



# Net Zero Carbon Public Sector Buildings Standard

SSN Presentation

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# Introductions



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# The Standard Overview

Scottish Government's *Net Zero Carbon Public Sector Buildings* standard

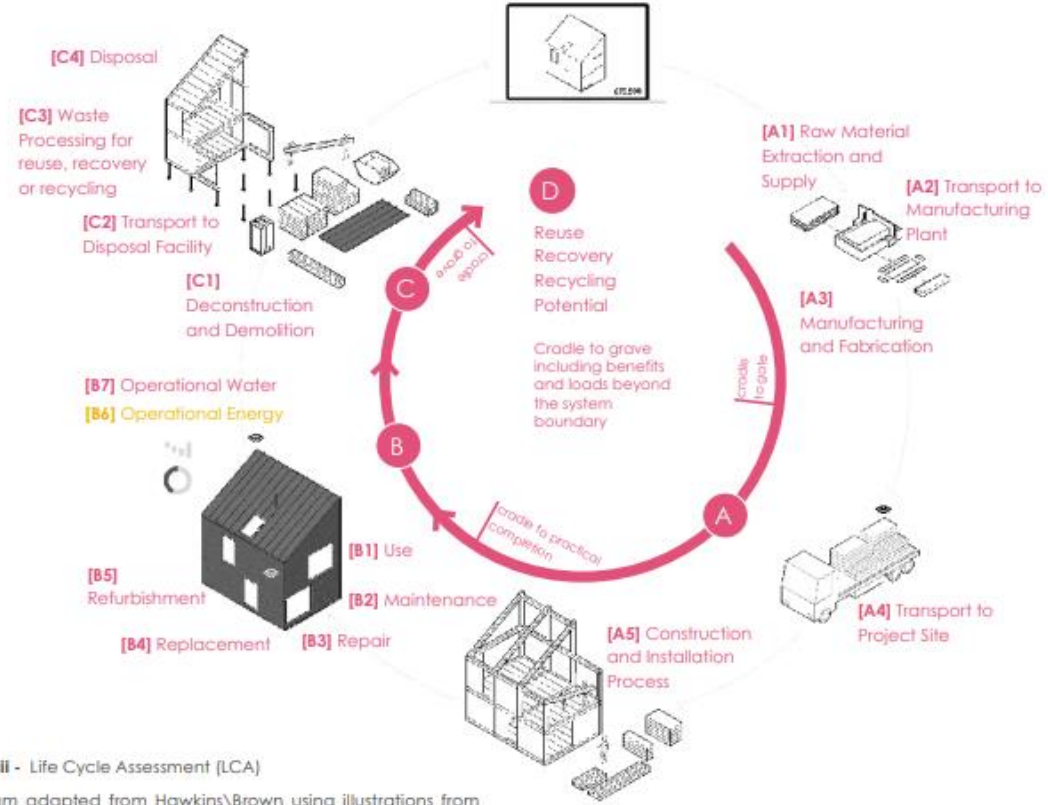
- Programme for Government 2019-20
- Demonstrates Leadership
  - Applies Scottish Government Policy to:
    - Public Sector Construction Projects
    - Newbuild
    - Major Refurbishment
- Further shaped for settings:
  - Local Authority Areas
  - Sectors
  - Organisational Policies

## Focus

- Defines Net Zero Carbon
- Zero Emission Heating
- Further Shaped by:
  - Local Authority Areas
  - Sectors
- Guidance on getting there
- Verification of arrival

