RIBA Sustainable Outcomes:
Delivering the UN Sustainable Development Goals

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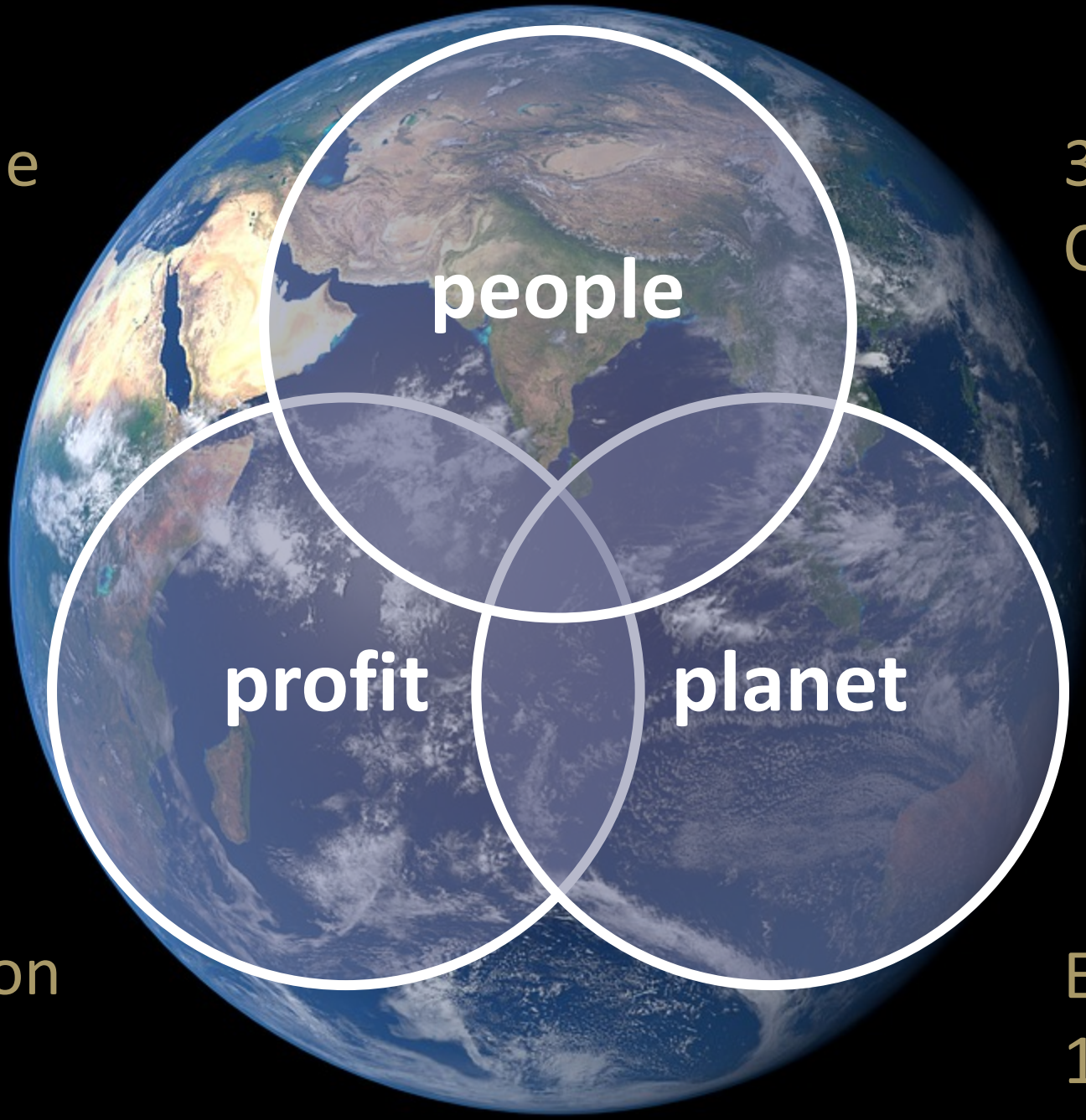
7.7 Billion People

37.1 Billion Tonnes CO_2 Emissions



1/3 from Buildings and Construction

$80,683.79 Billion

Earth absorbs 1/2 total CO_2

RIBA Climate Change Resolution

Declaration of an environment and climate emergency and support for the UK government's commitment to put into legislation the UKCCC recommendation for a UK 2050 net zero greenhouse gas emissions target.

