A woman with dark hair is pointing at a presentation board. The board has several cards with text. One card at the top left says 'Minoro'. Another card below it says 'e 0 [Pre-Design]'. A card at the bottom left says 'carbon management'. The woman is on the right side of the frame, looking towards the board.

Minoro:

Accelerating the decarbonisation of buildings

August 27th 2024 | CIBSE ANZ Seminar Series | The Need for Speed

David Ritter,
Australia & New Zealand Sustainability Lead, Grimshaw

GRIMSHAW

Agenda

1. Introduction to Grimshaw
2. Minoro: How to use the platform
3. Benefits of Minoro
4. Integrative Design Process
5. Q&A

Introduction

Grimshaw

A global practice



8

Global studios

600+

Total global staff

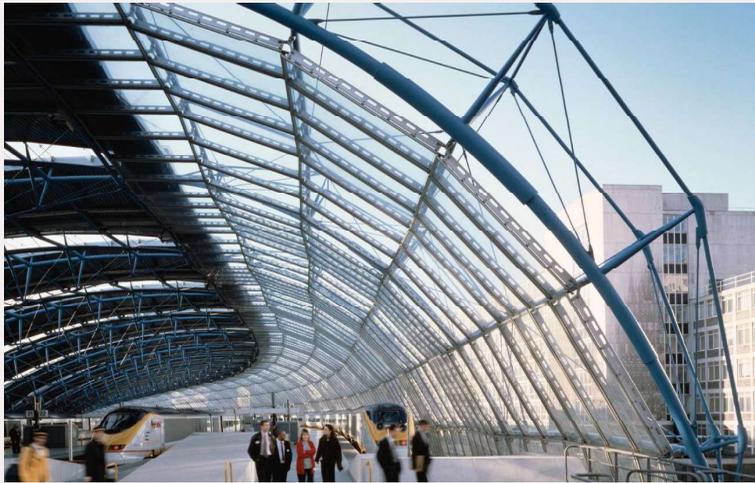
43

Years in business

250+

Awards for our work

WORLD CLASS PROJECTS



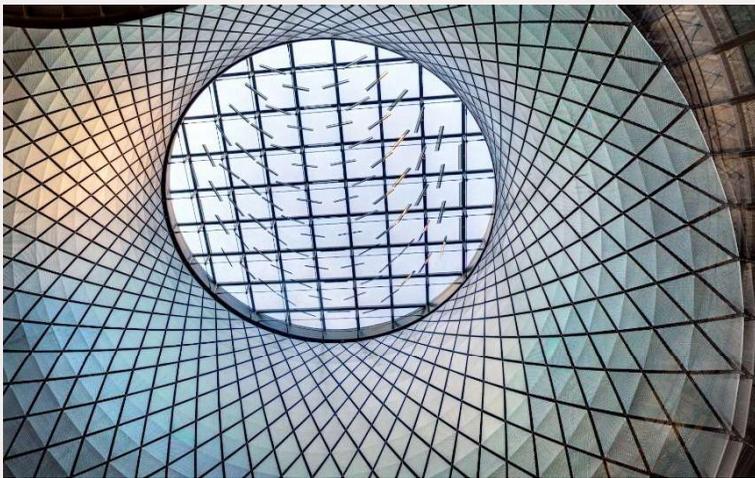
International Terminal Waterloo
London, United Kingdom



Eden Project
Cornwall, United Kingdom



Pulkovo Airport
St Petersburg, Russia



Fulton Center
New York City, NY, USA

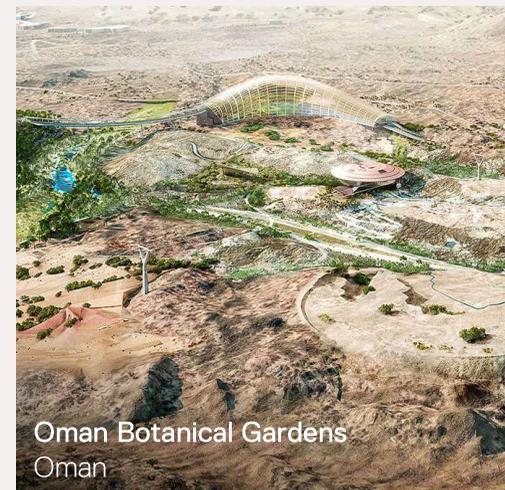


Southern Cross Station
Melbourne, Australia



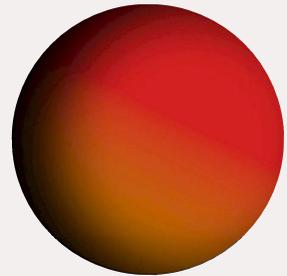
Thermae Bath Spa
Bath, United Kingdom

SUSTAINABILITY IS CENTRAL TO OUR DESIGNS



Addressing the emergency

Our commitments



Architects Declare
Climate and Biodiversity
Emergency

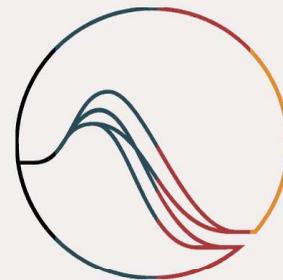


ARCHITECTS!
CLIMATE
ACTION
NETWORK

CLIMATE GROUP
CONCRETE
ZERO



ADVANCING
NET ZERO



SCIENCE
BASED
TARGETS



Minoro: how to use the platform

Whole life net zero carbon

Where do you start?

The collage features several key documents:

- Whole Life Carbon:** A comprehensive guide covering importance, definition, and guidance for whole life carbon.
- LETI Embodied Carbon Primer:** Supplementary guidance to the Climate Emergency Design Guide.
- LETI Climate Emergency Design Guide:** A guide for buildings to meet UK climate change targets.
- Net Zero Carbon Buildings: A Framework Definition:** A framework definition for net zero carbon buildings.
- Guidance Document for PAS 2080:** A guidance document for PAS 2080 certification.
- Net Zero Operational Carbon:** A guide for net zero operational carbon.
- Embodied Carbon Target Alignment:** A guide for embodied carbon target alignment.
- LETI Client Guide for Net Zero Carbon Buildings:** A client guide for net zero carbon buildings.

