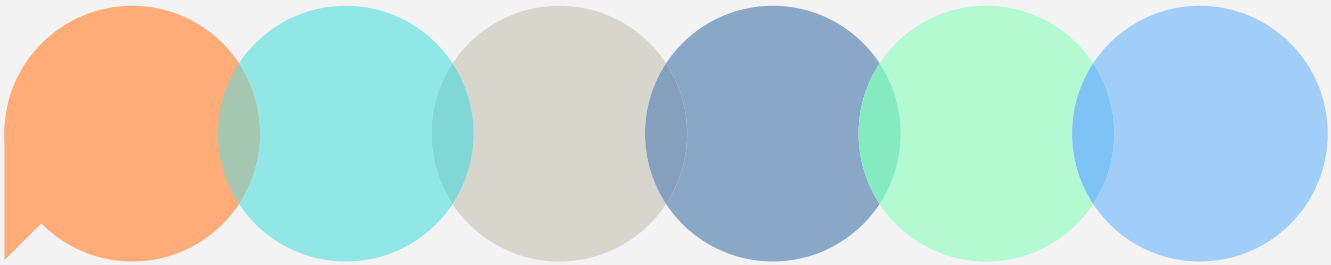
Climate Framework©



A cross-industry
action group initiative

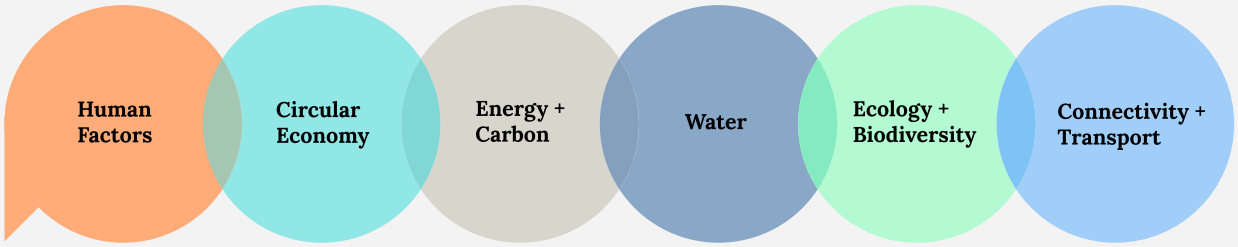
Detailed Framework Structure

The proposed Climate Framework consists of an introductory section that provides the essential background knowledge as it relates to climate change within the global and the built environment context, followed by the 'Outcomes' section, which specifically focuses on six overarching themes. These themes represent concepts that built environment professionals must holistically consider - both in retrofit and new build scenarios - in order to halt climate change, and mitigate its impacts.

Global Context + Fundamentals

Built Environment Context

Common Threads



Human Factors	Circular Economy	Energy + Carbon	Water	Ecology + Biodiversity	Connectivity + Transport
Health + Wellbeing	Resource Efficiency	Passive Design	Water Cycle	Biodiversity	Site Location
Biophilia + Sense	Flexibility + Adaptability	Active Design + Systems	Water Recycling + Reuse	Nature-Based Solutions	Walkability
User Experience	Impacts	Whole Life Carbon	Water Harvesting	Land Use	Infrastructure + Planning
Communities	Waste as a Resource	Offsetting	Water Pollution	Bio-Regional Urbanism	Low Carbon Transport
Social Value	Sourcing	Iterative Design	Climate Change Impacts	Food Production	Future Transport

Context

1 Introduction [to the Climate Framework]

Purpose
Audience/Reader
Learning Objectives/Outcomes/Standards
[Framework] Structure and Mapping
Key Concept and Definitions

2 Global Context and Fundamentals

Climate Fundamentals

— Climate Change
- Scientific Evidence
- Key Indicators and Monitoring
- Key Contributors, Individual & Collective Responsibilities, Carbon Budget and Debt
- Projected Physical Impacts (on Land, Nature, etc.) and Regional Priorities
- Psychological & Physical Health Impacts and Social Awareness

— Resource Use
- Current Trends and Future Prospects of Natural Resources
- Socio-economic Implications of Irresponsible Resource Use
- Planetary Boundaries, Resources and Climate Change
- Sustainable Resource Use and Management
- Shifts in Global, Regional & Local Land Use, Migration, Displacement and Conflict