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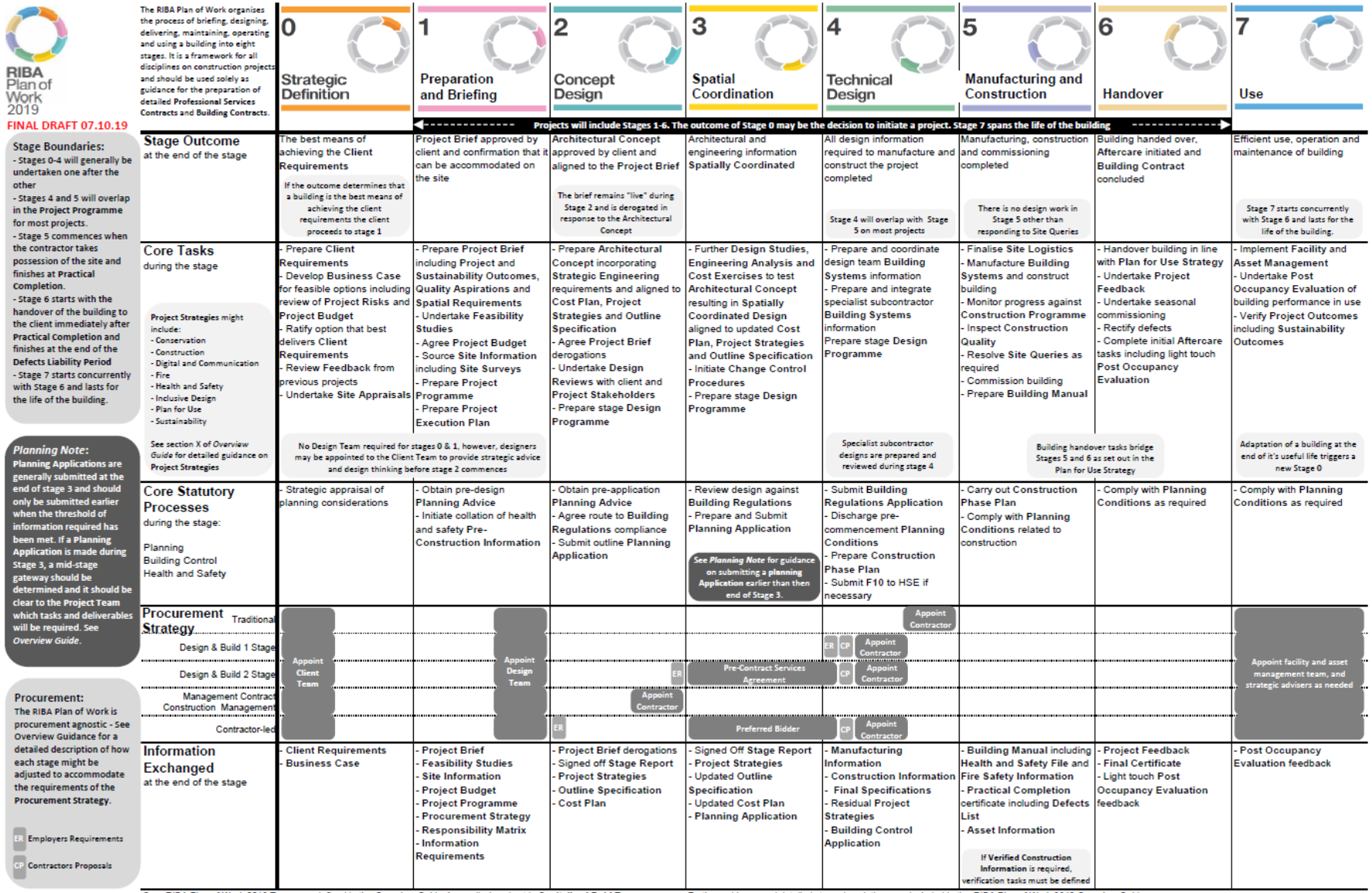
RIBA Plan of Work 2019 – Sustainability Strategy