A large "???" is overlaid in the center of the collage, indicating a point of uncertainty or a question about where to start.

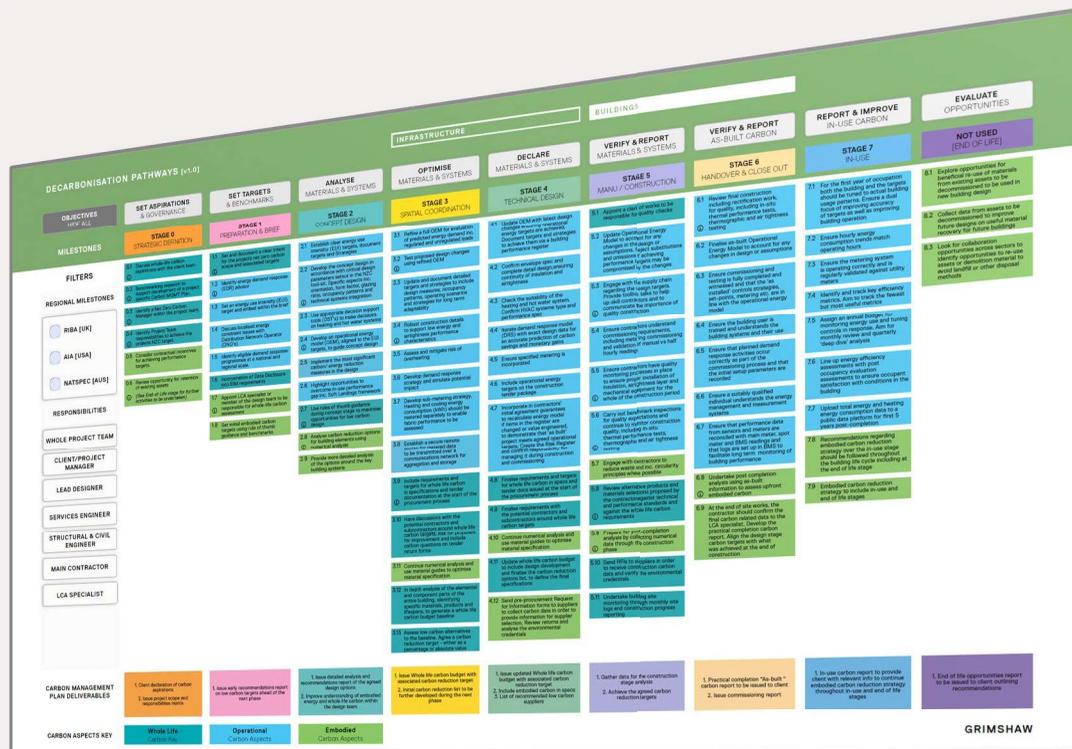
Whole life net zero carbon

Decarbonization pathways

OBJECTIVES HIDE ALL	SET ASPIRATIONS & GOVERNANCE	SET TARGETS & BENCHMARKS	ANALYSE MATERIALS & SYSTEMS	OPTIMISE MATERIALS & SYSTEMS	DECLARE MATERIALS & SYSTEMS	VERIFY & REPORT MATERIALS & SYSTEMS	VERIFY & REPORT AS-BUILT CARBON	REPORT & IMPROVE IN-USE CARBON	EVALUATE OPPORTUNITIES
MILESTONES	STAGE 0 STRATEGIC DEFINITION	STAGE 1 PREPARATION & BRIEF	STAGE 2 CONCEPT DESIGN	STAGE 3 SPATIAL COORDINATION	STAGE 4 TECHNICAL DESIGN	STAGE 5 MANU / CONSTRUCTION	STAGE 6 HANDOVER & CLOSE OUT	STAGE 7 IN-USE	NOT USED [END OF LIFE]
FILTERS	<p>0.1 Discuss whole-life carbon aspirations with the client team</p> <p>0.2 Benchmarking research to support development of a project specific Carbon MGMT Plan</p> <p>0.3 Identify a Net Zero Carbon Manager within the project team</p> <p>0.4 Identify Project Team responsibilities to achieve the projects NZC target</p> <p>0.5 Consider contractual incentives for achieving performance targets</p> <p>0.6 Review opportunity for retention of existing assets <i>(See End-of-Life stage for further activities to be undertaken)</i></p>								
REGIONAL MILESTONES	<p>1.1 Set and document a clear intent for the projects net zero carbon scope and associated targets</p> <p>1.2 Identify energy demand response (EDR) advisor</p> <p>1.3 Set an energy use intensity (EUI) target and embed within the brief</p> <p>1.4 Discuss localised energy constraint issues with Distribution Network Operator (DNO's)</p> <p>1.5 Identify eligible demand response programmes at a national and regional scale</p> <p>1.6 Incorporation of Data Disclosure into BIM requirements</p> <p>1.7 Appoint LCA specialist or member of the design team to be responsible for whole-life carbon assessment</p> <p>1.8 Set initial embodied carbon targets using rule of thumb guidance and benchmarks</p>								
RIBA [UK]	<p>2.1 Establish clear energy use intensity (EUI) targets, document targets and Strategies</p> <p>2.2 Develop the concept design in accordance with critical design parameters set out in the NZC tool-kit. Specific aspects inc. orientation, form factor, glazing ratio, occupancy patterns and technical systems integration</p> <p>2.3 Use appropriate decision support tools (DST's) to make decisions on heating and hot water systems</p> <p>2.4 Develop an operational energy model (OEM), aligned to the EUI targets, to guide concept design</p> <p>2.5 Implement the most significant carbon/energy reduction measures in the design</p> <p>2.6 Highlight opportunities to overcome in-use performance gap inc. Soft Landings framework</p> <p>2.7 Use rules of thumb guidance during concept stage to maximise opportunities for low carbon design</p> <p>2.8 Analyse carbon reduction options for building elements using numerical analysis</p> <p>2.9 Provide more detailed analysis of the options around the key building systems</p>								
AIA [USA]	<p>3.1 Refine a full OEM for evaluation of predicted energy demand inc. regulated and unregulated loads</p> <p>3.2 Test proposed design changes using refined OEM</p> <p>3.3 Update and document detailed targets and strategies to include design measures, occupancy patterns, operating scenarios and strategies for long term adaptability</p> <p>3.4 Robust construction details to support low energy and airtightness performance characteristics</p> <p>3.5 Assess and mitigate risk of overheating</p> <p>3.6 Develop demand response strategy and simulate potential impact</p> <p>3.7 Develop sub-metering strategy. Heating and cooling energy consumption (kWh) should be metered separately to enable fabric performance to be assessed</p> <p>3.8 Establish a secure remote source for metered data to be transmitted over a communications network for aggregation and storage</p> <p>3.9 Include requirements and targets for whole life carbon in specifications and tender documentation at the start of the procurement process</p> <p>3.10 Have discussions with the potential contractors and subcontractors around whole life carbon targets. Ask for proposals for improvement and include carbon questions on tender return forms</p> <p>3.11 Continue numerical analysis and use material guides to optimise material specification</p> <p>3.12 In depth analysis of the elemental and component parts of the entire building, identifying specific materials, products and lifespans, to generate a whole life carbon budget baseline</p> <p>3.13 Assess low carbon alternatives to the baseline. Agree a carbon reduction target - either as a percentage or absolute value</p>								
NATSPEC [AUS]	<p>4.1 Update OEM with latest design changes ensuring operational energy targets are achieved. Document targets and strategies to achieve them via a building performance register</p> <p>4.2 Confirm envelope spec and complete detail design ensuring continuity of insulation and airtightness</p> <p>4.3 Check the suitability of the heating and hot water system. Confirm HVAC systems type and performance spec</p> <p>4.4 Iterate demand response model (DRS) with exact design data for an accurate prediction of carbon savings and monetary gains</p> <p>4.5 Ensure specified metering is incorporated</p> <p>4.6 Include operational energy targets on the construction tender package</p> <p>4.7 Incorporate in contractors' initial agreement guarantees to recalculate energy model if items in the register are changed or value engineered, to demonstrate that 'as built' project meets agreed operational targets. Create the Risk Register and confirm responsibility for managing it during construction and commissioning</p> <p>4.8 Finalise requirements and targets for whole life carbon in specs and tender docs issued at the start of the procurement process</p> <p>4.9 Finalise requirements with the potential contractors and subcontractors around whole life carbon targets</p> <p>4.10 Continue numerical analysis and use material guides to optimise material specification</p> <p>4.11 Update whole life carbon budget to include design development and finalise the carbon reduction options list, to define the final specifications</p> <p>4.12 Send pre-procurement Request for Information forms to suppliers to collect carbon data in order to provide information for supplier selection. Review returns and analyse the environmental credentials</p>								
