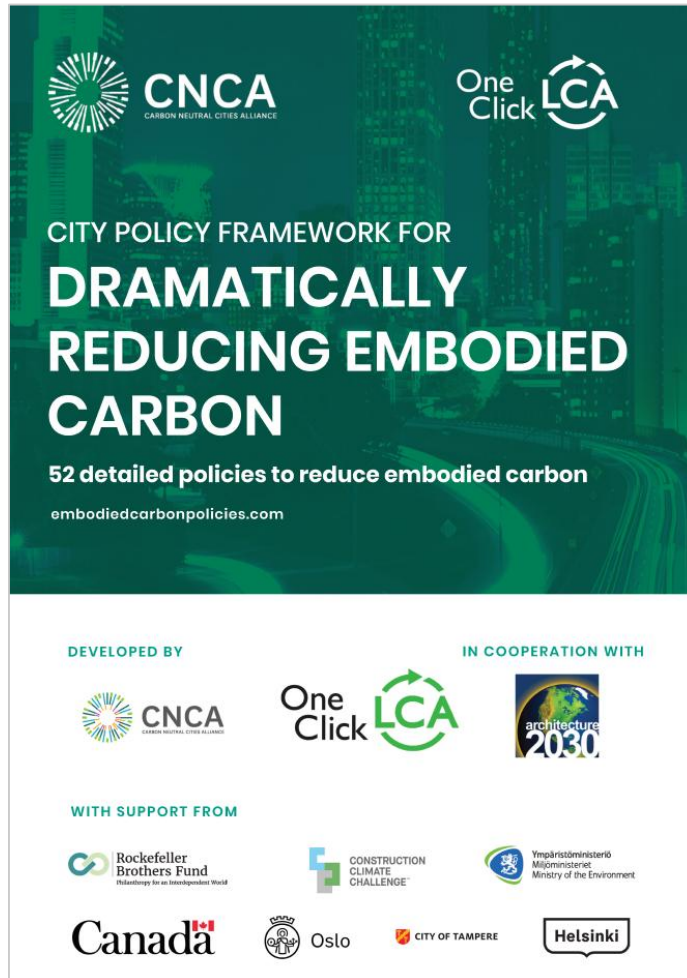




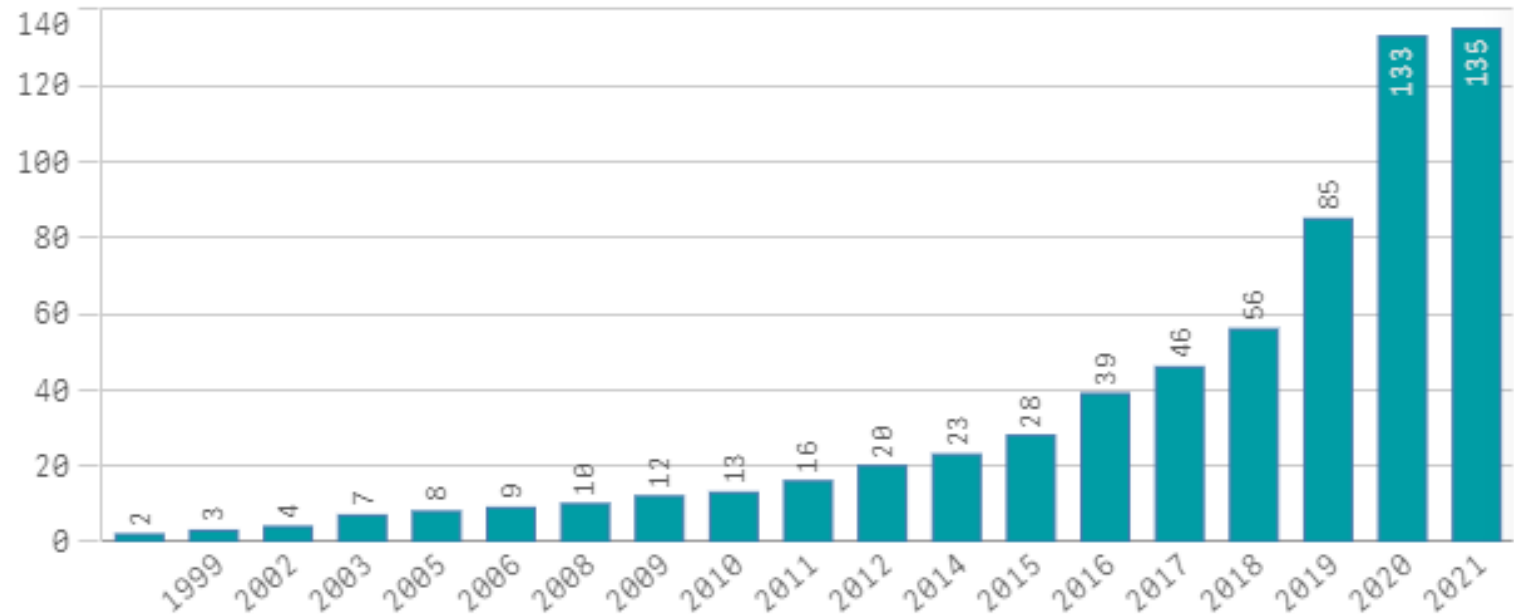
C40 Policy Guide

- Covers wide range of policy options with examples
- Includes case studies from cities & local authorities around the world (e.g. Vancouver, New York, Oslo)

Local policy options

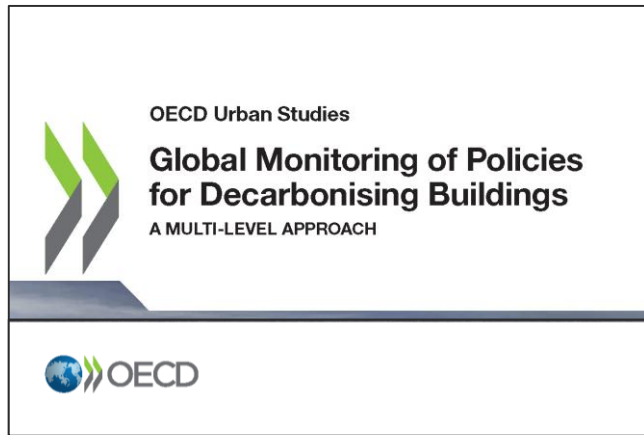


Number of policies and actions adopted over the years



Uptake based on C40 Clean Construction Policy Explorer

(Inter)national regulations



11% of respondents: embodied carbon in policy, further 43% of respondents 'future priority'



EU Energy Performance in Buildings Directive: regulating embodied carbon **starting 2028**