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0 Strategic Definition

1 Preparation and Brief

2 Concept Design

3 Spatial Coordination

4 Technical Design

5 Manufacturing and Construction

6 Handover

7 Use

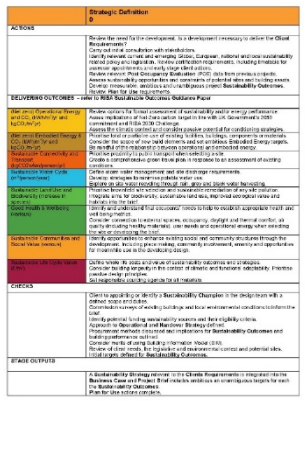
GOALS

STRATEGY & INTEGRATION

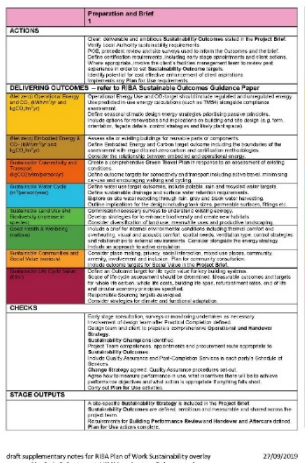
MONITOR & REVIEW

VALIDATE & DISSEMINATE

IMPROVE



draft supplementary notes for RIBA Plan of Work Sustainability overlay 27/09/2019
prepared by Craig Robertson at AHRIM. crobertson@ahrimcs.uk



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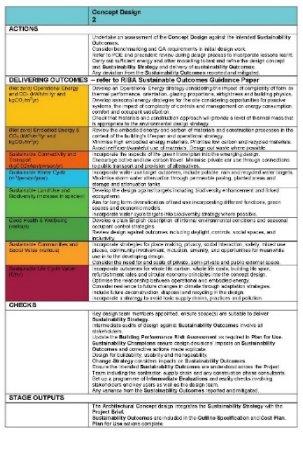

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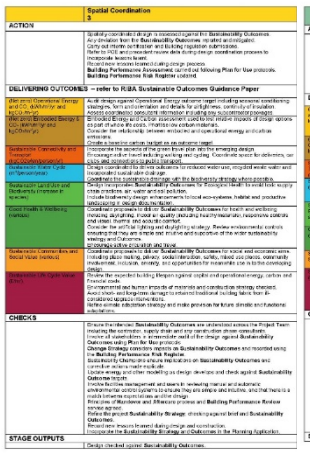

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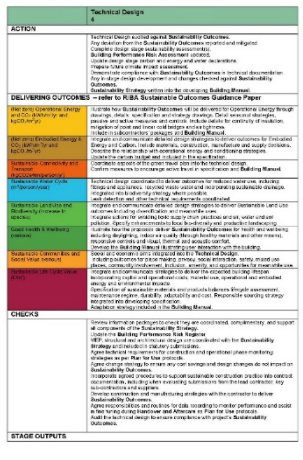

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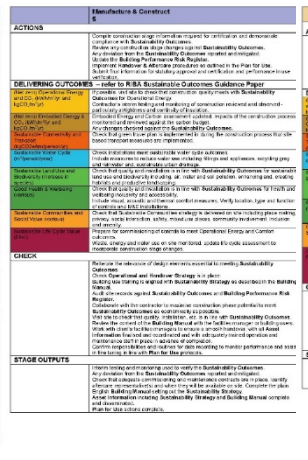

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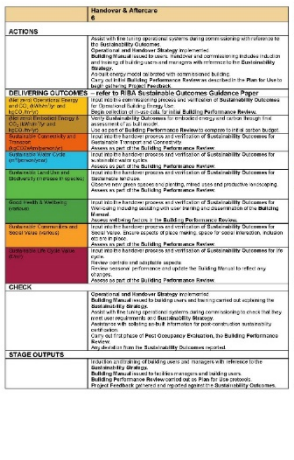

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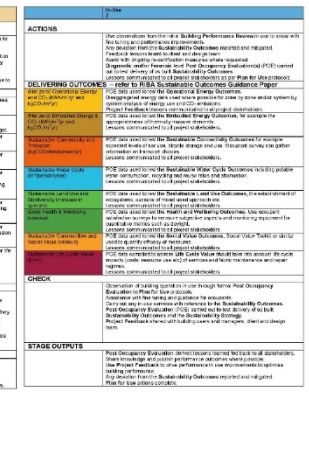

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UN Sustainable Development Goals

RIBA Sustainable Outcomes

- Good Health and Well-being
- Sustainable Water Cycle
- Net Zero Operational Carbon Emissions
- Sustainable Life Cycle Cost
- Sustainable connectivity and transport
- Sustainable Communities and Social Value
- Net Zero Embodied Carbon Emissions
- Whole Life Carbon Emissions
- Sustainable Water Cycle
- Sustainable land-use and ecology