RESPONSIBILITIES	<p>5.1 Appoint a clerk of works to be responsible for quality checks</p> <p>5.2 Update Operational Energy Model to account for any changes in the design or assumptions. Reject substitutions and omissions if achieving performance targets may be compromised by the changes</p> <p>5.3 Engage with the supply chain regarding the design targets. Provide toolbox talks to help up-skill contractors and to communicate the importance of quality construction</p> <p>5.4 Ensure contractors understand commissioning requirements, including metering commissioning and validation of manual vs half hourly readings</p> <p>5.5 Ensure contractors have quality monitoring processes in place to ensure proper installation of insulation, airtightness layer and mechanical equipment for the whole of the construction period</p> <p>5.6 Carry out benchmark inspections for quality expectations and continue to monitor construction quality, including in-situ thermal performance tests, thermographic and air tightness testing</p> <p>5.7 Engage with contractors to reduce waste and inc. circularity principles where possible</p> <p>5.8 Review alternative products and materials selections proposed by the contractor against technical and performance standards and against the whole life carbon requirements</p> <p>5.9 Prepare for post-completion analysis by collecting numerical data through the construction phase</p> <p>5.10 Send RFIs to suppliers in order to receive construction carbon data and verify the environmental credentials</p> <p>5.11 Undertake building site monitoring through monthly site logs and construction progress reporting</p>								
WHOLE PROJECT TEAM	<p>6.1 Review final construction including rectification work for quality, including in-situ thermal performance tests, thermographic and air tightness testing</p> <p>6.2 Finalise as-built Operational Energy Model to account for any changes in design or assumptions</p> <p>6.3 Ensure commissioning and testing is fully completed and witnessed and that the 'as installed' controls strategies, set-points, metering etc. are in line with the operational energy model</p> <p>6.4 Ensure the building user is trained and understands the building systems and their use</p> <p>6.5 Ensure that planned demand response activities occur correctly as part of the commissioning process and that the initial setup parameters are recorded</p> <p>6.6 Ensure a suitably qualified individual understands the energy management and measurement systems</p> <p>6.7 Ensure that performance data from sensors and meters are reconciled with main meter, spot meter and BMS readings and that logs are set up in BMS to facilitate long term monitoring of building performance</p> <p>6.8 Undertake post completion analysis using as-built information to assess upfront embodied carbon</p> <p>6.9 At the end of site works, the contractor should confirm the final carbon related data to the LCA specialist. Develop the practical completion carbon report. Align the design stage carbon targets with what was achieved at the end of construction</p>								
CLIENT/PROJECT MANAGER	<p>7.1 For the first year of occupation both the building and the targets should be tuned to actual building usage patterns. Ensure a dual focus of improving accuracy of targets as well as improving building operation</p> <p>7.2 Ensure hourly energy consumption trends match operating hours</p> <p>7.3 Ensure the metering system is operating correctly and is regularly validated against utility meters</p> <p>7.4 Identify and track key efficiency metrics. Aim to track the fewest but most useful metrics</p> <p>7.5 Assign an annual budget for monitoring energy use and tuning controls in response. Aim for monthly review and quarterly 'deep dive' analysis</p> <p>7.6 Line up energy efficiency assessments with post occupancy evaluation assessments to ensure occupant satisfaction with conditions in the building</p> <p>7.7 Upload total energy and heating energy consumption data to a public data platform for first 5 years post-completion</p> <p>7.8 Recommendations regarding embodied carbon reduction strategy over the in-use stage should be followed throughout the building life cycle including at the end of life stage</p> <p>7.9 Embodied carbon reduction strategy to include in-use and end of life stages</p>								
LEAD DESIGNER	<p>8.1 Explore opportunities for beneficial re-use of materials from existing assets to be decommissioned to be used in new building design</p> <p>8.2 Collect data from assets to be decommissioned to improve future designs on useful material recovery for future buildings</p> <p>8.3 Look for collaboration opportunities across sectors to identify opportunities to re-use assets or demolition material to avoid landfill or other disposal methods</p>								
SERVICES ENGINEER									
STRUCTURAL & CIVIL ENGINEER									
MAIN CONTRACTOR									
LCA SPECIALIST									