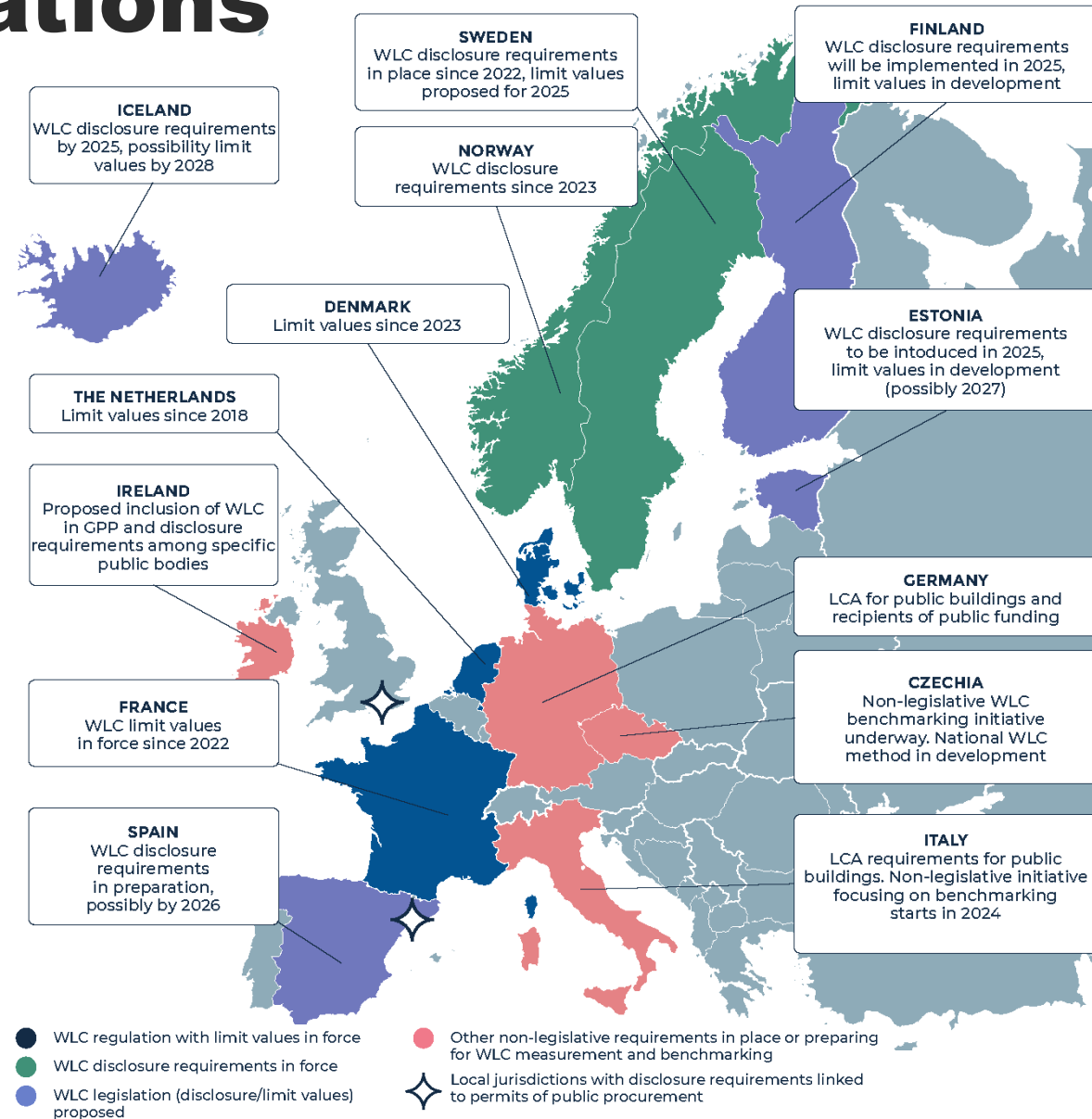


Figure from BPiE (2024) [How to establish whole life carbon benchmarks](#)

Most common European approach

- **Signal:** advise industry of intention to regulate
- **Develop** supporting infrastructure: national assessment methodology, reporting templates etc.
- **Report** emissions in line with mandatory requirement
- **Limit** emissions: set mandatory quantitative performance-based threshold (e.g. must be $<600 \text{ kgCO}_2/\text{m}^2$)
- **Reduce** limits over time: revise limits at stated intervals based upon prior reporting period

Points of differentiation

- **Policy scope:** building types & size, exemptions, special conditions, retrofits etc.
- **Assessment scope:** building elements, life cycle stage, reference study period, biogenic carbon etc.
- **Required practice:** templates, scenarios, reporting units, limit values, submission intervals etc.
- **Implementation:** verification, enforcement, phasing etc.

Incoming EU requirements

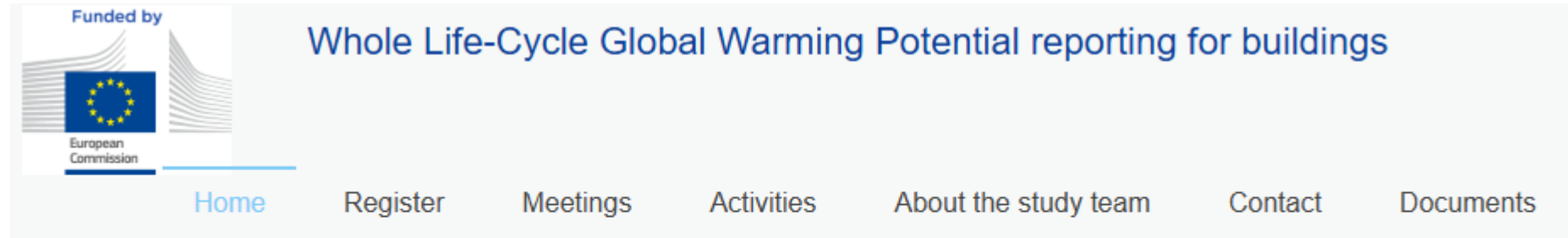


- Article 7 of revised Energy Performance of Buildings Directive entered into force in 2024 and will be transposed into national laws by May 2026
- Article 7(2) requires **calculation of life cycle global warming potential** from 2028 for new buildings >1000m² & 2030 for all new buildings
- Article 7(5) requires member states to publish by 2027 **national roadmaps** detailing introduction of **limit values** and targets that ratchet down over time

Timeline for EU requirements



Ongoing development of guidance



Policy context

The revision of the Energy Performance of Buildings Directive (EPBD) will upgrade the existing regulatory framework to reflect higher ambitions and more pressing needs in climate and social action, as well as a different geopolitical context, while also providing Member States with the flexibility needed to take into account the differences in the building stock across Europe.

This includes requirements on the calculation and reporting of the whole life-cycle GWP of:

- all new buildings with a useful floor area larger than 1000m² from 1 January 2028;
- all new buildings by 2030.

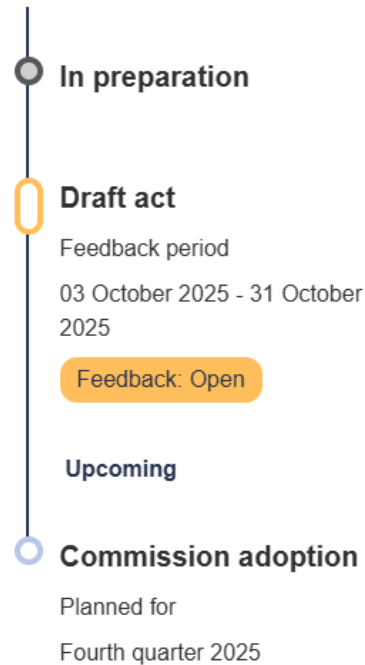
You can sign up to follow development of the EU guidance on [the project website](#)

Recent EU framework consultation


[Log in](#)
[EN](#)

[Law](#)

EU framework for calculating the global warming potential of new buildings

[Have your say - Public Consultations and Feedback](#) > [Published initiatives](#) > [EU framework for calculating the global warming potential of new buildings](#)


About this initiative

Summary

Under Article 7(3) of the revised Energy Performance of Buildings Directive, the Commission is required to establish an EU framework so that practitioners can calculate the whole life-cycle global warming potential (GWP) of new buildings. The requirement to calculate the life-cycle GWP will apply to large new buildings from 2028 and to all new buildings from 2030.

The objective is to make the national values for the life-cycle GWP of new buildings comparable.