RIBA Sustainable Outcomes

Environmental Sustainability

Social Sustainability

Whole Life Net Carbon

Economic Sustainability

Outcome	**Net Zero Operational Carbon**	**Net Zero Embodied Carbon**	**Sustainable Water Cycle**	**Sustainable Connectivity & Transport**	**Sustainable Land Use & Ecology**	**Good Health & Well-being**	**Sustainable Communities & Social Value**	**Sustainable Life Cycle Cost**
Metric	*$kWh/m^2/y$ $kgCO_2e/m^2/y$*	*TCO_2e Embodied*	*Litre/person/year Potable water*	*$kgCO_2e$/km/per occupant*	*Species added Enhancement*	*Various Metrics*	*Various Metrics*	*£/m^2 value*
Principles	1. Prioritise deep retrofit of existing buildings 2. Prioritise Fabric First principles for building form and envelope 3. Fine tune internal environment with efficient mechanical systems 4. Provide responsive local controls 5. Specify ultra low energy sufficient appliances 6. Specify ultra low energy sufficient IT 7. Prioritise maximum use of onsite renewables appropriate to context 8. Demonstrate additionality of offsite renewables 9. Offset remaining carbon through recognized scheme	1. Prioritise building re-use 2. Carry out whole life carbon analysis of building elements. 3. Prioritise ethical and responsible sourcing of all materials 4. Prioritise low embodied carbon and healthy materials 5. Minimise materials with high embodied energy impacts 6. Target Zero construction waste diverted to landfill 7. Promote use of local natural materials 8. Consider modular off-site construction systems 9. Detailing to be Long life and robust 10. Design building for disassembly and the circular economy 11. Offset remaining carbon emissions through recognized scheme	1. Provide Low flow fittings and appliances 2. Provide Waterless appliances where possible 3. Provide Leak detection 4. Provide Rainwater and greywater recycling and attenuation but consider operational implications of complex systems 5. Provide on-site black water cleansing and recycling if viable 6. Create Sustainable Urban Drainage that supports natural aquatic habitats and human amenity	1. Create comprehensive green transport plan including digital connectivity 2. Prioritise high quality Digital Connectivity to avoid need for unnecessary travel 3. Prioritise site selection with good proximity to public transport 4. Provide high quality pedestrian links to local amenities 5. Provide end of journey provision for active travel runners and cyclists (showers, dry lockers etc) 6. Provide infrastructure for electric vehicles as a priority 7. Provide car sharing spaces 8. Provide suitable onsite personal storage	1. Leave a site in better ‘regenerative’ ecological condition than before development. 2. Prioritise Building and site re-use 3. Prioritise Brownfield site selection 4. Carry out sustainable remediation of site pollution 5. Retain existing natural features 6. Create mixed use development with density appropriate to local context 7. Create a range of green spaces (green roofs, vertical greening, pocket parks, green corridors) 8. Create habitats that enhance bio-diversity 9. Create ‘productive’ 10. landscapes for urban food production 11. Zero local pollution from the development	1. Provide spaces with strong visual connection to outside 2. Provide responsive local controls eg. opening windows, or local control 3. Design spaces with appropriate occupant density for activity 4. Design spaces with good indoor air quality 5. Design spaces with good indoor daylighting, lighting and glare control 6. Design spaces to adaptive thermal comfort standards 7. Design spaces with good acoustic comfort 8. Design spaces that are inclusive and universal accessible 9. Prioritise active circulation routes-e.g. stairs, cycling provision, walking routes etc 10. Provide indoor and outdoor planted spaces	1. Prioritse placemaking that expresses identity and territory 2. Create secure places for privacy 3. Create places for social interaction 4. Create vibrant mixed use places 5. Provide high quality permeable links to social amenities 6. Provide High quality pedestrian public realm 7. Create inclusive Places for community interaction 8. Create Secure Places with overlooking views	1. Carry out whole life cycle analysis of key building systems 2. Carry out Soft Landings Graduated to Handover and aftercare 3. Measure energy costs 4. Measure management and maintenance costs 5. Measure overall running costs 6. Measure added value of occupant health and wellbeing 7. Measure added value of sustainable outcomes of building
	Performance Verification: Publicly disclose energy use and carbon emissions	*Construction Verification:* Construction measurement and offset	*Performance Verification:* Measure potable water usage in operation	*Performance Verification:* Post Occupancy Evaluation occupant survey	*Construction Verification:* Measure bio-diversity enhancement in use	*Performance Verification:* Post Occupancy Evaluation	*Performance Verification:* Post Occupancy Evaluation questionnaire	*Performance Verification:* Measure operational running costs