Whole life net zero carbon

Decarbonization pathways

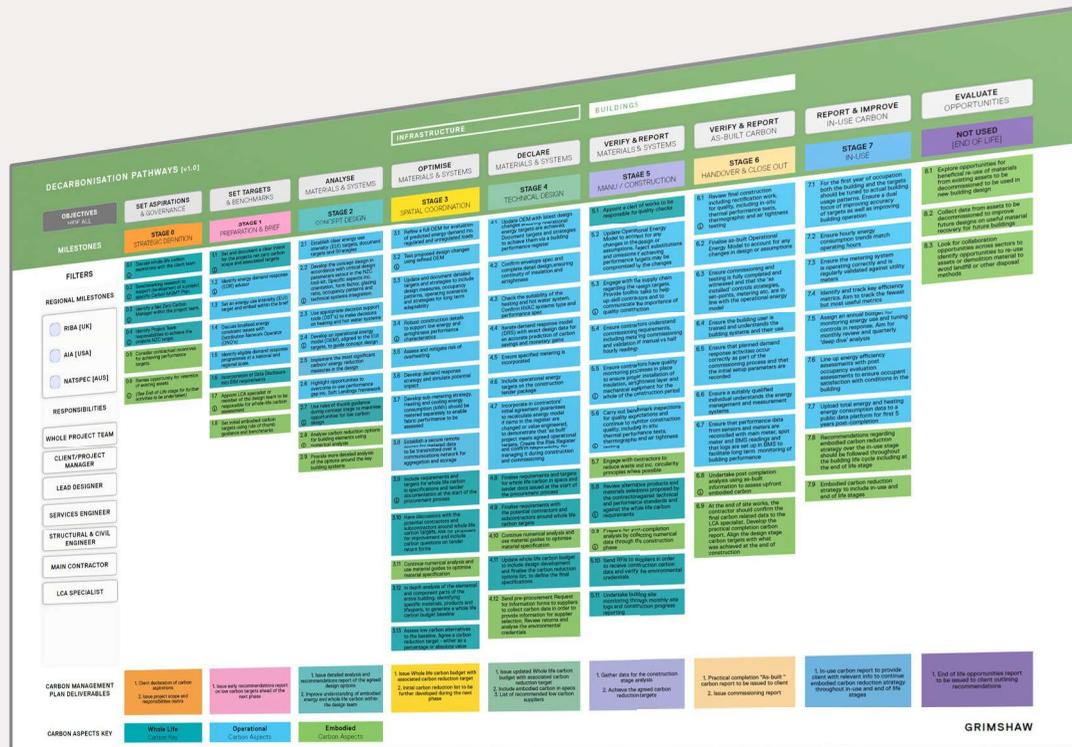


For each action outlined in the pathway guidance is provided on:

1. What needs to be done
2. Who is responsible
3. How to go about it

Whole life net zero carbon

Decarbonization pathways: carbon management activities



1. Establish scope & governance

2. Set carbon benchmarks & targets

3. Operational energy optimisation

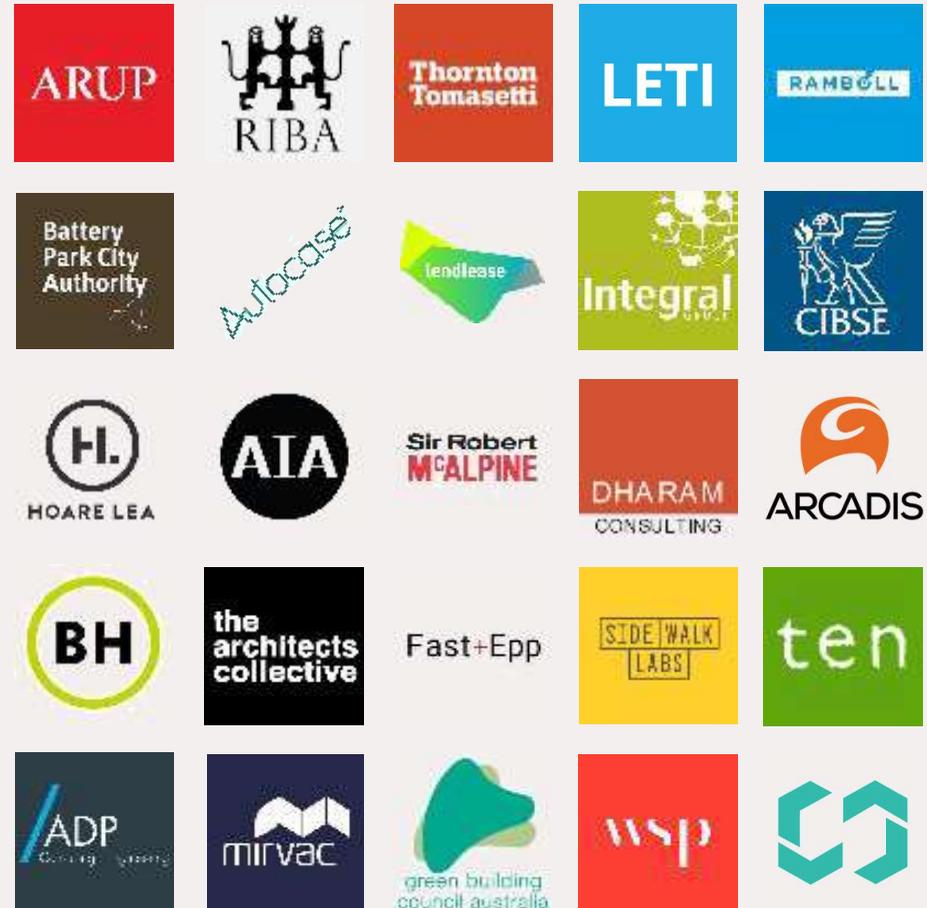
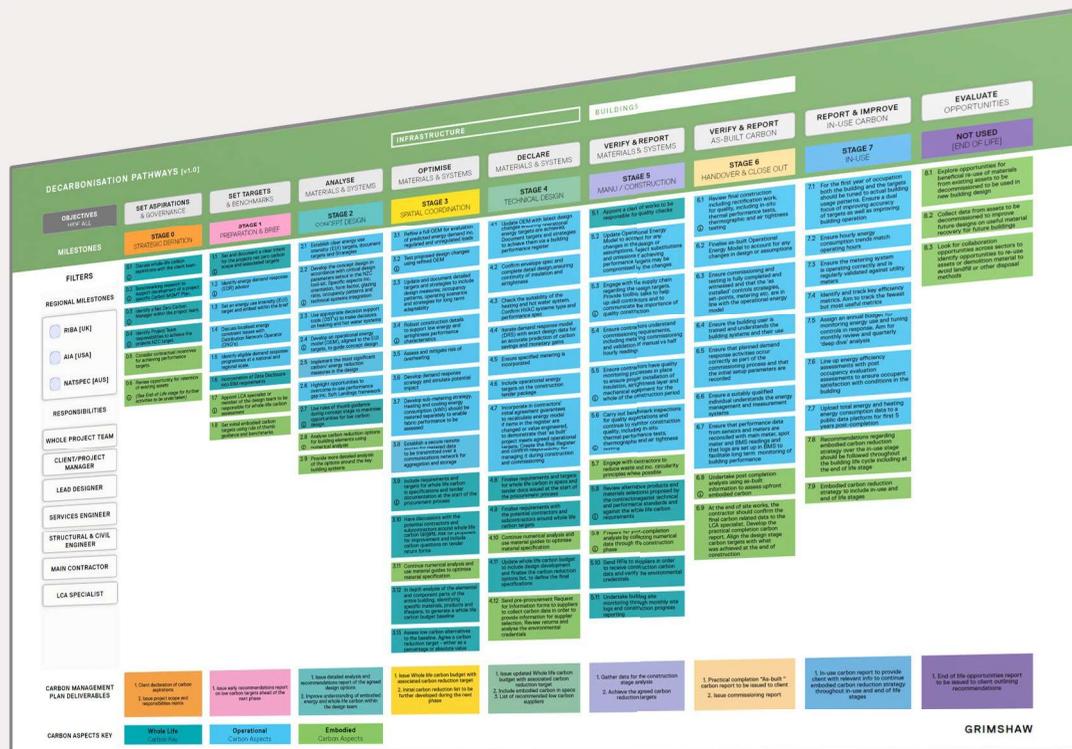
4. Embodied carbon optimisation

5. Assessment & reporting

6. Commissioning & validation

Whole life net zero carbon

Decarbonization pathways



Introduction to Minoro

Minoro

Registration

Register Minoro to keep informed of the latest updates and improvements.

I would like to contribute data to the new database to future Minoro updates.

Submit

* By providing your information you agree to Minoro contacting you to inform you of the latest updates to the platform.
 * Your information will not be passed on to any other third party and will only be used for Minoro related communications.
 * The information you supply will be managed in accordance with international data protection laws – Refer to Minoro's [privacy policy](#) for more information.