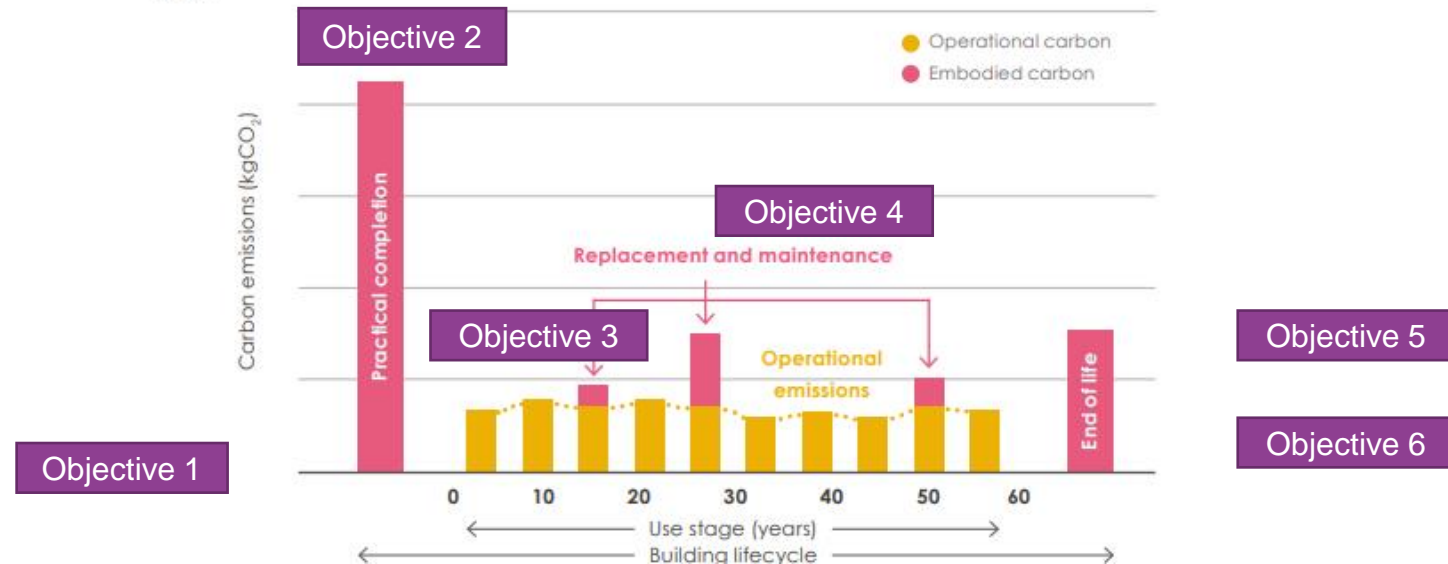
Place	Objective 1	Inclusive NZC Economy Outcomes	MML	MOTT MACDONALD	MABBETT	IES
Carbon	Objective 2	Construction Embodied Carbon	ARMILA			
	Objective 3	Operational Energy Carbon Impacts	MML	MOTT MACDONALD	MABBETT	IES
	Objective 4	Whole Life Carbon	ARMILA			
	Objective 5	Indoor Environmental Quality	MML	MOTT MACDONALD	MABBETT	IES
Environment	Objective 6	Other Aspects	MML	MOTT MACDONALD	MABBETT	IES