— Systems Thinking
- Measurable Changes in Earth's Systems and Processes
- Causes and Effects of Global Changes
- Socioeconomic Drivers and Economic Consequences
- Risk & Resilience, the Role of Data / Feedback
- Regenerative Leadership

International Legislations, Agreements, Frameworks, Roadmaps and Plans for Action
- United Nations Framework Convention on Climate Change, The Kyoto Protocol and the Doha Amendment
- United Nations Agenda 2030: Sustainable Development Goals, Global Indicator Framework for SDGs and Targets of the 2030 Agenda, The New Urban Agenda and Race to Zero & Race to Resilience Campaigns
- The Paris Agreement and Regional (EU) Directives
- Sendai Framework for Disaster Risk Reduction
- The Sharm El-Sheikh to Kunming Action Agenda for Nature and People, Global Species Action Plan (GSAP) and Strategic Plan for Biodiversity (with Aichi Biodiversity Targets)

Risks and Opportunities in a Net Zero Economy
- Climate Change & Biodiversity Loss Risk Management and Nature Economy
- Physical Risks (Stranded Assets), Monitoring / Measurement, Opportunities and Actions
- Transition Risks (Renewable Energy Technology Developments) and Environmental & Social Value
- Global Institution/Sector Economy and New Economic Models
- Circular Economy Implementation and Climate Positive Economy

This section covers topics on climate science, systems thinking, global policies and commmitments...

Context (continued)

3 Built Environment Context

Environmental Impacts and Drivers of the Built Environment

- Sustainable Consumption and Production, Scale, Balance and Monitoring
- Impacts on the External Environment (Land Use, Air, Soil, Water Pollution, Other Greenhouse Gases)
- Impacts on the Internal Environment (Energy and Water Use, Waste, Thermal Efficiency, Health)
- Building Whole Life and Product Life Cycles
- Cross-cutting Themes

Ethics and Value of Sustainability

- Ethics in Practice
- Health, Wellbeing, Safety and Resilient Communities
- Rights of Nature
- Rights of Current and Future Generations
- Supply and Value Chains

Sustainable Urbanism, Architecture and Engineering

- Vernacular Design (in Different Climates / Regions)
- 19th Century Industrial Revolution: Building in a Time of Industry
- 20th Century International Style: Building in a Time of Globalisation
- 21st Century Imperative: Building in a Time of Emergency
- Regenerative Urban Development, Buildings, Infrastructure and Growth

Built Environment Policy, Legislation, Regulations, Commitments, Benchmarks and Construction Industry Guidance

- Policies, Legislation, Regulations, Carbon Budgets and Implementation
- Overview of (Key) Existing Guidance, Targets and Standards (ISO, CEN, EPD, HPD, RIBA, AIA, LETI, UKGBC, CIBSE, RICS, BBP, IStructE, etc.)
- Overview of (Key) Existing Commitments, Roadmaps and Frameworks (WorldGBC, GlobalABC, C40, etc.)
- Other Mechanisms for Change (Certifications such as BREEAM, LEED, WELL, NABERS, DGNB, HQE, Green Star, CASBEE, BEAM Plus, GORD, One Planet Living, Living Building Challenge (The Red List Materials), Passivhaus and Declarations,)
- Advocacy, Commitments/Pledges and Policymaking

Construction and Real Estate Industry

- Activities, Briefing, Decision-Making and Communication
- Stakeholders and Values
- Governance
- Construction Processes and Supply Chains
- Financing Models

Context (continued)

4 Common Threads

Retrofit (Adaptation and Reuse)

- Retrofit Primer: Scale, Urgency, Challenges and Opportunities
- Hierarchy of Interventions: Passive Design, Retro-First, Fabric and Fuel
- Whole Building Approaches: Rethinking Retrofit Delivery and Cost
- Energy Efficiency Action Plan (for Buildings), EnerPHit and Net Zero
- Transitions: Incentives, Policy and Engagement

Building Safety

- Fire & Life Safety and Sustainability in the Built Environment
- Material Traceability and Transparency
- Information Thread, Maintenance and Performance Certainty
- Toxic Materials and Long-term Health
- Roles and Responsibilities

Designing for Performance, Feedback and Closing the Performance Gap

- Outcome-based Design
- Integrated Systems, Technologies and Controls
- User Engagement and Training
- Commissioning, Monitoring and Post Occupancy Evaluation
- Roles and Responsibilities

Planning for (Climate) Extremes, Disaster Risk, Resilience/Robustness, Redundancy and Adaptation