Topic

Energy

Type of act

Delegated regulation

Expert group

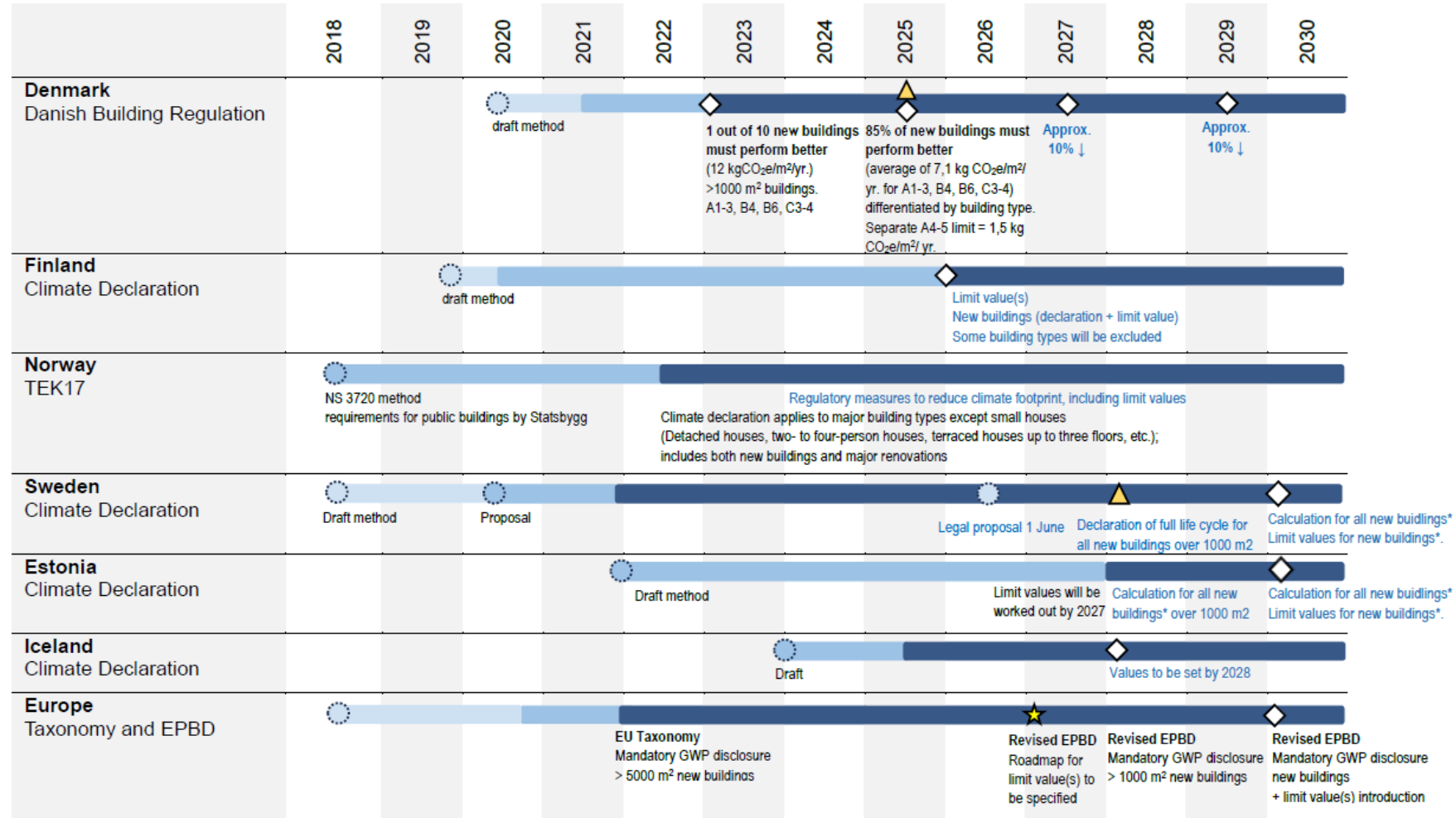
[E03689](#)

Draft act

[Feedback: Open](#)

Read the [consultation documents](#) for further detail

Nordic regulations timeline



- Integration in national legislation
- Test phase of coming regulation
- Preliminary method development
- Limit values (to be) integrated
- Draft method publication
- Declaration scope extension
- "Blue" indicates proposals, not final decisions
- ★ Roadmap
- * New buildings for which energy is used to condition the indoor environment

Comparison within Nordic countries

Included life cycle stages	Denmark	Estonia	Finland	Iceland	Norway	Sweden	Level(s)
A1-A3	✓	✓	✓	✓	✓	✓	✓
A A4 Transport to site	✓	✓	✓	✓	✓	✓	✓
A5 Construction	✓	✓	✓	✓	✓*	✓	✓
B1 Use in building							
B2 Maintenance							
B3 Repair							
B B4 Replacements	✓						
B5 Refurbishment							
B6 Energy	✓						
B7 Water							
C1 Demolition works							
C2 Transport							
C C3 Waste management	✓						
C4 Final disposal	✓						
D Additional	✓						
*Only waste included							

	Denmark	Estonia	Finland	Iceland	Norway	Sweden	Europe
Included building parts	BR28	Proposed draft method for climate declaration (2021)	Climate declaration	Climate declaration proposal (under development)	TEK17	Climate declaration 2022	Limit values 2025 Climate declaration 2027 (Boverket's proposal)
Site preparation	-	-	soil stabilization and site reinforcement elements	-	-	-	reported separately from 2027
Substructure							
Foundations	X	X	X	X	X	X	X
Piling	X	X	X	X	X	X	X
Basement walls	X	X	X	X	X	X	X
Ground floor structure	X	X	X	X	X	X	X
Superstructure							
Frame (columns, beams)	X	X	X	X	X	X	X
External walls, façade	X	X	X	X	X	X	X
External doors, windows	X	X	X	X	X	X	X
Balconies	X	X	X	X	X	X	X
Roof structures	X	X	X	X	X	X	X
Internal walls, load- and non-load bearing	X	X	X	X	X	X	X
Floor slabs	X	X	X	X	X	X	X
Internal doors	X	X	X	X	X	X	X
Stairs and ramps	X	X	X	X	X	X	X
Wall and ceiling interior finishes and coverings	X	X	X	X	X	X	X
Flooring materials	X	X	X	X	X	X	X
Suspended ceilings	X	X	X	X	X	X	X
Internal finishes							
Lifts and escalators	X	X	X	X	X	X	X
Building services							
Electricity system	-	-	X	X	X	X	X
HVAC system	X	X	X	X	X	X	X
Renewable energy systems	X	X	X	X	X	X	X
Water system	X	X	X	X	X	X	X
Sewage system	X	X	X	X	X	X	X
Other systems (e.g. firefighting)	-	-	X	X	X	X	X
External works	only if included in the area definition	-	only external structures on yard	-	-	-	-
Furnishing							
Fixed furniture	-	-	X	-	-	-	-
User furniture	-	-	-	-	-	-	-

Country/Region	(in place or proposed) Regulation	RSP	Floor area definition	external wall thickness	Primary functions	Secondary functions (e.g. circulation area, storage)	Internal walls and columns	Basement/cellar	Stairs	Common facilities (in multi-units, incl. staircase, lift, vertical voids)	Enclosed car park connected to building	Attic	Roof/terrace	Plantrooms on roof	Balcony	External area including car park
Denmark	Danish Building regulation (BR28) – embodied part	50	reference area	X	X	X	X	If ceiling height > 1.25 m	X	counted for all floors	included with 50%	Only if > 1.5 m high	included with 25%	X	-	included with 25% (for external areas only when connected to the building)
	Danish Building regulation (BR28) – operational part	50	heated gross floor area	X	Included if heated	X	If ceiling height > 1.25 m included with 40%	-	counted for all floors	-	-	Only if > 1.5 m high	-	-	-	-
Estonia	Proposed method for climate declaration (2021)	50	heated net floor area	-	Included if heated	X	Included if heated	-	-	-	-	-	-	-	-	-
Finland	Proposed method for climate declaration (2021)	50	heated net floor area	-	Included if heated	X	X	X	X	-	X	X	X	X	X	-
Norway	TEK17	50	gross floor area	X	X	X	X	Included if > 1.9m high for a width of ≥ 0.6m	-	-	X	Included if > 1.9m high for a width of ≥ 0.6m	Included in enclosed by glass	X	-	-
Sweden	Klimadeklaration 2022	N/A (50)	gross floor area	X	X	X	X	X	-	-	X	Included if > 1.9m high for a width of ≥ 0.6m	-	X	X	-
	Swedish Building regulation (BBR29) Operational energy calculation	50	heated net floor area	-	Included if heated	X	X	X	X	Included if heated	-	Included if heated	-	-	-	-
Europe	Level(s) – Office	50	IPMS 3 Useful floor area	-	X	X	X	If in exclusive use	-	-	-	-	Separate item	-	Separate item	-
	Level(s) – Residential	50	IPMS 3B Useful floor area	-	X	X	X	Separate item	Only on ground floor	-	Separate item	Separate item	Separate item	Separate item (unless common facility)	Separate item	-

Follow [Nordic Sustainable Construction](#) or [read more about comparisons](#)