Core Sustainable Outcomes Metrics

1 Net Zero Operational Carbon - *kWh/m2/y, kgCO2e/m2/y*
CIBSE TM54, Passivhaus, Living Building Challenge

2 Net Zero Embodied Energy Carbon - *$kgCO_2e/m^2$*
RICS Whole Life Carbon, BREEAM, Living Building Challenge

3 Sustainable Connectivity and Local Transport- *$kgCO_2e/km/p/y$*
BREEAM Transport

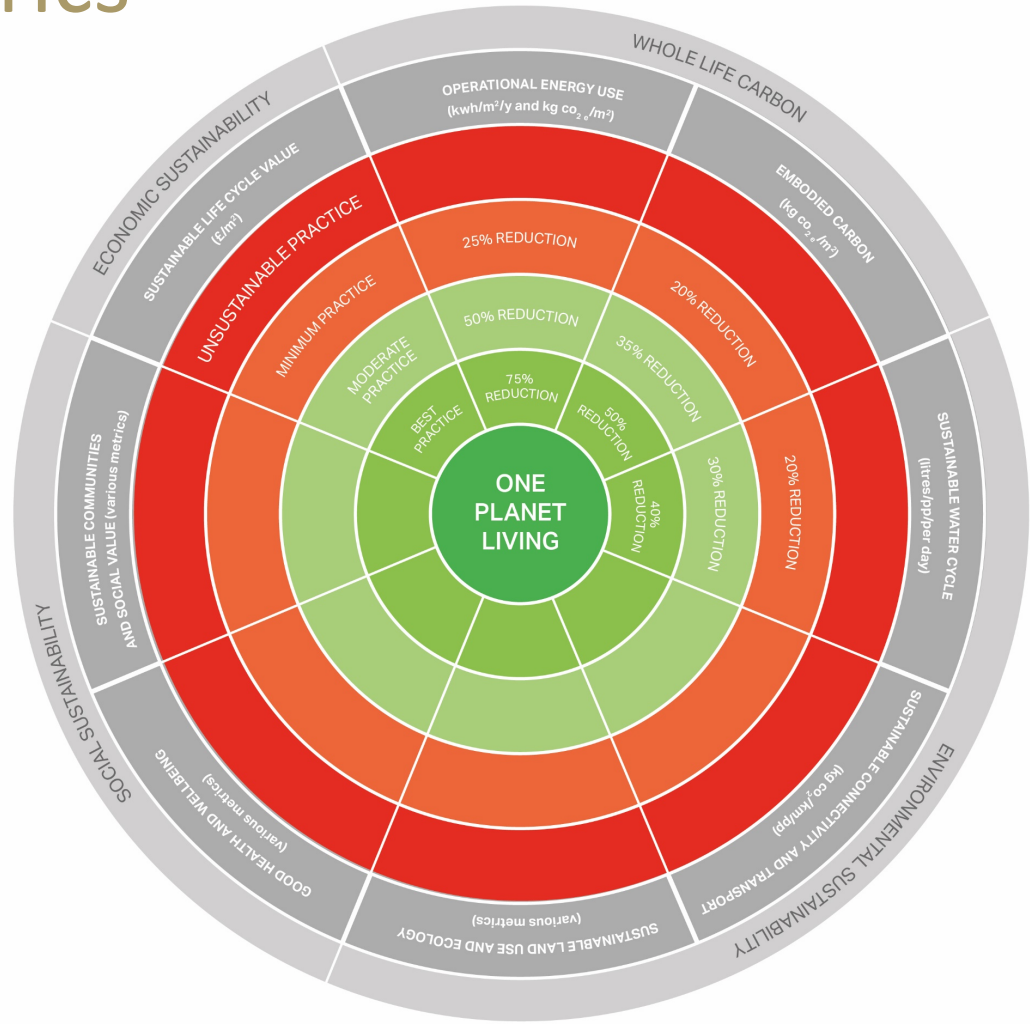
4 Sustainable Water Cycle - *litres/person/day*
Living Building Challenge, BREEAM Water

5 Sustainable Land-use and Ecology - *various metrics*
Living Building Challenge, BREEAM Bio-diversity

6 Good Health & Wellbeing - *various metrics*
BREEAM, Well building Standard- light, air, water, noise, overheating

7 Sustainable Communities and Social Value - *various metrics*
Living building Standard, BREEAM, Well building Standard, RIBA Social Value Toolkit