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Stage 0 [Pre-Design]	Stage 1 [Pre-design]	Stage 2 [Design]	Stage 3 [Design]	Stage 4 [Design]	Stage 5 [Construct]	Stage 6 [Handover]	Stage 7 [In Use]	Stage 8 [End of life]
0-01 Establish carbon management scope	1-01 Adapt measurement standards	2-01 Confirm energy use intensity targets	3-01 Review carbon reduction targets	4-01 Finalise contractor scope & responsibilities	5-01 Engage with specialist sub-contractors	6-01 Undertake commissioning handover audit	7-01 Gather energy supply & demand	8-01 Explain life extension opportunities [C-D]
0-02 Challenge the project premise / need	1-02 Identify specialist appointments	2-02 Update environmental strategies & systems	3-02 Refine environmental strategies & systems	4-02 Finalise monitoring, reporting procedures	5-02 Finalise specialist sub-contractor proposals	6-02 Finalise operational energy model [B6]	7-02 Identify further reduction opportunities [B17]	
0-03 Establish governance & reporting	1-03 Establish energy use intensity targets	2-03 Commission energy demand response study	3-03 Mitigate impacts of extreme weather	4-03 Finalise testing & commissioning procedures	5-03 Undertake benchmark testing	6-03 Finalise embodied carbon model [A1-A5]	7-03 Measurement & verification	
0-04 Establish policy & legislative drivers	1-04 Establish embodied carbon targets	2-04 Set up an operational energy model [LCa module B6]	3-04 Update operational energy model [B6]	4-04 Review carbon reduction targets	5-04 Undertake commissioning	6-04 Finalise whole-life carbon assessment [A-C]	7-04 Update carbon management plan	
0-05 Explore sustainable finance options	1-05 Identify reduction opportunities	2-05 Identify energy use hotspots	3-05 Update energy use hotspots	4-05 Finalise environmental strategies & systems	5-05 Update operational energy model [B6]	6-05 Update reduction opportunities		
0-06 Explore carbon targets	1-06 Update carbon management plan	2-06 Establish commissioning framework	3-06 Refine systems, components & materials	4-06 Update operational energy model [B6]	5-06 Update embodied carbon model [A1-A5]	6-06 Update carbon management plan		
0-07 Create carbon management plan		2-07 Confirm embodied carbon targets	3-07 Update embodied carbon model [A1-A5]	4-07 Refine systems, components & material	5-07 Update whole-life carbon assessment [A-C]			
		2-08 Evaluate systems, components & materials	3-08 Update embodied carbon hotspots	4-08 Update embodied carbon model [A1-A5]	5-08 Update reduction opportunities			
		2-09 Set up embodied carbon model [A1-A5]	3-09 Update whole-life carbon assessment [A-C]	4-09 Update whole-life carbon assessment [A-C]	5-09 Update carbon management plan			
		2-10 Identify embodied carbon hotspots	3-10 Update reduction opportunities	4-10 Update reduction opportunities				
		2-11 Set up whole life carbon assessment [LCa module A-C]	3-11 Update carbon management plan	4-11 Update carbon management plan				
		2-12 Update reduction opportunities	3-12 Engage potential contractors					
		2-13 Engage supply-chain	3-13 Engage supply-chain					
		2-14 Update carbon management plan	3-14 Finalise transfer documentation					

1 Leadership & Governance 2 Target Setting & Baseline 3 Operate In-use Energy 4 Operate Embodied Carbon 5 Procurement 6 Monitor & Manage 7 Monitor Report & Verify 8 Client / Owner 9 Project Manager 10 Cost Manager 11 Carbon Manager 12 Architect / Lead Designer 13 Structural Engineer 14 Services Engineer 15 Energy Modelling Specialist 16 LCA Specialist 17

Introduction to Minoro (www.minoro.org)

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0-02 Challenge the project premise / need	1-02 Identify specialist appointments	2-02 Evaluate environmental strategies & systems	3-02 Refine environmental strategies & systems	4-02 Finalise monitoring, reporting procedures	5-02 Finalise specialist sub-contractor proposals	6-02 Finalise operational energy model [B6]	7-02 Identify further reduction opportunities [B1-7]	
0-03 Establish governance & reporting	1-03 Establish energy use intensity targets	2-03 Commission energy demand response study	3-03 Mitigate impacts of extreme weather	4-03 Finalise testing & commissioning procedures	5-03 Undertake benchmark testing	6-03 Finalise embodied carbon model [A1-A5]	7-03 Measurement & verification	
0-04 Establish policy & legislative drivers	1-04 Establish embodied carbon targets	2-04 Set up an operational energy model [LCA module B6]	3-04 Update operational energy model [B6]	4-04 Review carbon reduction targets	5-04 Undertake commissioning	6-04 Finalise whole-life carbon assessment [A-C]	7-04 Update carbon management plan	
0-05 Explore sustainable finance options	1-05 Identify reduction opportunities	2-05 Identify energy use hotspots	3-05 Update energy use hotspots	4-05 Finalise environmental strategies & systems	5-05 Update operational energy model [B6]	6-05 Update reduction opportunities		
0-06 Explore carbon targets	1-06 Update carbon management plan	2-06 Establish commissioning framework	3-06 Refine systems, components & materials	4-06 Update operational energy model [B6]	5-06 Update embodied carbon model [A1-A5]	6-06 Update carbon management plan		
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		2-08 Evaluate systems, components & materials	3-08 Update embodied carbon hotspots	4-08 Update embodied carbon model [A1-5]	5-08 Update reduction opportunities			
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		2-10 Identify embodied carbon hotspots	3-10 Update reduction opportunities	4-10 Update reduction opportunities				
		2-11 Set up whole life carbon assessment [LCA module A-C]	3-11 Update carbon management plan	4-11 Update carbon management plan				
		2-12 Update reduction opportunities	3-12 Engage potential contractors					
		2-13 Update carbon management plan	3-13 Engage supply-chain					
			3-14 Finalise tender documentation					

1. Leadership & Governance 2. Target Setting & Baselines 3. Optimise In-use Energy 4. Optimise Embodied Carbon 5. Procurement 6. Measure & Manage 7. Monitor, Report & Verify 8. Client / Owner 9. Project Manager 10. Cost Manager 11. Carbon Manager 12. Architect / Lead Designer 13. Structural Engineer 14. Services Engineer 15. Energy Modelling Specialist 16. LCA Specialist 17

Benefits of Minoro

Benefits of Minoro

- Grimshaw and their design teams have gone through the '*learning by doing*' phase - this saves time and costs.
- Minoro has been peer reviewed and improved by 90+ organisations and industry experts.
- Actions found in Minoro come from practical knowledge through the concept and design stages
- Minoro outlines the process with guidance and actions for carbon management