- Climate Change Impacts (from Increased Temperatures (Heatwaves and Urban Heat Island Effect), Winds, Wildfires, Sea Level Rises, Increased Precipitation, Storms, Floods, Droughts, Earthquakes)
- Vulnerability (Exposure and Sensitivity) and Adaptive Capacity
- Proactive Adaptation and Managed Retreat
- Climate Buffers and Reactive Adaptation
- Stakeholders and Participation

Climate Justice, Equitable and Inclusive Design

- Dimensions of Climate Justice
- Designing for Equitable, Healthy and Universal Communities
- Access to Affordable, Green Energy, Resources and Opportunities
- Access to Sustainable Housing, Work, Leisure and Green Spaces
- Accountability, Responsibility and Distribution of Economic Investment

Process, Investment and Procurement

- Funding and Investment (for the Asset and the Team)
- Alternative Development Models
- Value Approach to Procurement (Value Toolkit)
- Team Formulation and Delivery/Validation Process
- Sustainable Outcomes Value and Life Cycle Costing

This section covers crucial topics that are applicable to all the overarching, six 'outcomes' topics of the Framework.

Context (continued)

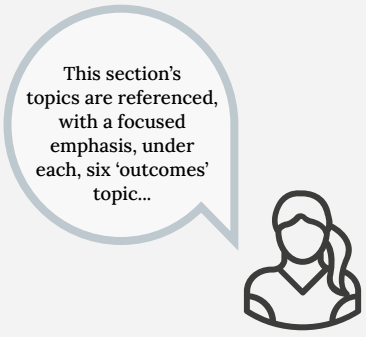
4 Common Threads

Stakeholder Engagement

- Co- and Participatory Design
- Stakeholders Representation
- Roles and Responsibilities
- Business Case and Brief
- Engagement and Communication Strategy

Research, Innovation and Partnerships

- Research-based Design and Implementation in Practice
- "Interprofessionalism": Transdisciplinary and Interdisciplinary Approach
- Future Scenarios: Benchmarking and Analysis through Digital Innovation
- Governance and Funding
- International/Regional/Local Agency, Institutions and Partnerships



Outcomes

1 Human Factors

Context

Health, Wellbeing and Comfort

- Air Quality (Indoor and Outdoor) and Olfactory Comfort
- Thermal Comfort (Indoor and Outdoor)
- Visual Comfort (Daylight, Lighting and Glare)
- Acoustic Comfort and Noise Mitigation
- Ergonomic Comfort and Accessibility

Biophilic and Sensory Design

- Place-based, Human-Nature Relationships and Multi-sensory Design
- Environmental Features (Air, Water, Plants, Natural Habitats, Sound, etc.), and Sensory Stimuli (Physiological and Physical Factors)
- Natural Forms/Shapes, Patterns and Systems (Biomimicry)
- Light, Space and Color
- Materials and Textures (Hapticity)

User Experience Design and Occupancy Behavior / Control

- Human-Centered Research and Design Approach: Expectations, Interaction and Space
- User Experience (UX) Design and Learning Process
- Occupancy Patterns and Zoning
- Interdisciplinary Collaboration and Prototyping
- People-Space/Building Communication: Smart Controls, Integrated Technology Systems and Real-time Feedback (Post Occupancy)

Communities, Interconnectivity and Inclusion

- Healthy Placemaking, Community Building and Identity
- Accessibility Mapping, Universal Design and Security
- Inclusivity / Diversity Mapping
- Context Mapping and Scenario-based Design (Existing Context, Designed Context and Altered Context)
- Just / Equitable Transition

Social Value

- Stakeholders Interests: Social, Economic and Environmental
- Desired Outcomes
- Measuring Social Value: Assessment and Methodologies
- Social Return on Investment
- Trade-offs and Synergies

Case Studies

Resources (Tools and Guides)

Outcomes (continued)

2 Circular Economy

Context

Resource Efficiency and Geographic Implications

- Natural Capital and Capitals Approach
- Urban Systems and Circularity
- The R's of Circular Economy: Reduce, Reuse, Repair, Repurpose, Recycle
- Waste Sources and Reduction
- Choice of Construction Methods

Designing for Change (Flexibility and Adaptability) and Regeneration

- Designing for Circularity (Resource Flows)
- Designing for Disassembly, Deconstruction and Reassembly (Prefabrication, Standardisation, Panellisation)
- Designing for Flexibility (for Change of Space within the Same Use)
- Designing for Adaptability (for a Change of Use and Climate), Durability and Resilience
- Designing for 'Leasibility': from Products and Spaces to Services