# Interfacing with Industry Definition

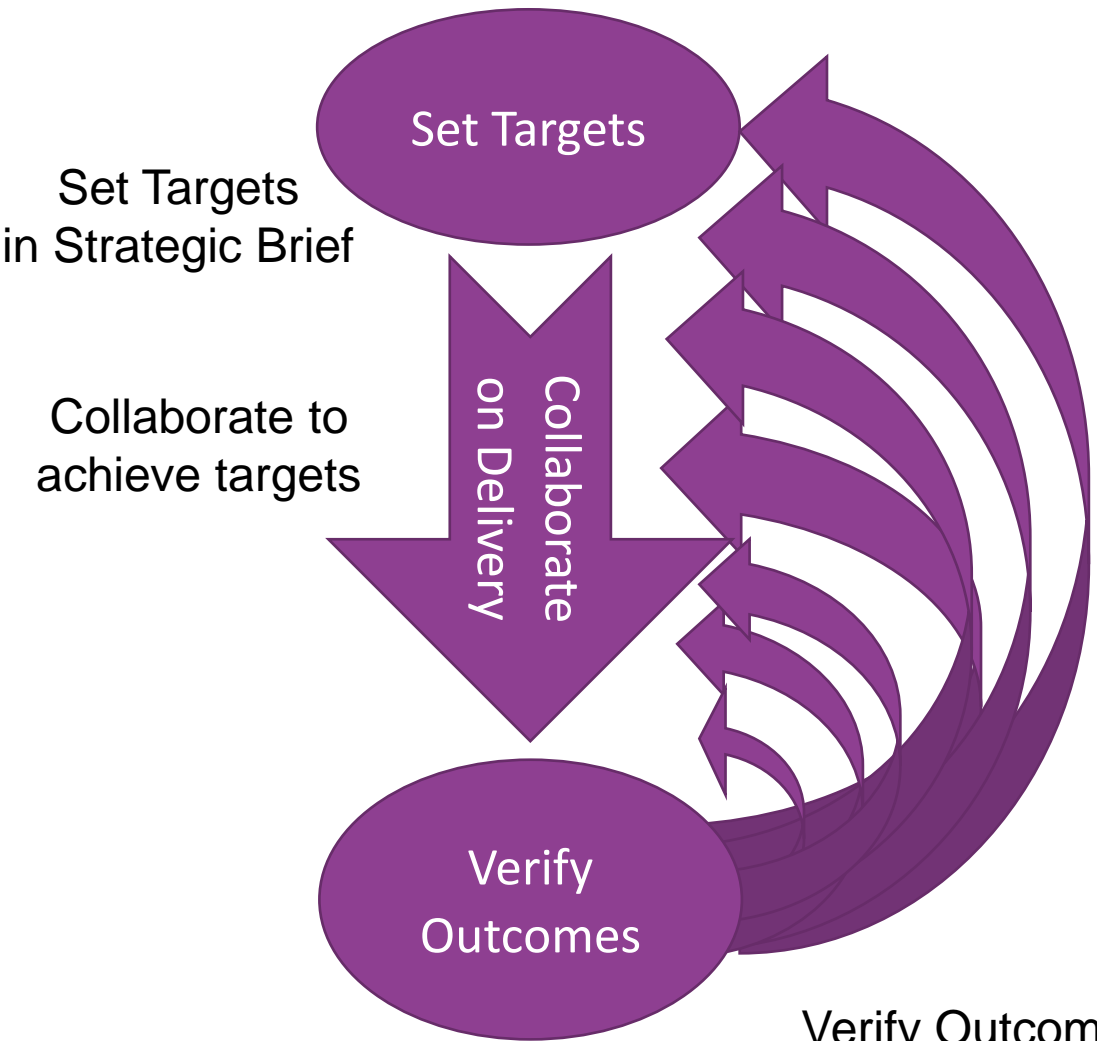


# Embodied Carbon Primer | LETI

**Figure II - Life Cycle Assessment (LCA)**  
 Diagram adapted from Hawkins, Brown using illustrations from Open Systems Lab 2018 licensed under Creative Commons CC-BY-ND