8 Sustainable Life Cycle Cost - *$£/m^2$*
ICMS Whole Life Cost



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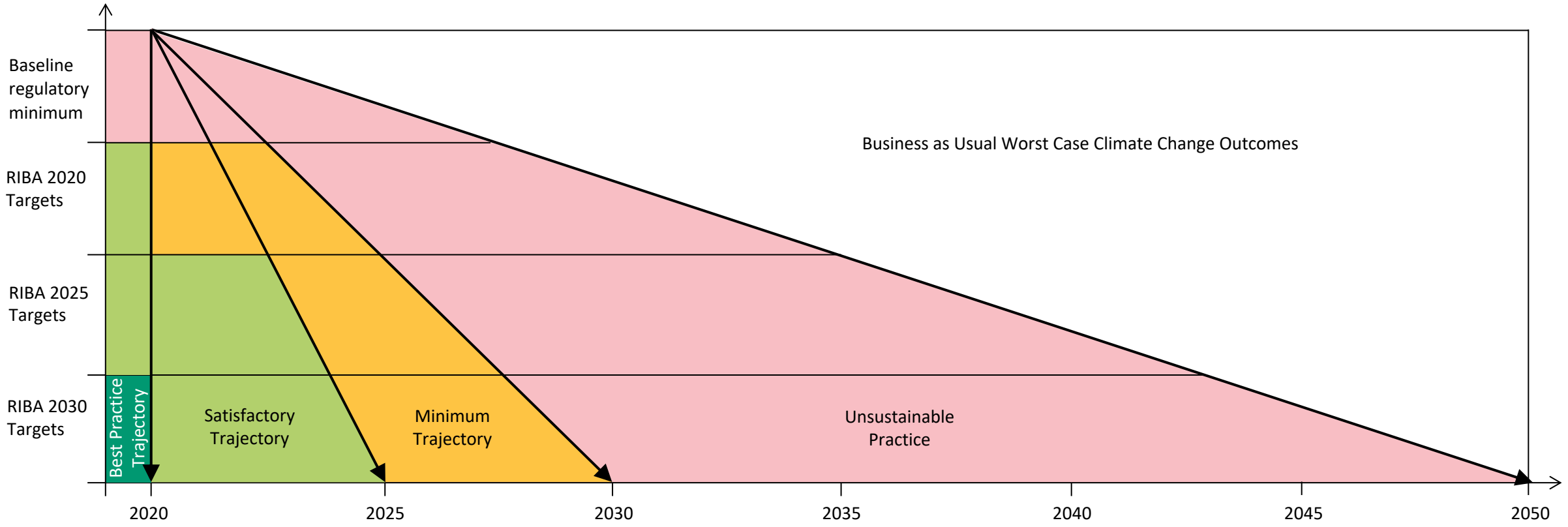
RIBA 2030 Climate Challenge Trajectories



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RIBA 2030 Climate Challenge: Domestic Building Targets

RIBA Sustainable Outcome Metrics	Current Benchmarks	2020 Targets	2025 Targets	2030 Targets	Notes
Operational Energy kWh/m^2/y	146 kWh/m^2/y (Ofgem benchmark)	< 105 kWh/m^2/y	< 70 kWh/m^2/y	< 0 to 35 kWh/m^2/y	UKGBC Net Zero Framework 1. Fabric First 2. Efficient services, and low-carbon heat 3. Maximise onsite renewables 4. Minimum offsetting using UK schemes
Embodied Carbon kgCO$_2$e/m^2	1000 kgCO$_2$e/m^2 (M4i benchmark)	< 600 kgCO$_2$e/m^2	< 450 kgCO$_2$e/m^2	< 300 CO$_2$e/m^2	RICS Whole Life Carbon (A-C) 1. Whole life carbon analysis 2. Using circular economy strategies 3. Minimum offsetting using UK schemes
Potable Water Use Litres/person/day	125 l/p/day (Building regulations England and Wales)	< 110 l/p/day	< 95 l/p/day	< 75 l/p/day	Using CIBSE Guide G

Best Practice Health Metrics		References
Overheating	25-28 °C maximum for 1% of occupied hours	CIBCE TM52, CIBSE TM59
Daylighting	> 2% av. daylight factor, 0.4 uniformity	CIBSE LG10
CO$_2$ levels	< 900 ppm	CIBSE TM40
Total VOCs	< 0.3 mg/m^3	Approved Document- F
Formaldehyde	< 0.1 mg/m^3	BREEAM

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RIBA 2030 Climate Challenge: Non-domestic Building Targets

