

Project Phase	Sub-Phase	Chapter	Owner	Construction Manager	Sustainability Consultant	Architect	Structural Engineer	General Contractor	A1-A3 Cradle to Gate	A4 Transportation	A5 Installation	B Use	C End of Life
First Steps	Pre-Design	Setting <b>embodied carbon benchmarks and targets</b>											
		Demonstrating <b>market demand for low carbon materials</b>											
Preconstruction	Concept/ Schematic Design	Requiring <b>embodied carbon accounting for projects</b>											
		Using <b>embodied carbon data to inform systems level design</b>											
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		Creating <b>an upfront carbon estimate</b>											
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Construction	Procurement	Creating <b>low carbon bid documents</b>											
		Including <b>embodied carbon data in bid leveling</b>											
	Construction	Tracking <b>realized embodied carbon of materials in construction</b>											
		Minimizing <b>transportation carbon emissions</b>											
		Minimizing <b>construction site carbon emissions</b>											
		Minimizing <b>construction waste</b>											
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			○	○	○	○	○	○
			○	○	○	○	○	○
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Deconstruction	Demolition/Disposal	Promoting <b>a circular economy</b>	○	○	○	○	○	○

## Who does what?

Reducing embodied carbon spans all phases of a building, from pre-design to its end of life.

It also requires engagement from all stakeholders, from the Owner's Team to the Design Team and General Contractor.

This plan outlines where each key stakeholder has some responsibility or role in implementing embodied carbon reduction on a building project.

- Leading Role
- Leading Role (if engaged on project)
- Supporting Role
- Supporting Role (if engaged on project)



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		Minimizing <b>construction waste</b>	○	○	○	○	○	○
			○	○	○	○	○	○
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Deconstruction	Demolition/Disposal	Promoting <b>a circular economy</b>	○	○	○	○	○	○

## Who does what?

### Design-Bid-Build Model

In a design/bid/build model, the General Contractor is not engaged during the preconstruction phase.

This puts more of the responsibility on the Sustainability Consultant (if engaged), Architect and Structural Engineer to complete the important scope of preparing an upfront carbon estimate during Design Development and Construction Documents.

- Leading Role
- Leading Role (if engaged on project)
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		Creating <b>an upfront carbon estimate</b>	○	○	○	○	○	○
		Creating <b>low carbon specifications</b>	○	○	○	○	○	○
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		Minimizing <b>transportation carbon emissions</b>	○	○	○	○	○	○
		Minimizing <b>construction site carbon emissions</b>	○	○	○	○	○	○
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			○	○	○	○	○	○
			○	○	○	○	○	○
Operations	Use/Replacement	Minimizing <b>replacement of materials</b>	○	○	○	○	○	○
Deconstruction	Demolition/Disposal	Promoting <b>a circular economy</b>	○	○	○	○	○	○

## Who does what?

### Design-Build and General Contractor/ Construction Manager (GCCM) Models

When the General Contractor is engaged during Preconstruction, they can work with the design team to prepare cost for design options and take the lead on preparing upfront carbon estimates, alongside cost estimates, during the Design Development and Construction Documents phase.

- Leading Role
- Leading Role (if engaged on project)
- Supporting Role
- Supporting Role (if engaged on project)

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Operations	Use/Replacement	Minimizing <b>replacement of materials</b>
Deconstruction	Demolition/Disposal	Promoting <b>a circular economy</b>

Owner


















Construction  
Manager

Who does what?

The Owner and their Construction Manager (if engaged on project) play an integral role throughout every phase and chapter of embodied carbon reduction.