Example – Denmark

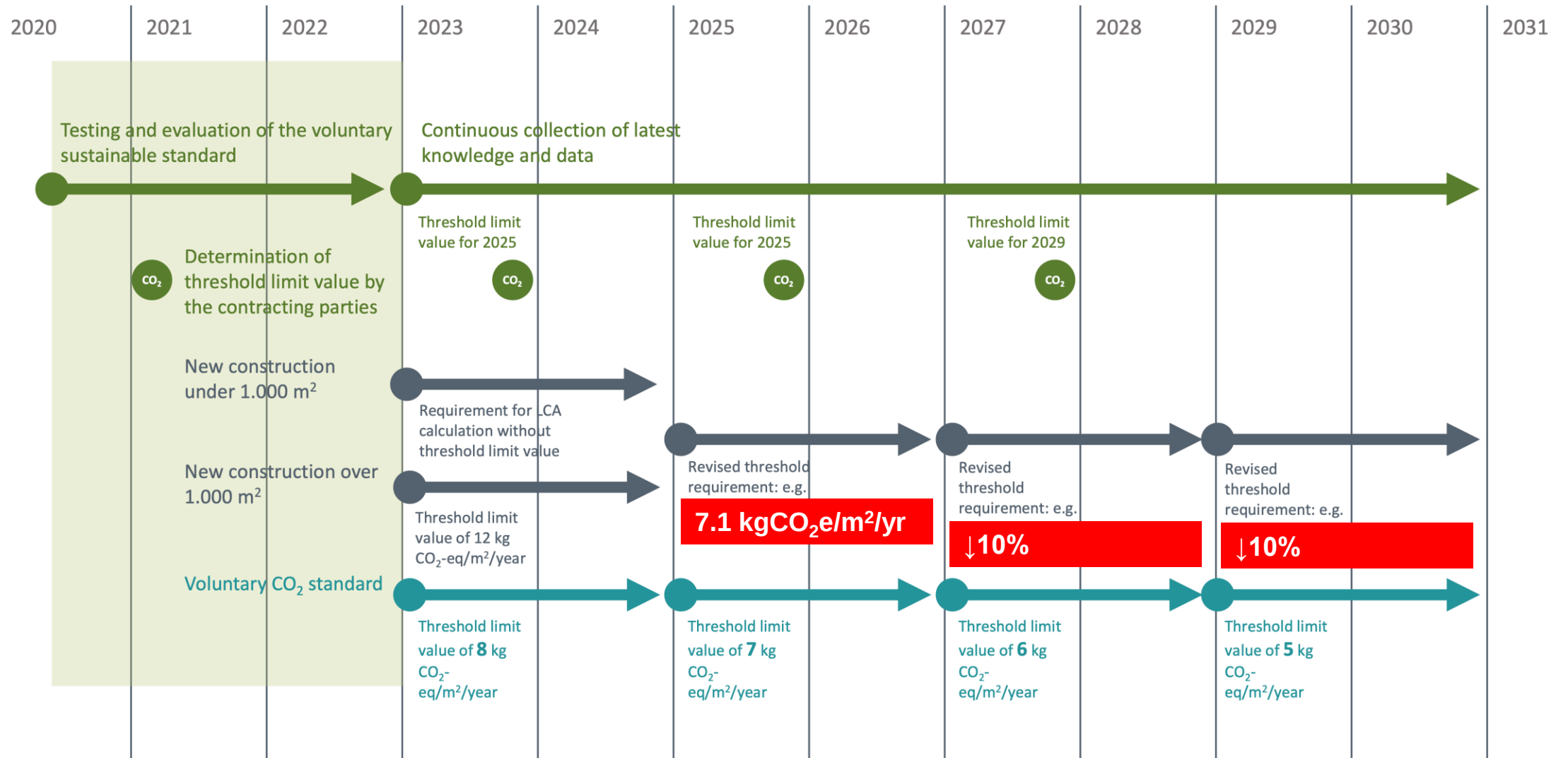
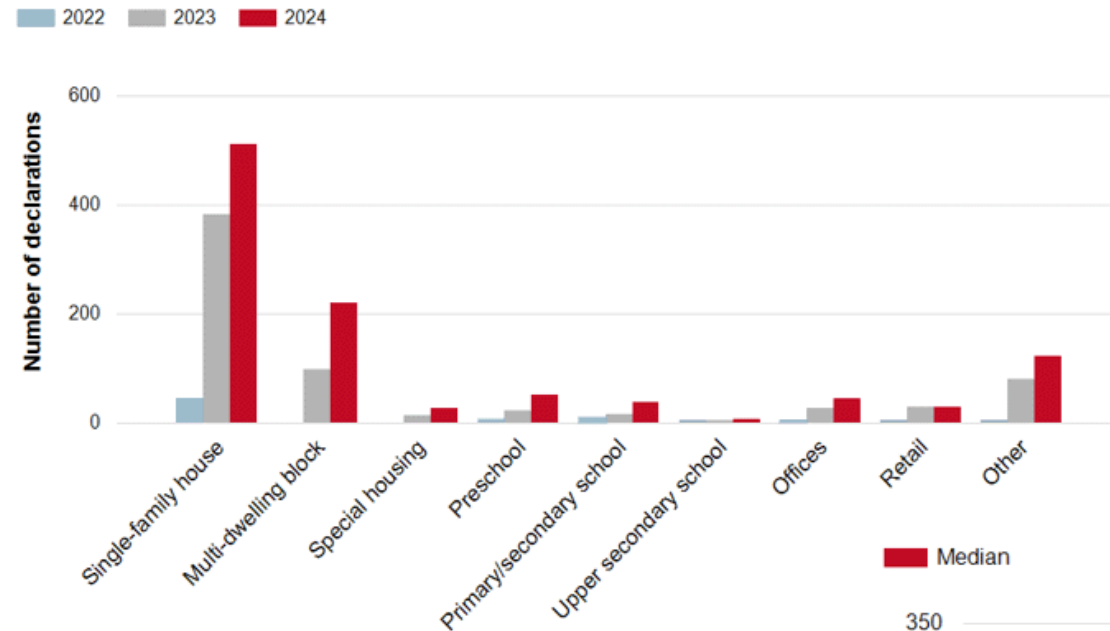


Figure from [LCAbyg](#). For overview of changes to limit values see [article from Nordic Sustainable Construction](#).

Danish limits

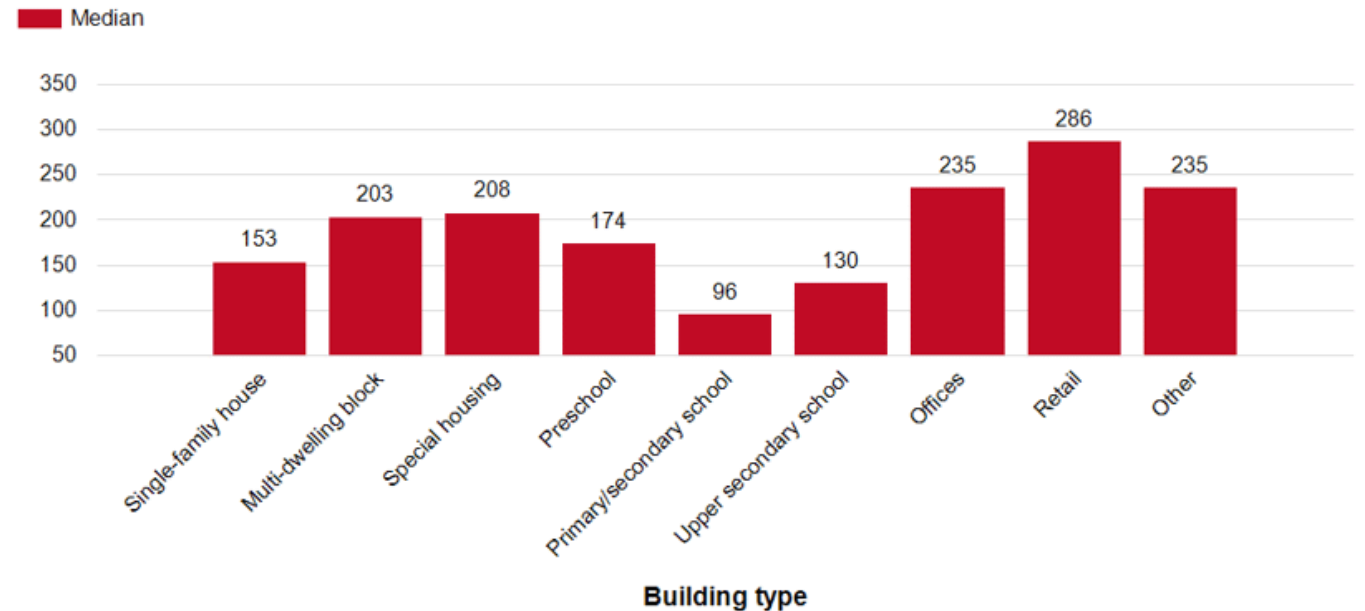
Limit values for new construction (kgCO ₂ e/m ² /year)	2025	2027	2029
Average limit value	7.1	6.4	5.8
Holiday homes <150 m ²	4.0	3.6	3.2
Holiday homes ≥150 m ² , single family and row houses	6.7	6.0	5.4
Apartment and office buildings	7.5	6.8	6.1
Institutions and other building typologies	8.0	7.2	6.4
<i>Individual limit value for construction process</i>	<i>1.5</i>	<i>1.3</i>	<i>1.1</i>
<i>Average limit value including construction process</i>	<i>8.6</i>	<i>7.7</i>	<i>6.9</i>