RIBA Sustainable Outcome Metrics	Current Benchmarks	2020 Targets	2025 Targets	2030 Targets	Notes
Operational Energy kWh/m^2/y	225 kWh/m^2/y DEC D rated (CIBSE TM46 benchmark)	< 170 kWh/m^2/y DEC C rating	< 110 kWh/m^2/y DEC B rating	< 0 to 55 kWh/m^2/y DEC A rating	UKGBC Net Zero Framework 1. Fabric First 2. Efficient services, and low-carbon heat 3. Maximise onsite renewables 4. Minimum offsetting using UK schemes
Embodied Carbon kgCO$_2$e/m^2	1100 kgCO$_2$e/m^2 (M4i benchmark)	< 800 kgCO$_2$e/m^2	< 650 kgCO$_2$e/m^2	< 500 CO$_2$e/m^2	RICS Whole Life Carbon (A-C) 1. Whole life carbon analysis 2. Using circular economy strategies 3. Minimum offsetting using UK schemes
Potable Water Use Litres/person/day	> 16 l/p/day (CIRA W11 benchmark)	< 16 l/p/day	< 13 l/p/day	< 10 l/p/day	Using CIBSE Guide G

Best Practice Health Metrics		References
Overheating	25-28 °C maximum for 1% of occupied hours	CIBCE TM52, CIBSE TM59
Daylighting	> 2% av. daylight factor, 0.4 uniformity	CIBSE LG10
CO$_2$ levels	< 900 ppm	CIBSE TM40
Total VOCs	< 0.3 mg/m^3	Approved Document- F
Formaldehyde	< 0.1 mg/m^3	BREEAM

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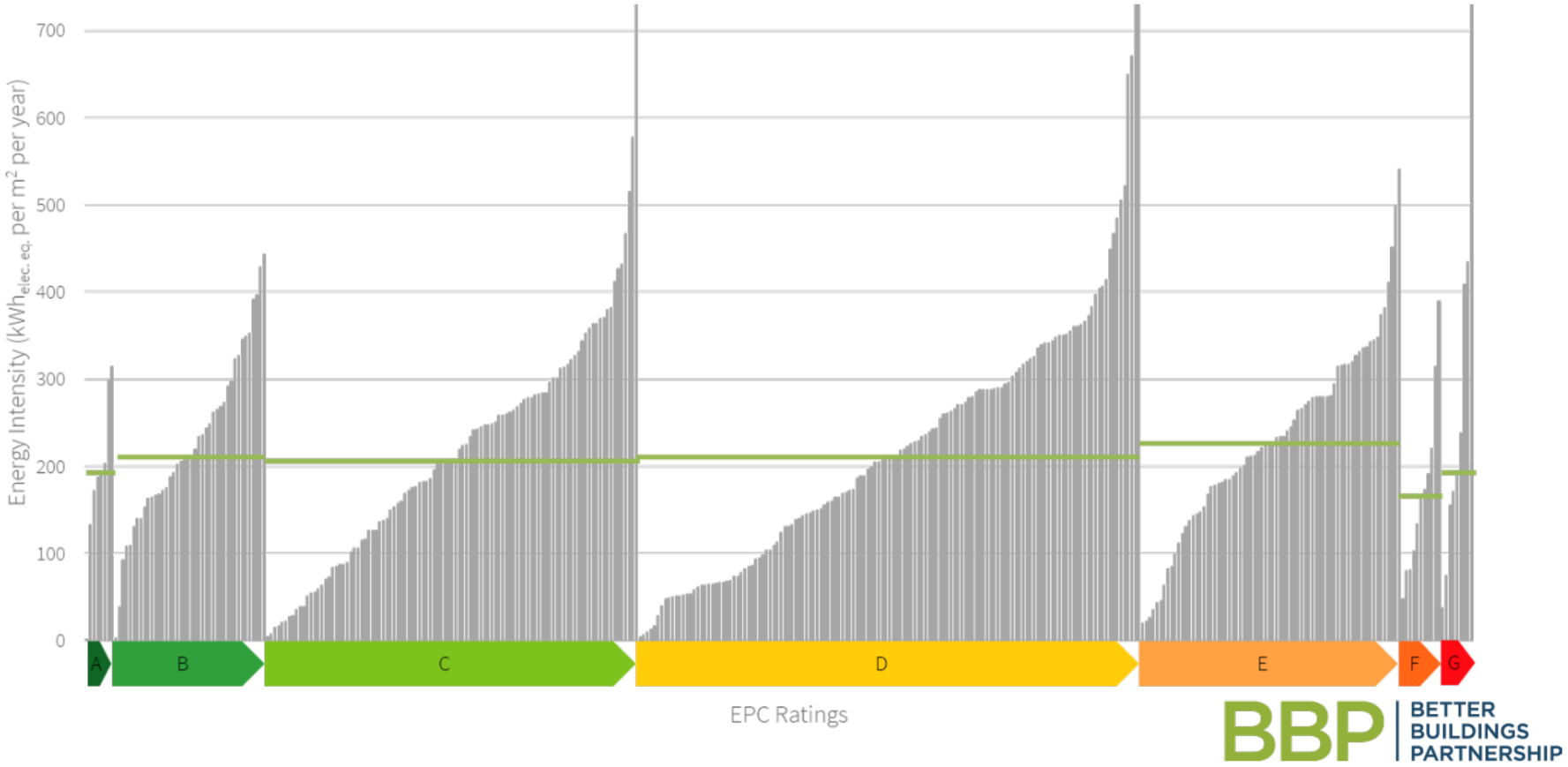
A Dysfunctional Rating System