# The Standard: Achieving Net Zero Carbon Outcomes



Bespoke Soft-Landings Energy Management Plan	Project Stage (RIBA)	Participant Activities	Reviews
Draft Energy Management Plan	Application Strategic Outline Case (0 Strategic Definition; 1 Preparation & Brief)	<b>Objectives</b> Participants commit to key NZCPSB objectives relevant to their building category, sector, programme & Local Authority Area (e.g. NZC commitments & LHEES).	■ Sector Lead ■ Accredited 3rd Party
	<b>High Level Targets</b> Review relevant comparators & propose high level targets and target dates.	<b>Adjust For:</b> - Occupancy hours - Separable Uses - Location	
Energy Management Plan	<b>Project-Specific Targets</b> Set targets for OET, Peak Power Demand, ZEH, NZC-DE date, IEQ, Construction & NZC-WL.	<b>Site Selection</b> Optimise site selection, exposure, orientation, form factor, applying high level Energy Modelling.	Application compliant?
	<b>Concept Design</b> to Outline Business Case (2 Concept Design)	<b>Collaborative Design to Achieve Targets</b> Build upon high level Energy Modelling to develop a detailed model by the end of RIBA Stage 2 to support design team collaboration, optimising the design response to achieve energy, carbon & IEQ targets. Produce Concept Design Stage Verification Plan.	On track?
Draft handover and aftercare strategy plan	<b>Detailed Design</b> to Full Business Case (3 Spatial Coordination, 4 Technical Design)	<b>Detailed Design</b> Complete detailed design and use detailed Energy Modelling to demonstrate that the design is on track to meet targets, e.g. energy, carbon, indoor environmental quality targets. Employ an appropriately qualified person to produce a Detailed Design Stage Verification Plan for use at Verify Performance stage by a 3rd Party Verifier. Produce a metering strategy to support the Verification Plan, Carbon Strategy & treatment of Separable Uses.	Design compliant?
	<b>Delivery</b> Post Financial Close – From Construction start to Handover (5 Manufacturing and Construction, 6 Handover)	<b>Quality &amp; Commissioning</b> - Monitor construction quality and NZC-Construction in relation to key targets - Commission equipment & controls - Adjust Energy Model for as-fitted fabric, plant and equipment etc. and run to confirm OET, ZEH, NZC-WL, IEQ and other targets will be met.	Installation compliant?
Qualitative health check and seasonal commissioning	<b>Verify Performance</b> Prior to Handover for ~15 months (7 In Use)	<b>Verified &amp; Transparent Performance Reporting</b> - Calibrate Energy Model for any variations in occupancy, Separable Uses etc. relative to design intent - Verify performance of OET, ZEH, NZC-DE, IEQ, NZC-WL, versus target - Report verification outcome to Scottish Government	Targets met?
	<b>Continuous Improvement</b> Continuous Improvement and Corrective Action (7 In Use)	<b>Continuous Improvement</b> - Report annually to Scottish Government on performance versus target: OET, ZEH, NZC-DE, NZC-WL, accounting for variations in occupancy etc. - Report NZC-DE date is met	Targets & NZC OE Date met?

Verify Outcomes from design through construction to operation

# Benefits

1

## Different Approach

Setting embodied, operational energy and IEQ performance targets

2

## Best in Class

Step change in performance in line with ambitious aspirations.

Balancing energy and emissions performance with indoor quality

3

## Operational Verification

Consideration and development of monitoring and measurement strategies and outcomes from concept

4

## Structured Approach

Standardised 'Framework' approach to all aspects of net zero

5

## Guidance

Structured guidance to support development considering:

- Local Authority
- Sector
- Organisation requirements

# Objective 1

## Inclusive NZC Economy Outcomes

- Place Based approach to project inception
- Fundamental 'pre-project' process and approval
- Collaborative appraisal of Public Sector built environment needs
- Potential influence on 'net zero' needs across all Objectives