Sweden results so far

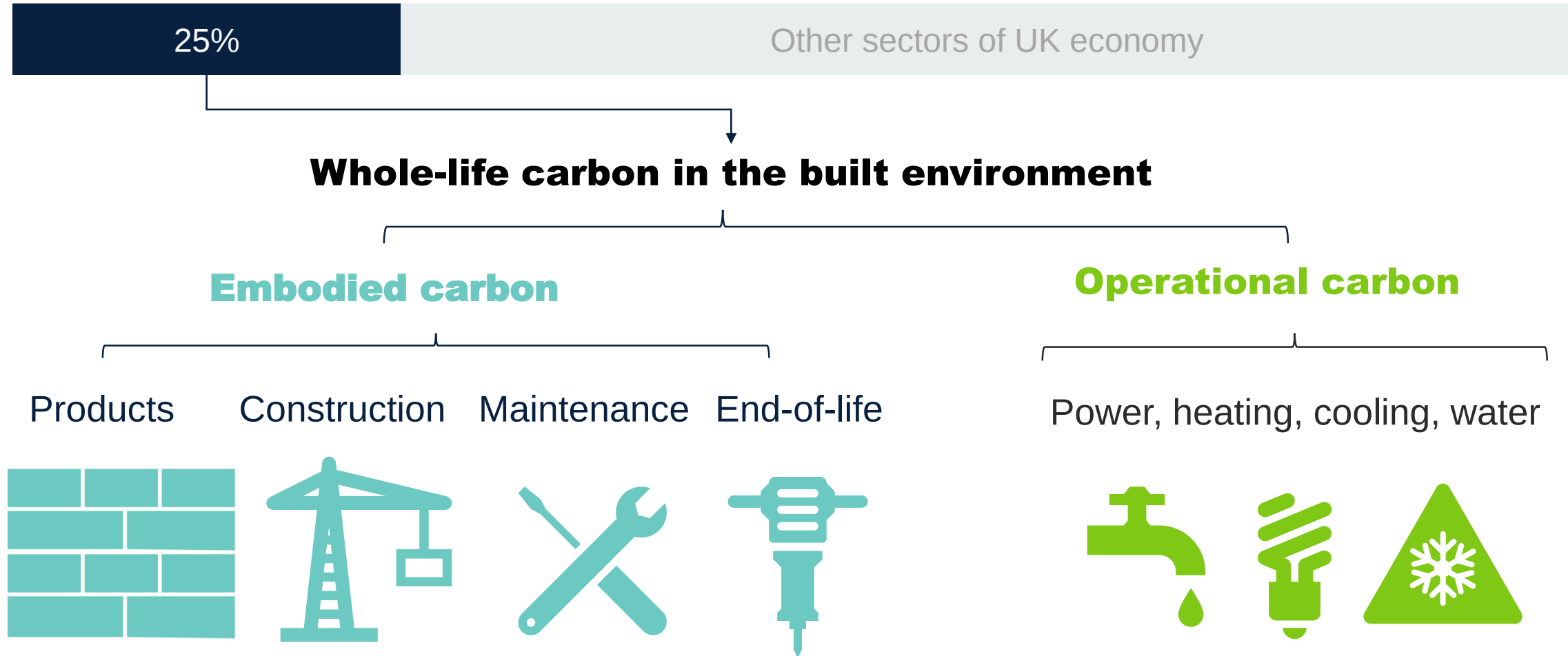


- 1765 climate declarations submitted up to end of 2024
- Mostly domestic buildings

- Median kgCO₂/m² lower than anticipated in policy impact assessment



UK's carbon footprint



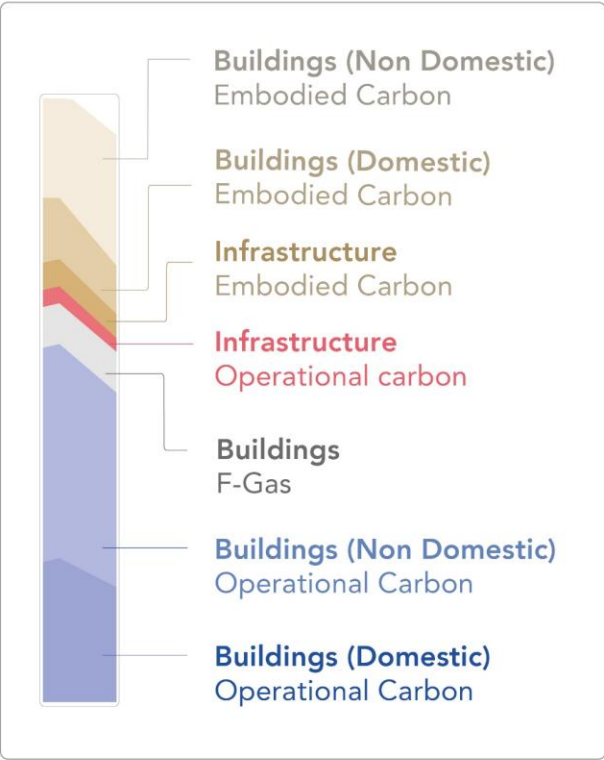
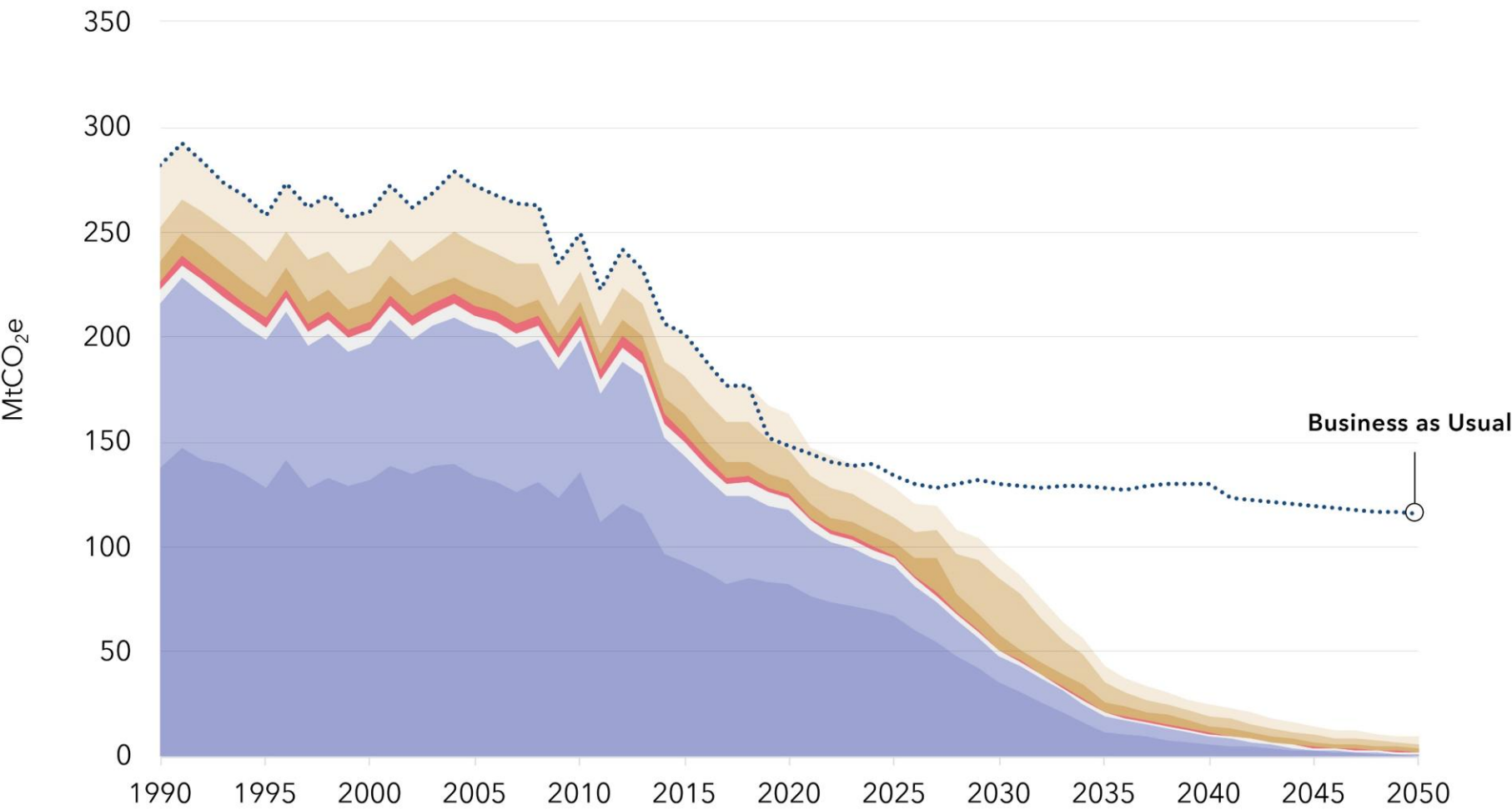