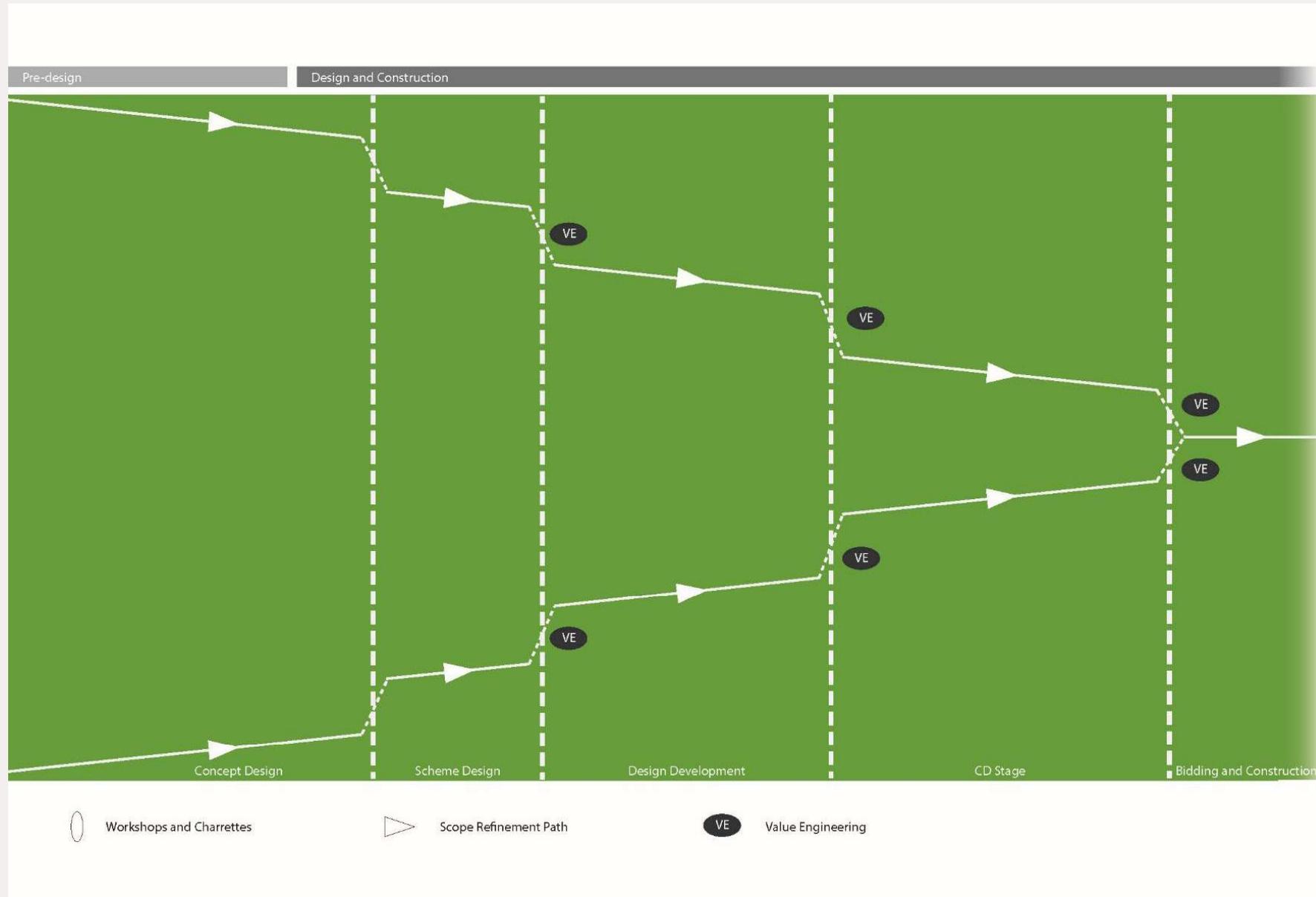
Benefits of Minoro



- **Create a plan for carbon management**
Meet project aspirations and maximise value from the outset by implementing a comprehensive plan to manage whole life carbon.
- **Develop credible, informed carbon reduction targets**
Understand how to set realistic targets that are backed by science in order to achieve a successful project outcome.
- **Make the connection between policy and fiscal incentives**
Drive out carbon across a project's value chain by leveraging available policies and fiscal incentives.
- **Seek opportunities at all project stages**
Identify and maintain a register of carbon reduction opportunities throughout a project's life including design, construction and maintenance.