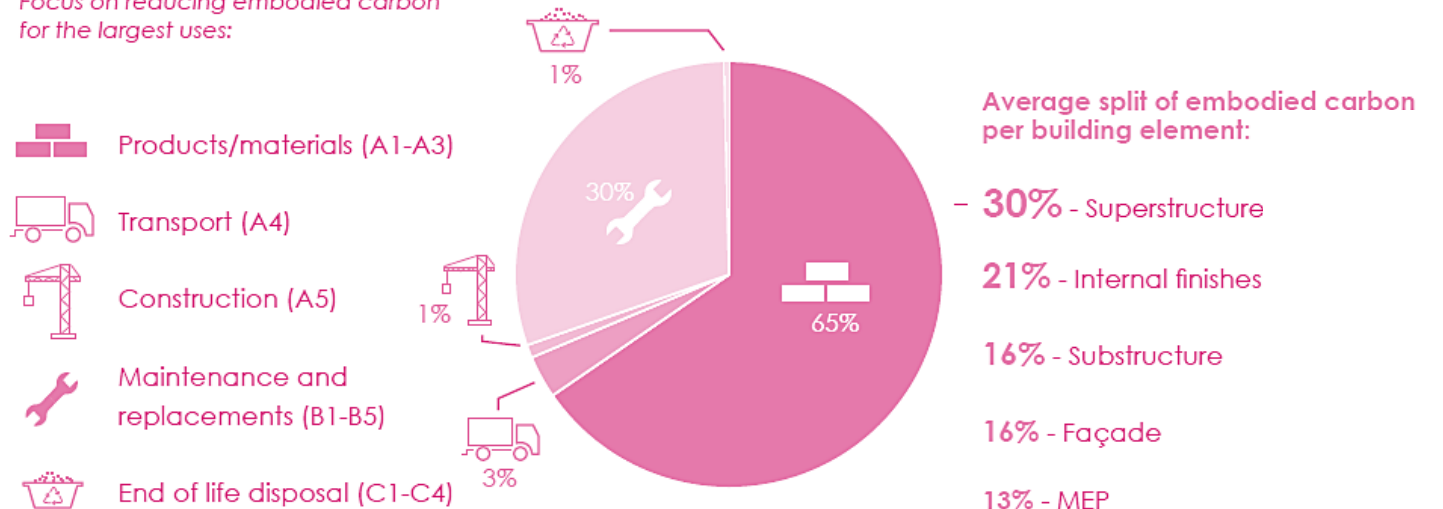
# Objective 2

## Embodied Carbon to practical completion

- Targeted approach
  - Product stage (A1 – A3) & construction process stage (A4 & A5)
- Life Cycle Assessment
- Consistent methodology
  - Alignment with RICS PS
- Circular design and construction practices
  - Waste minimisation

### Embodied carbon

Focus on reducing embodied carbon for the largest uses:



# Objective 3

## Operational Energy Carbon Impacts:

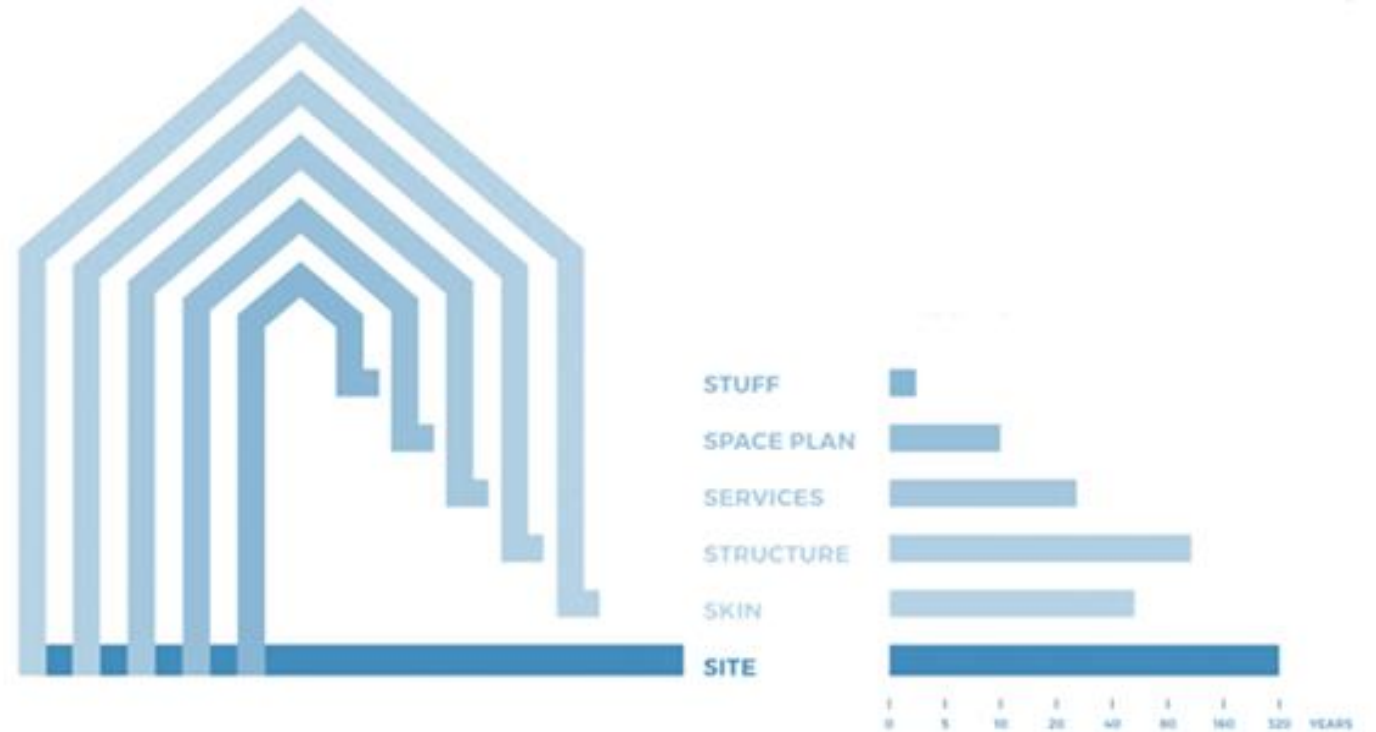
- Ambitious Operational Energy Target (OET)
  - Mandatory
- OET Net Zero Deadline
- Zero Emissions Heating commitment