Net Zero Roadmap

Outlines a common vision & industry-wide actions for achieving net zero carbon in the construction, operation, & demolition of buildings & infrastructure in the UK.

Based on input from >100 stakeholders across industry

UK Built Environment GHG Emissions 1990-2050



PROGRESS: 2018-2024

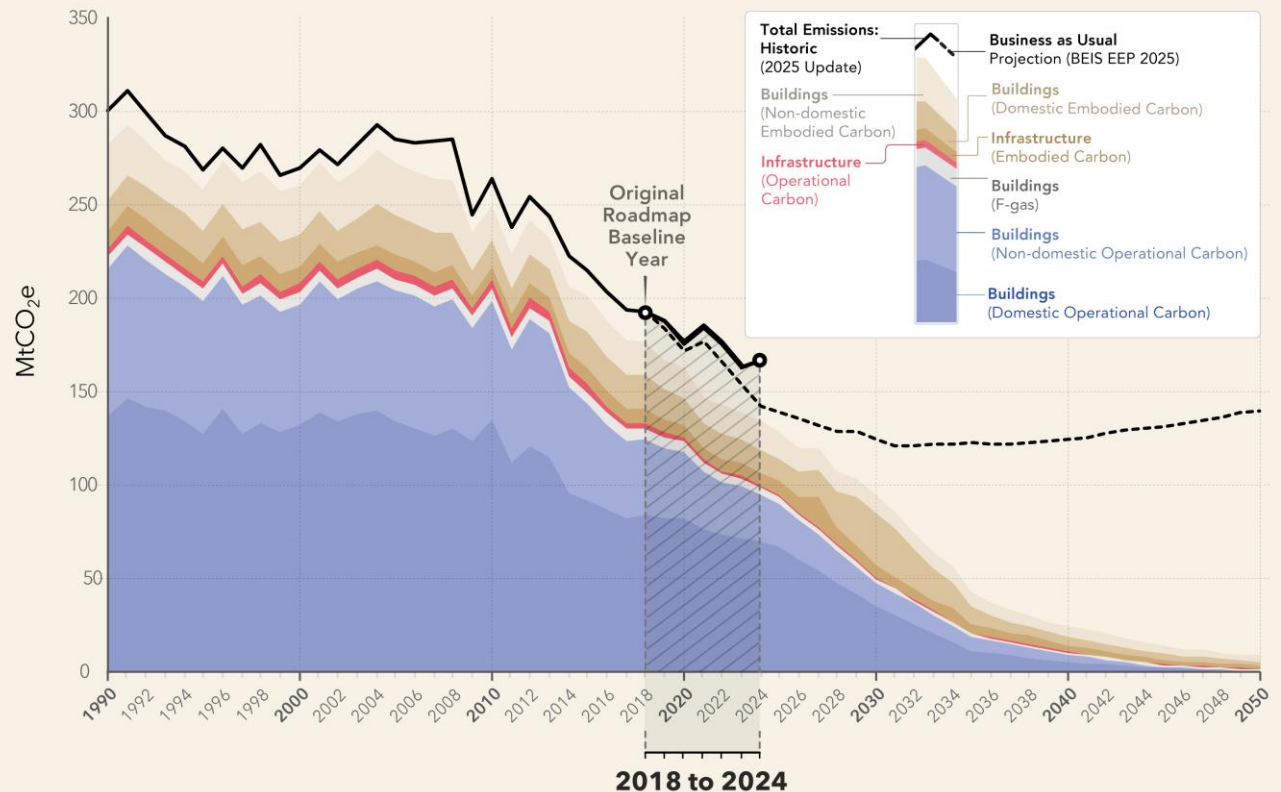
1 UK built environment emissions **reduced 14%** since 2018, falling short of the 24% reduction needed.

2 Annual embodied carbon **rose by 5%** compared to the 20% reduction needed – a significant failing.

3 Committed policies are making progress but still **falling short of the rates required** to deliver decarbonisation by 2050.

FIGURE 1: HISTORIC BUILT ENVIRONMENT EMISSIONS (1990-2024)

Excluding Transport, with Business as Usual Projections Overlaid onto the 2021 UKGBC Net Zero Whole Life Carbon Roadmap Data.

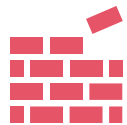


DRIVERS OF TREND



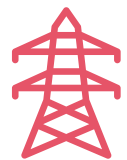
Operational carbon

Annual operational emissions reduced significantly, by **21%**, falling just short of the Roadmap trajectory (24%).



Embodied carbon

Annual embodied carbon **rose** by **5%** compared to the 20% reduction needed – a significant failing.



Grid decarbonisation

The carbon intensity of electricity has fallen **24%** since 2018, compared to the 67% predicted.