Waste as a Resource

- Waste Sources from the Built Environment: Materials, Energy, Water, Organic Matter
- Waste-to-Material/Product (Upcycling and Downcycling)
- Waste-to-Energy (Heat and Electricity)
- Waste-to-'Food' (Composting)
- Waste-to-Nature (Decomposition)

Environmental and Health Impacts of Materials and Waste

- Carbon Impact (Recycle Content, Recyclability, Bio-based and Biogenic Materials)
- Chemical Impact (Toxicity)
- Material and Product Declarations/Certifications/Disclosure (EPD, HPD, C2C, FSC, etc.)
- Waste Impact (Hazards)
- Pollution on Air, Water and Land

Responsible and Ethical Sourcing

- Procurement, Supply Chain Management and Auditing
- Value Chain and Stakeholder Health and Wellbeing
- Green and Lean Upstream Production
- Downstream Distribution
- Social Procurement

Case Studies

Resources (Calculations, Tools, Databases and Guides)

Outcomes (continued)

3 Energy and Carbon

Context

Passive Design

- Climate and Microclimate
- Building Orientation, Form, Form Factor and Layout
- Thermal Mass
- Fabric First Approach, Thermal Comfort and Overheating
- Passive Heating and Cooling

Active Design: Environmental Systems and Technologies

- Building Systems
- Energy Demand, Supply Sources and Balance (Heat Gains and Losses)
- Energy Storage, Load Sharing and District Networks
- Smart Systems, Technologies, Monitoring and Maintenance
- Low Carbon and Renewable Energy Supply

Whole Life Carbon Impacts (for Retrofit and New Build)

- Upfront Impacts (Stage A): Product and Construction
- In-Use (Embodied and User) Impacts (Stage B) and Capital Carbon
- End-of-life (Embodied) Impacts (Stage C)
- Beyond Building Life Cycle (Module D)
- Biogenic Carbon, Carbon Capture, Storage, Sequestration and Carbonation/Calcination and Direct Air Capture Technologies

Carbon Offsetting

- Carbon Offset Projects
- Renewable Energy Procurement
- Carbon Accounting
- Carbon Offset Purchasing and Contracts
- Ethics and Limitations of Carbon Offsetting

Operational Energy Modelling, Embodied Carbon Assessment and Iterative Design Process

- Regulated vs. Unregulated Energy Sources
- Operational Energy Modelling
- Life Cycle Assessment: Embodied Carbon and other Environmental Indicators
- Iterative Design Process and Other Environmental Assessments
- Stakeholder Responsibilities

Case Studies

Resources (Methodologies, Tools, Databases and Guides)

This section covers energy use, and carbon emissions' reduction, as well as offsetting in the built environment.

Outcomes (continued)

4 Water

Context

Water Cycles, Sources, Stresses, Quality and Management

- Water Cycles
- Water Sources and Uses
- Water Availability and Stresses
- Water Quality and Sanitation
- Water Distribution and Management

Water Recycling and Reuse

- Benefits and Challenges
- Wastewater Sources
- Wastewater Treatment and Reuse
- Technological Advancements
- Health, Environment and Socioeconomic Outcomes

Rainwater Harvesting, Stormwater Management and Sustainable Urban Drainage

- Benefits and Challenges
- Water Runoff, Quantity and Quality
- Rainwater Uses
- Catchment and Storage
- Sustainable Urban Drainage Systems

Water Pollution on Land and in Aquatic Habitats

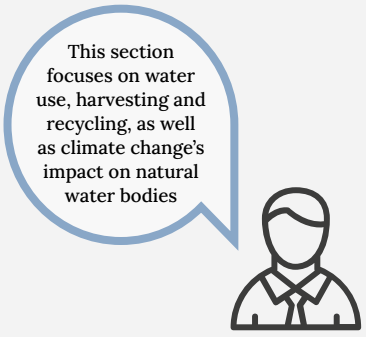
- Water Pollution Sources
- Causes and Effects
- Water Pollution Prevention
- Water Pollution Control
- Water Pollution Monitoring and Management

Impacts of Climate Change (Water-related Hazards and Disasters)

- Impacts on People & Nature and Cascading Events
- Designing for Water Scarcity and Droughts
- Designing for Intense Rainfall, Storms and Wind Damage
- Designing for Sea Level Rise and Flood Risk
- Adaptation Opportunities and Challenges [to reducing Vulnerabilities]