Building Type	Benchmark (kWh/m <sup>2</sup> )					Backstop Totals (kWh/m <sup>2</sup> )	
	Total Consumption		Non heating electricity			Backstop - Non Elec Heating	Backstop - Elec Heating
	Best Case OET Non Elec Heated	Best Case OET Elec Heated	Estimated Regulated	Estimated Unregulated	Total		
Office	83	56	16	18	34	94	67
Nursery	97	63	20	15	35	110	90
Primary School	83	57	20	16	36	110	90
Secondary School	70	51	10	25	35	110	90
Community Centre	93	56	10	15	25	138	81
Library	70	43	10	10	20	135	90
Dry Leisure Centre	118	81	25	25	50	142	105
Residential Care Home	149	95	15	35	50	179	125
Health & Social Care Centres	102	71	27	18	45	149	96
Hospital - General Acute	193	134	60	25	85	231	172
Hospital - Community	177	121	50	25	75	213	157
Higher Education Residences	110	69	18	18	36	132	91
Fire Station	133	90	28	28	55	160	117
Police Station	143	106	40	35	75	171	134
Prison	192	112	31	15	46	230	150
Court	115	79	25	25	50	138	102
College	105	80	25	34	59	126	101

# Objective 4

## Net Zero Carbon - Whole Life

- Use stage (B Modules)
  - In use emissions, maintenance and replacement, water use
- End of Life Stage (C Modules)
  - Design for disassembly
- Benefits and loads beyond the system boundary (D modules)
  - Circular economy principles
- Life Cycle Assessment (LCA)
- Whole life cost and LCA integration

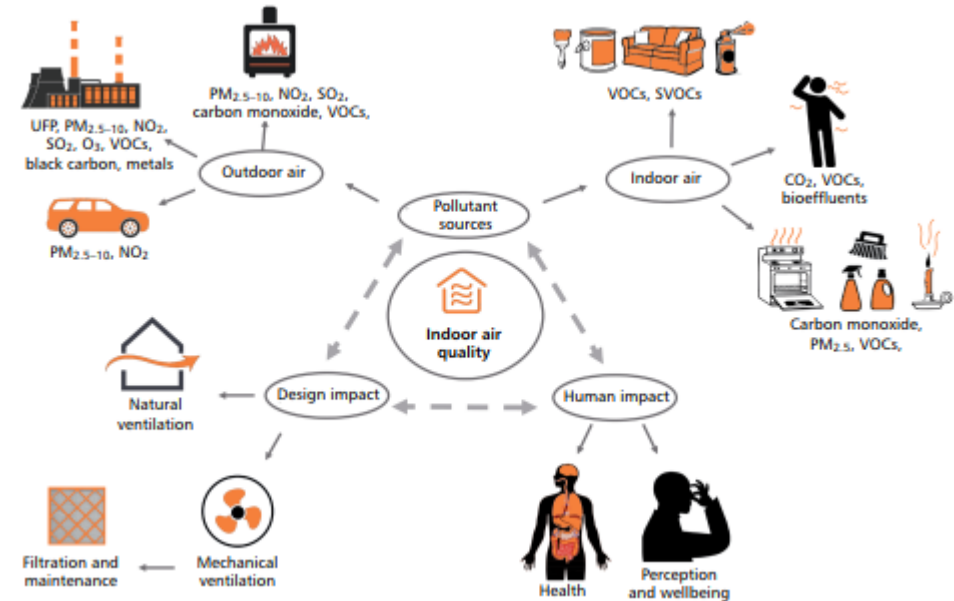
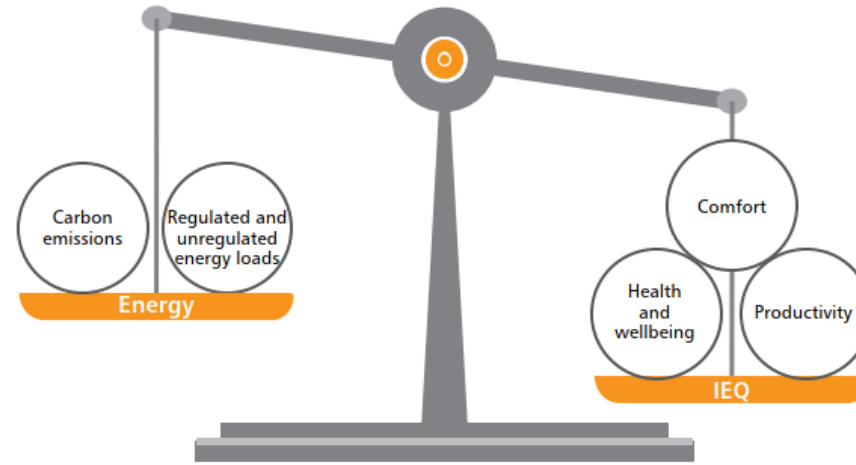