FIGURE 2: REQUIRED EMISSIONS REDUCTIONS

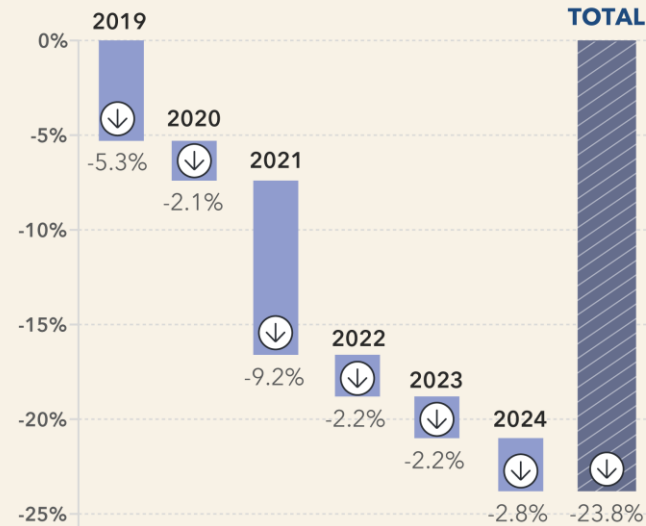
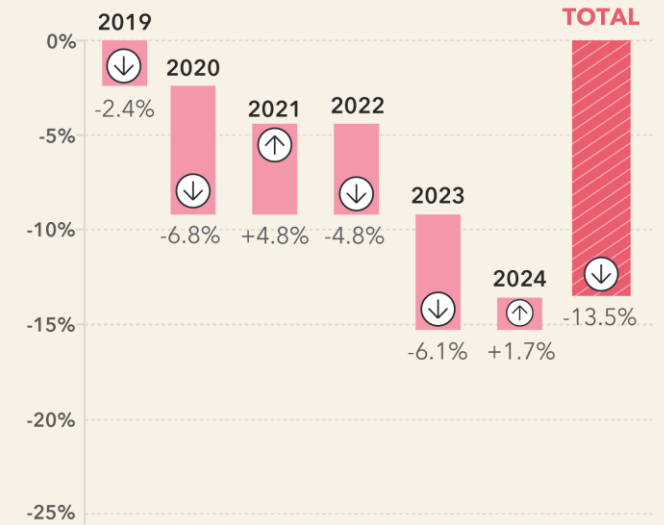
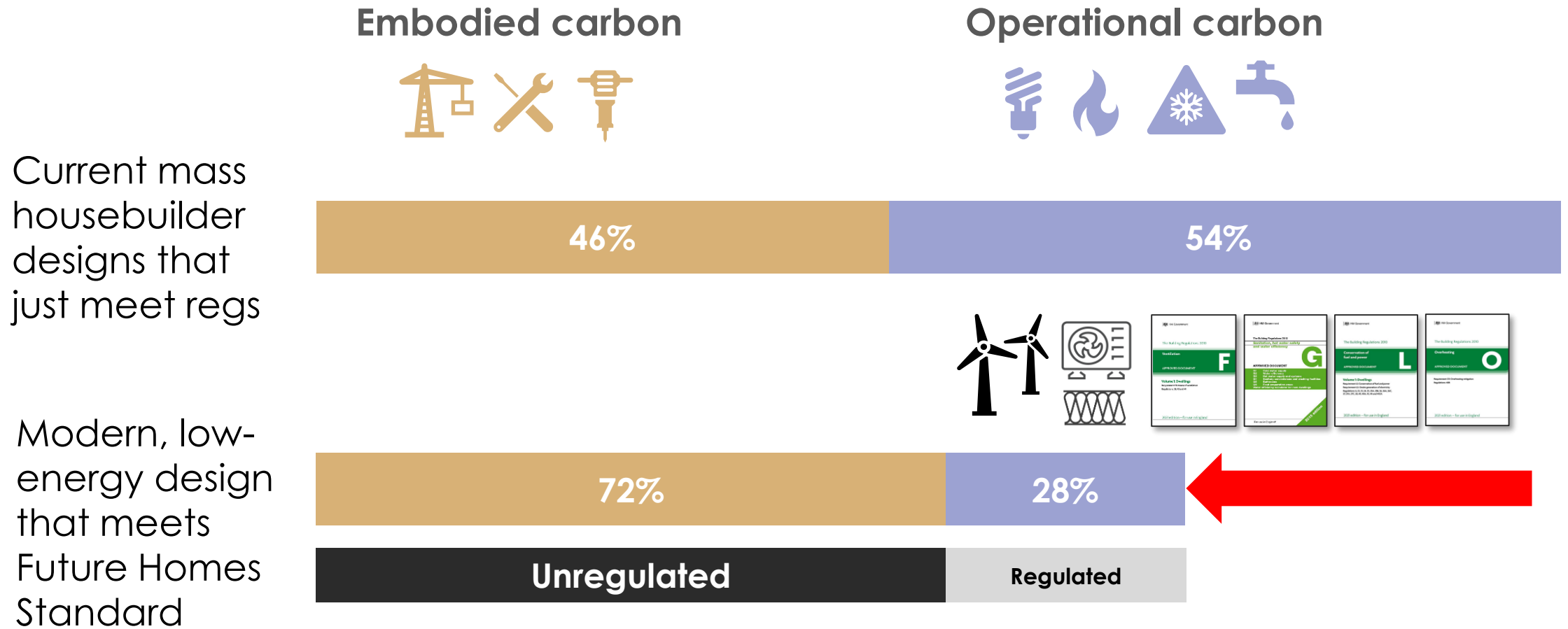