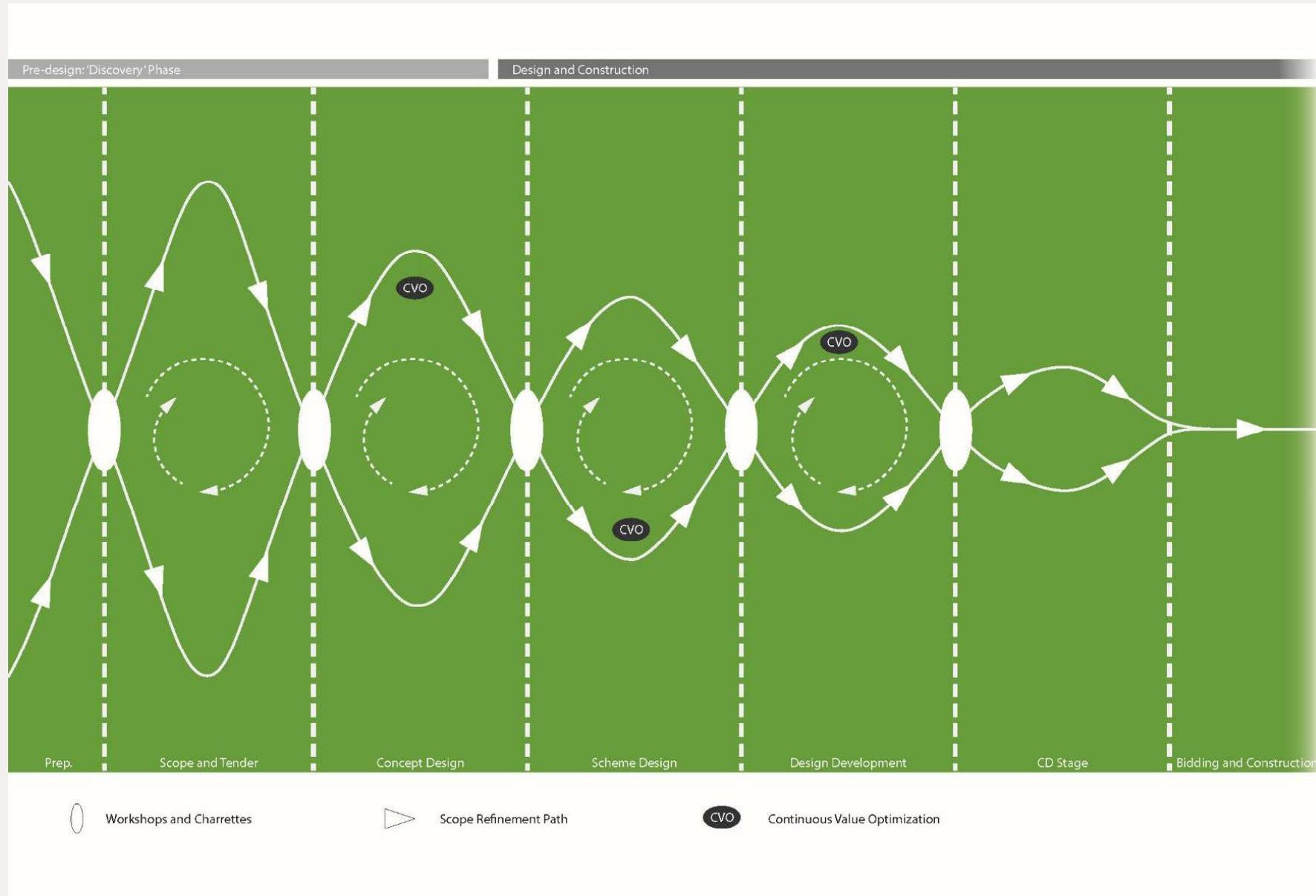
Integrative design approach

Business-As-Usual



*Image credit: Atelier Ten
Based on the work of 7 Group and Bill Reed,
The Integrative Design Guide to Green Building*

An Integrative Design Process



*Image credit: Atelier Ten
Based on the work of 7 Group and Bill Reed,
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An Integrative Design Process

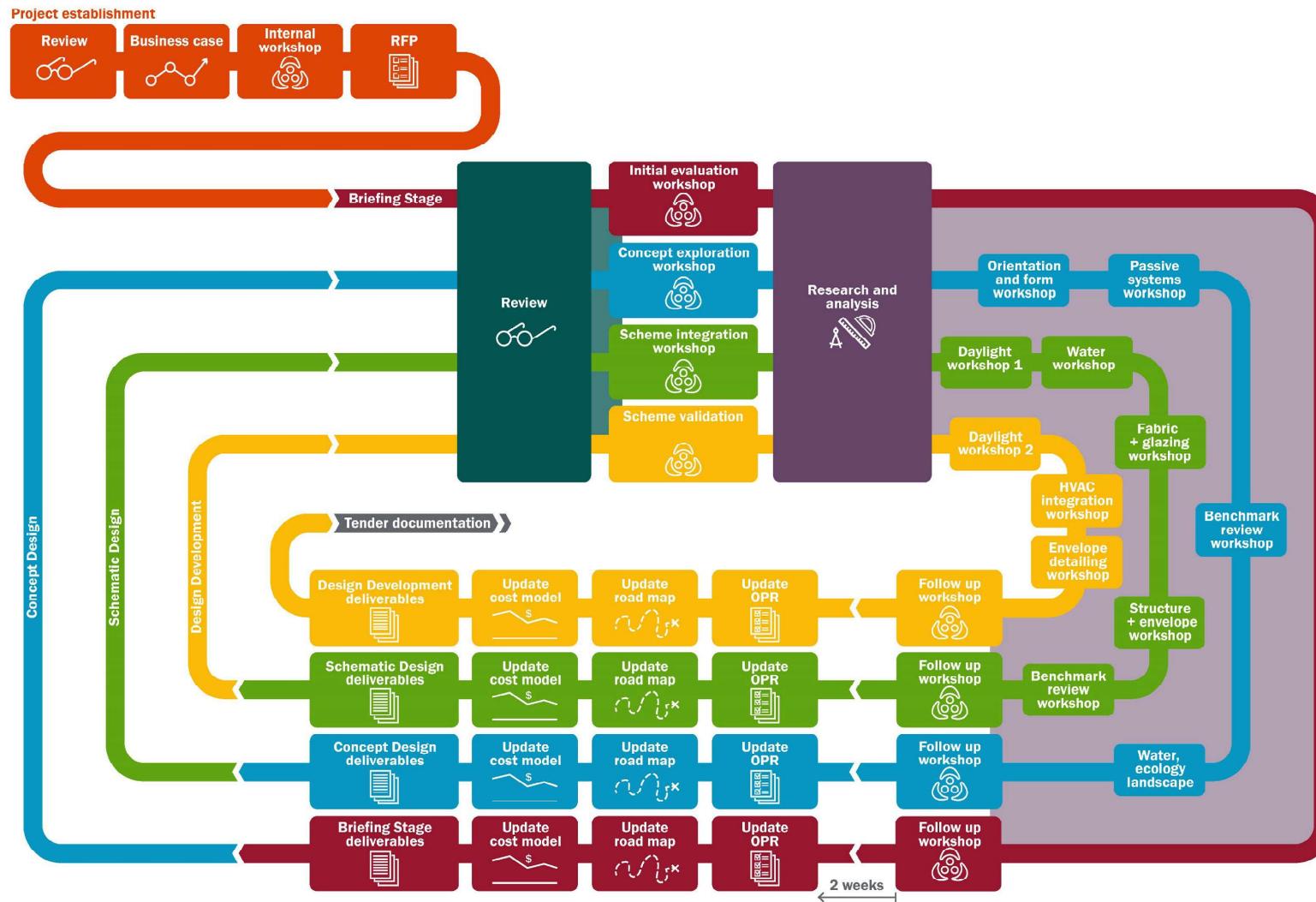


Image credit: Atelier Ten

Minoro

Stage 0 [Pre-Design]

Stage 1 [Pre-Design]

Q&A

Strategy

Establish carbon management

100%

Adaptation

100%

Climate