Resources (Calculators, Tools and Guides)

Case Studies



Outcomes (continued)

5 Ecology and Biodiversity

Context

Biodiversity and Net Gain

- Biodiversity Value and Habitat Evaluation: Factors, Impacts, Risks, Pre- and Post-Development Conditions
- Key Actors and the Business Case
- Mitigation Hierarchy, Conservation/Restoration and Multi-layered Outcomes
- Measurement and Monitoring
- Offsetting Net Biodiversity Loss

Nature-based Solutions

- Benefits
- Barriers and Trade-offs
- Key Actors and Implementation Process
- Balanced Solutions at Scale
- Advanced Solutions: Bio-based Products and Processes

Land Use and Building Density

- Land Use Activities and Models
- Land Use Changes
- Pressures: Environmental, Socioeconomic, Cultural
- Demand and Supply: Human Needs and Natural Capital
- Land Use Planning, Zoning and the Built Environment

Bioregional Planning and Biophilic Urbanism

- Citizen Participation and Action-oriented Planning
- Place-based Design
- Balance of the Urban Metabolism
- Green Regionalism and Infrastructures
- Responsible Regionalism and Environmental Ethics

Sustainable Food Production and Urban Food Systems

- Benefits and Challenges
- Farming Methods and Land Balance
- Productive Landscapes: Urban, Rural and Peri-Urban Farms
- Building-integrated Solutions
- Regenerative Agricultural Practices

Case Studies

Resources (Tools and Guides)

Outcomes (continued)

6 Connectivity and Transport

Context

Site Selection, Location and Urban Ecosystems

- Economies of Scale: Environment, Economic and Social Implications
- Landlocked and Transit-bridging Sites
- Greenfield, Brownfield and Reclaimed Sites
- Urban Accessibility
- Rural Accessibility

Compact Development and Walkability

- Change in Behaviours and Health Benefits
- The 15-minute Neighbourhood and City
- Safe, Walkable, Liveable Streets, Car-free Centres and Mobility Hubs
- Complete Streets and Curbside Management
- Mobility Corridors: Green Infrastructure

Regional and Local Infrastructure and Planning

- Sustainable Transportation Indicators
- Polycentric, Unicentric and Regenerative Communities
- Sustainable Land Use Planning
- Shifts in Infrastructural Modes
- Digital Infrastructure and Resilience

Low Carbon Transport and Multimodal Transportation Networks

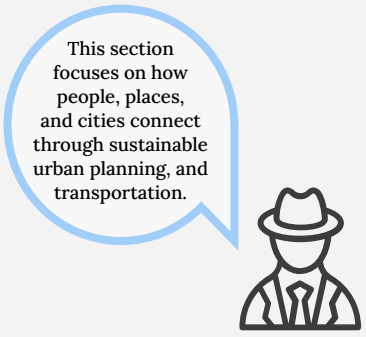
- Flows and Capacity
- Active Travel (Walking, Cycling, etc.)
- Electric Vehicles and Charging Infrastructure
- Car Sharing
- Autonomous Vehicles

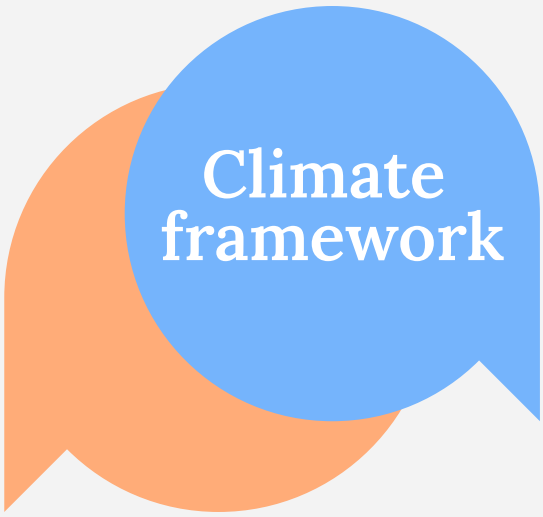
Planning for Future of Transportation

- Net Zero Carbon Regeneration and Renewal
- Strategic Logistic Hubs
- Demand and Sustainability of Alternative Fuels
- Investment and Risks
- Sustainability and Livability Planning Trends

Case Studies

Resources (Calculators, Tools and Guides)

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