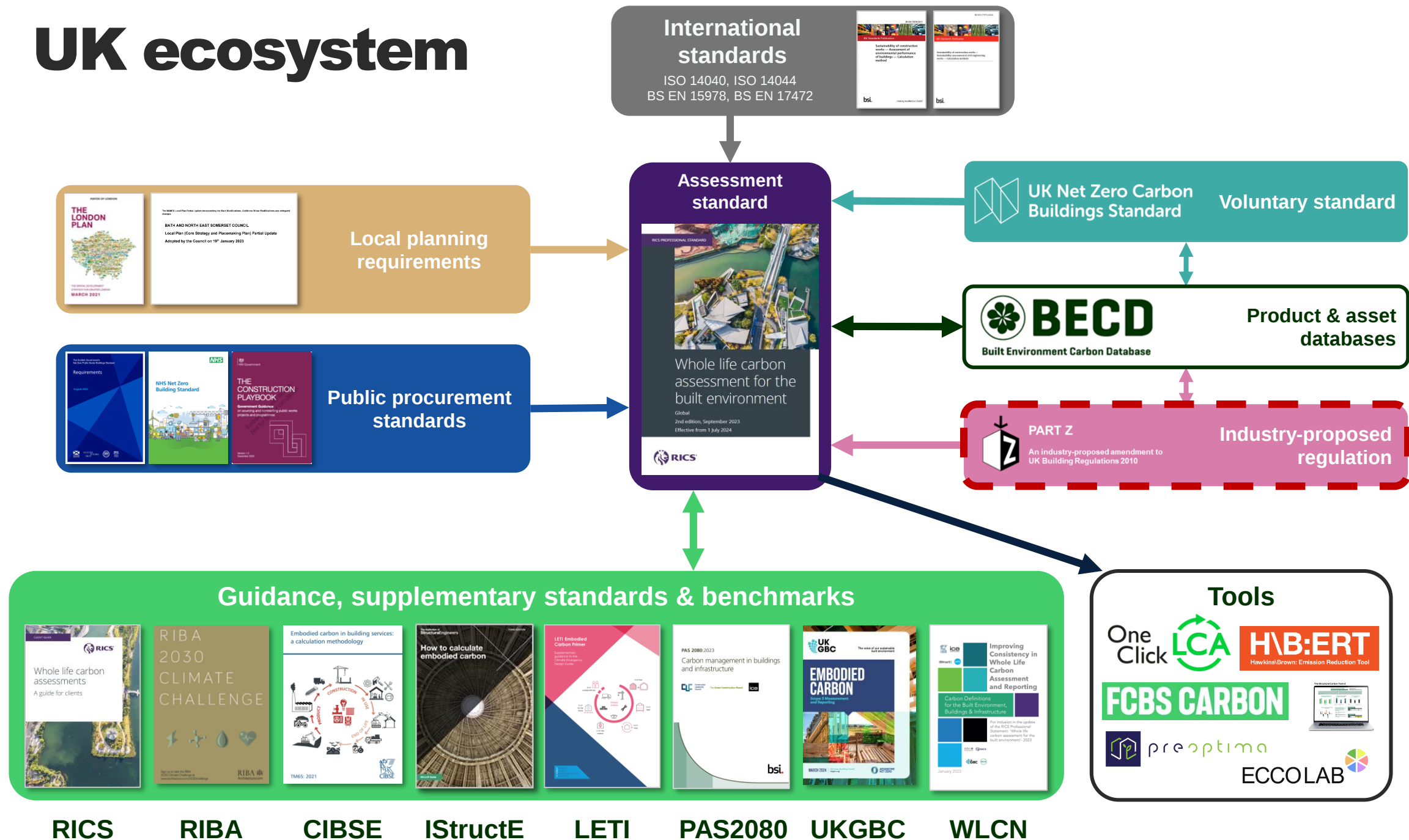
FIGURE 3: ACTUAL EMISSIONS REDUCTIONS



Typical housing project split



UK ecosystem



RICS

RIBA

CIBSE

IStructE

LETI

PAS2080

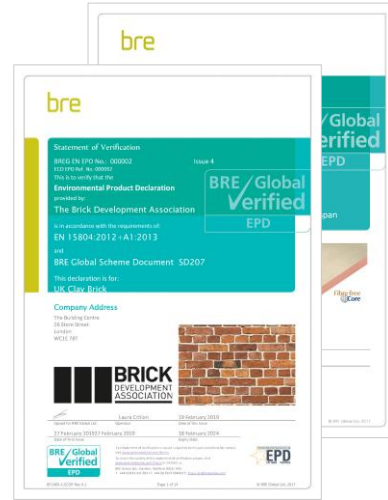
UKGBC

WLCN

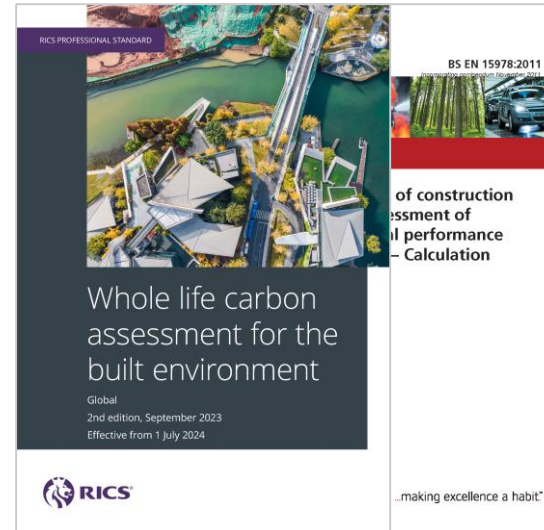
Typical assessment of a building



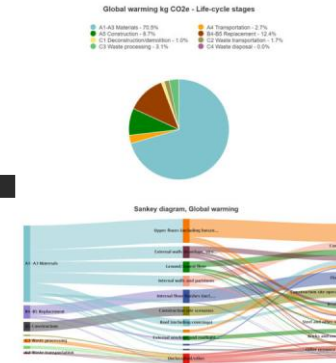
Material quantities
*e.g. from building
model or BoQ*



Product data
*from EPD or
generic carbon
factors*



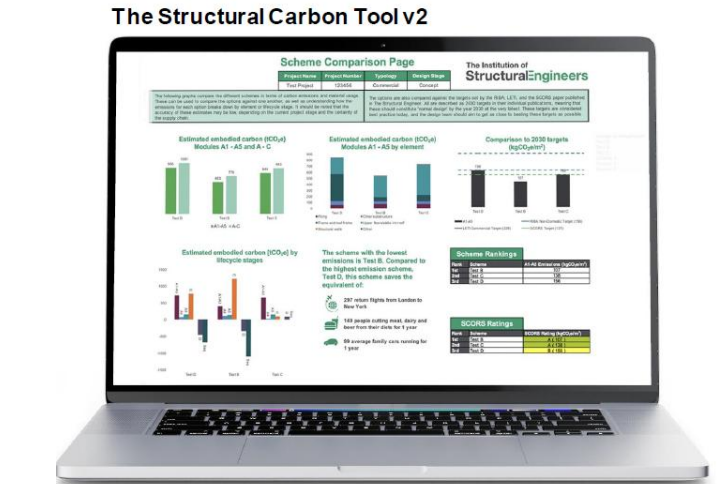
Assessment standards
e.g. BS EN 15978 + RICS PS



Software tool
e.g. OneClickLCA



Calculation tools



+ many more!

Types of data



**Environmental
Product
Declarations
(EPD)**



**Generic embodied
carbon databases**
e.g. ICE v4

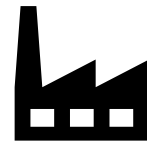


**Generic LCA
databases**
e.g. Ecoinvent



**Research
data**
*e.g. from
academic journals*

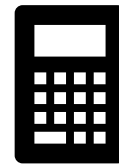
Embodied carbon factors



**Manufacturer
data**
*e.g. manufacturer
self-declared
environmental
claims*

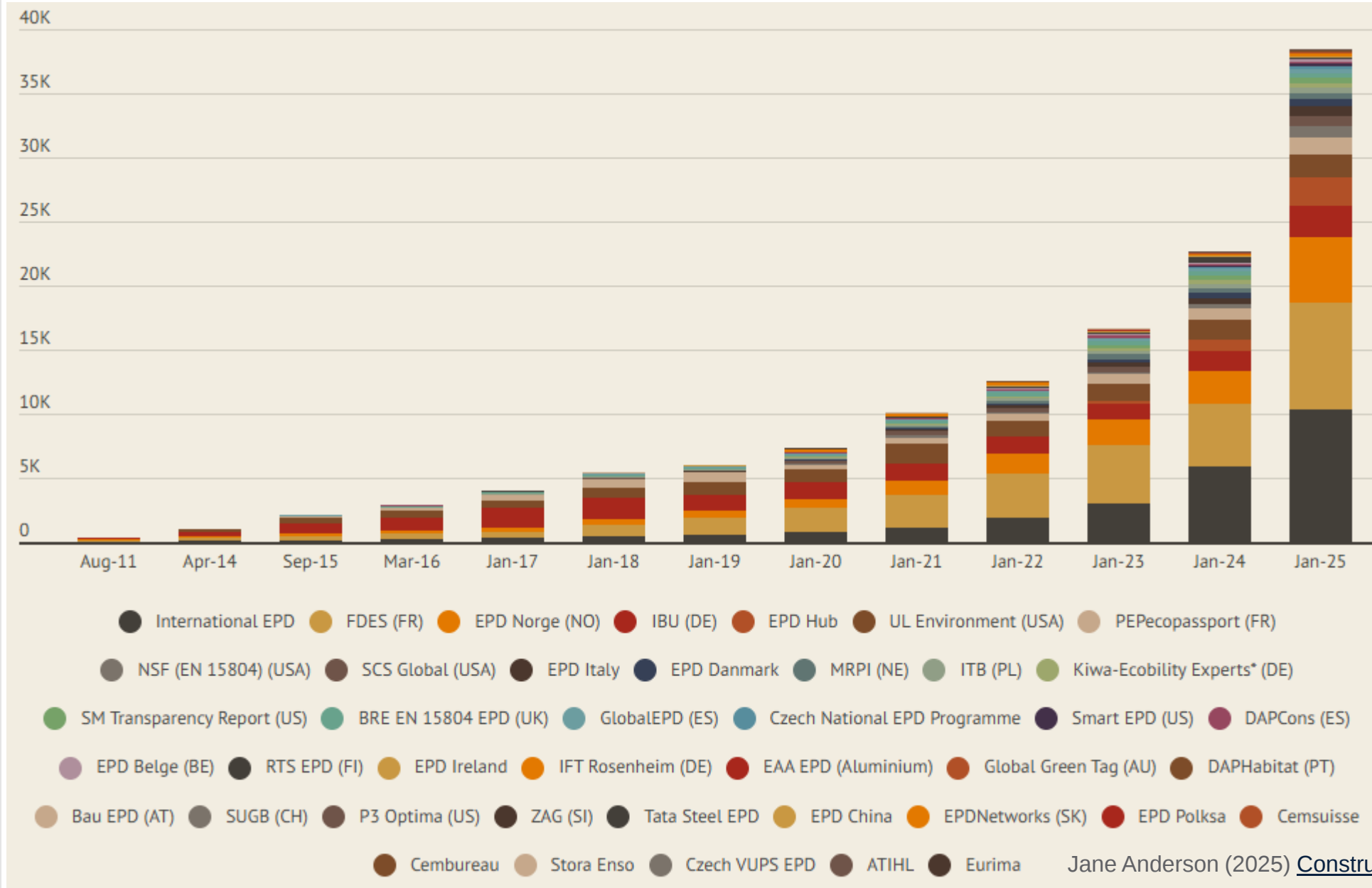


Industry data
*e.g. data
aggregated by
trade associations
& industry bodies*



**Primary
calculations**
*e.g. hand
calculations using
factors for basic
materials*

Growth in EPD to EN15804



How does UK compare internationally?

- UK best practice = global best practice
- UK common practice is falling behind countries with regulations
- UK has stronger ecosystem of guidance & standards than most countries but lacks strong regulatory drivers of uptake
- UK has less central coordination of ecosystem development than comparator countries
- UK EPD availability is lower than comparator countries

Lessons for Scotland

- There is no single perfect policy approach
- Start simple & expand scope over time
- There's value in consistency between jurisdictions
- Sharing best practice is key to rapid learning
- The largest emission reductions will likely be from the first step of requiring widespread assessment

Role for policy vs voluntary standards