# Objective 5

## Internal Environmental Quality:

### Targets for:

- Thermal Comfort
- Air Quality
- Noise
- Acoustics
- Water Hygiene



# Objective 6

## 'Other' Environmental Aspects:

- Sustainable Land Use and Ecology
- Sustainable Connectivity and Transport
- Other requirements which can and need to be monitored as 'success factors'

NP4 interface



Diagram 3: RIBA Core Sustainable Outcomes Target, Gary Clark

# Interfacing Guidance

- National Guide to provide 'process' to the Standard
  - Clarity on activities and outcomes at each project stage
  - Detailed supporting Objective 'guides' and templates to provide consistency
- Supporting Local Authority, Sector and Organisational Guides
  - Focusing on Scottish Public Sector 'best practice'
  - Includes reference to other initiatives such as SIMP and Quality Control
- Also looks to draw on other 'Best Practice' including:
  - UKGBC
  - LETI
  - RIBA 2030 Climate Challenge

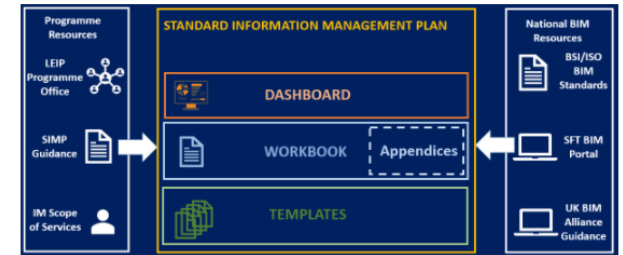
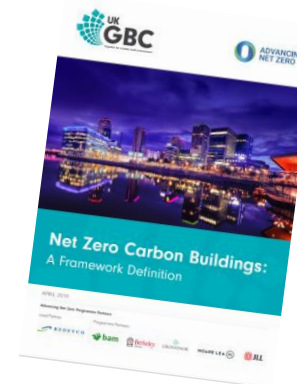


Figure 1. Constituent parts of SIMP



# Standard 'Ownership'

- Requires a joint approach to project development and delivery
  - Client, Design Team, Construction Contractor and FM provider
- Client ultimately responsible
  - **'Inclusive Net Zero Champion(s)'** to 'own' standard and it's processes
- 'Tracker' being developed as part of tools
  - Supporting 'compliance' tracker

# Next Steps with SSN

- MML and AS guidance development due shortly
- Future SSN workshop / peer review of outcomes:
  - May 2021 workshop led by SFT



# Questions?



**Thank you**