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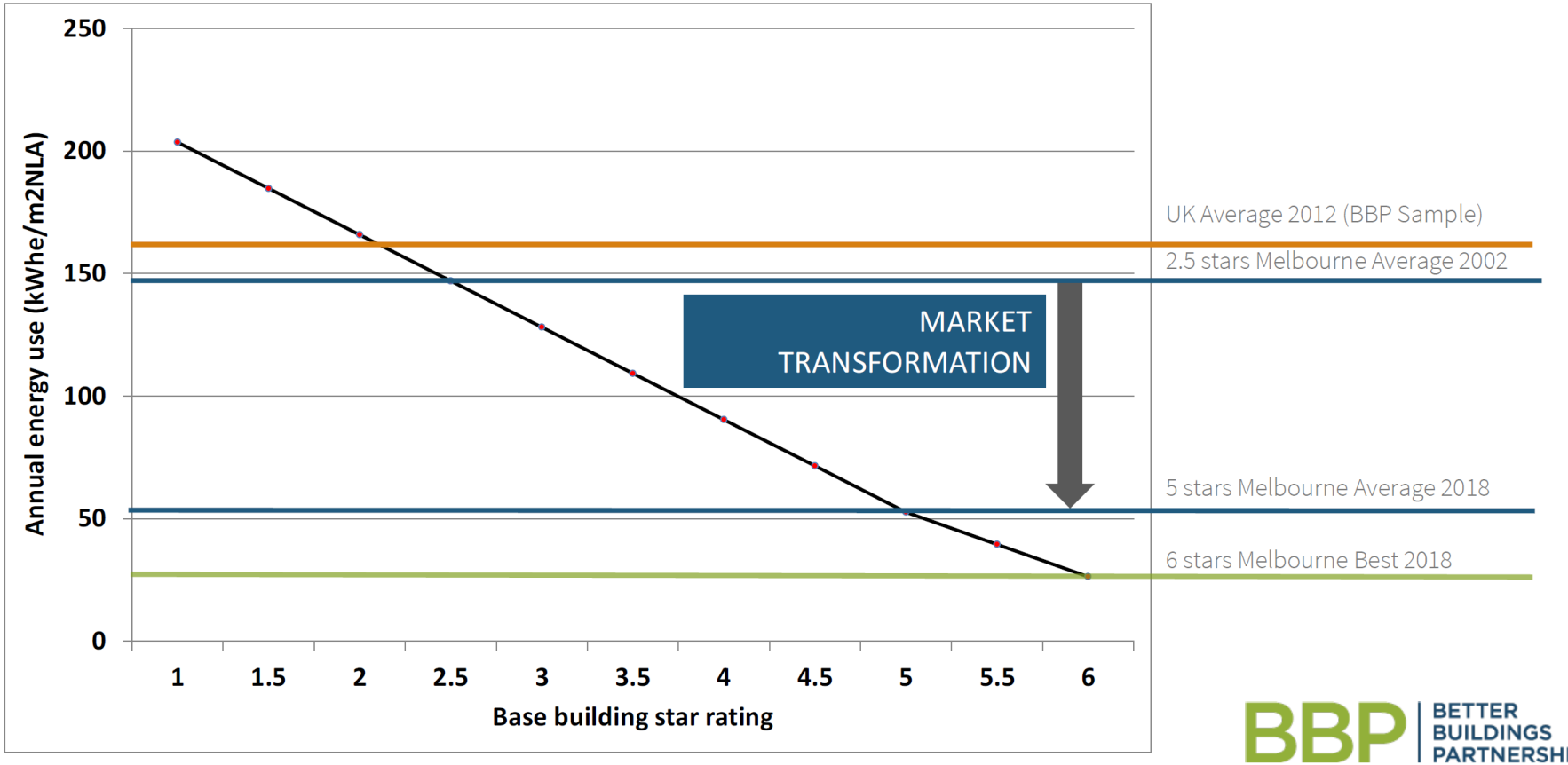
UK and Australian Offices Compared



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