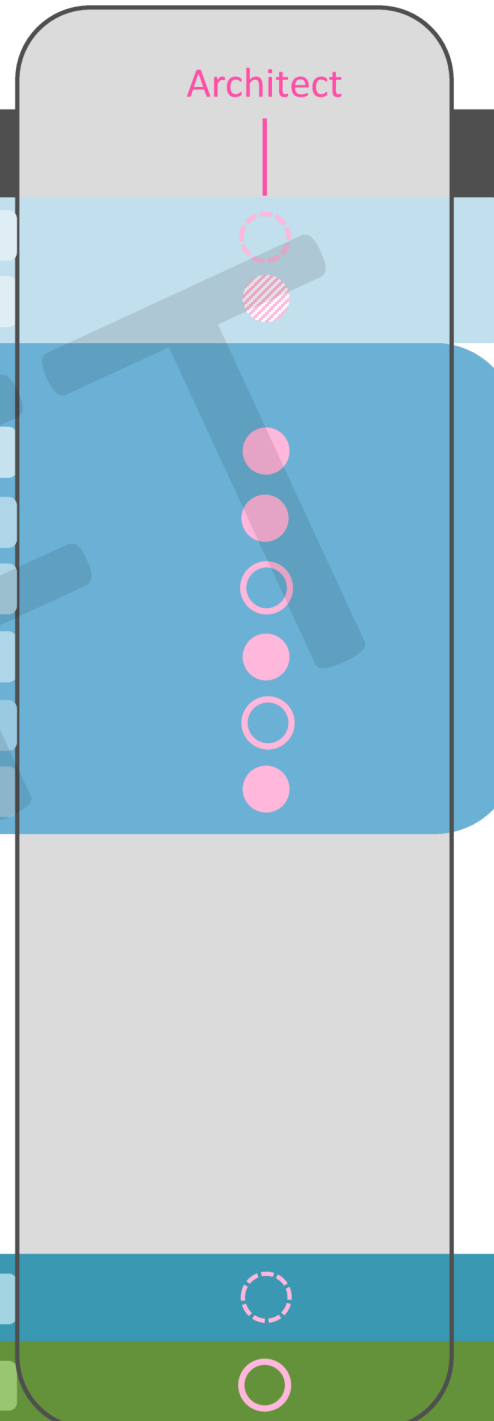
Owners first need to understand the full process of embodied carbon accounting and reduction, as well as the key stakeholders they should lean on to create and provide the information they need to take action.

With the appropriate embodied carbon data provided to them at the various phases of their project, Owners can make informed low carbon decisions.

Project Phase	Sub-Phase	Chapter	Consultant	Who does what?
First Steps	Pre-Design	Setting <b>embodied carbon benchmarks and targets</b>		The Sustainability Consultant can be the Owner's right hand person when it comes leading the work necessary to first set benchmarks and targets, then supporting the process of accounting for and reducing embodied carbon, through all phases of a building's life.
		Demonstrating <b>market demand for low carbon materials</b>		
Preconstruction	Concept/ Schematic Design	Requiring <b>embodied carbon accounting for projects</b>		If engaging a sustainability consultant on a project, finding someone with knowledge of whole building life cycle assessment (WBLCA) and low carbon specification and procurement can be an asset.
		Using <b>embodied carbon data to inform systems level design</b>		
	Design Development	Setting <b>a bill of materials for embodied carbon tracking</b>		
		Creating <b>an upfront carbon estimate</b>		
		Creating <b>low carbon specifications</b>		
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Operations	Use/Replacement	Minimizing <b>replacement of materials</b>
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## Who does what?

The Architect plays a key role in the embodied carbon assessment of design and material choices. They are the conduit between an Owner's embodied carbon commitments and targets and the low carbon building systems and material selections that meet all of the design, program and performance requirements that an Owner specifies.

It is helpful to select an architect with expertise in using WBLCA tools early in design, as well as implementing low carbon specifications and materials selections in the later stages.

Project Phase

Sub-Phase

Chapter

*Who does what?*

First Steps

Pre-Design

Setting **embodied carbon benchmarks and targets**

Demonstrating **market demand for low carbon materials**

Preconstruction

Concept/  
Schematic Design

Using **embodied carbon data to inform systems level design**

Design  
Development

Setting **a bill of materials for embodied carbon tracking**

Creating **an upfront carbon estimate**

Creating **low carbon specifications**

Construction  
Documents

Refining **the upfront carbon estimate**

Refining **low carbon specifications**

Operations

Use/Replacement

Minimizing **replacement of materials**

Deconstruction

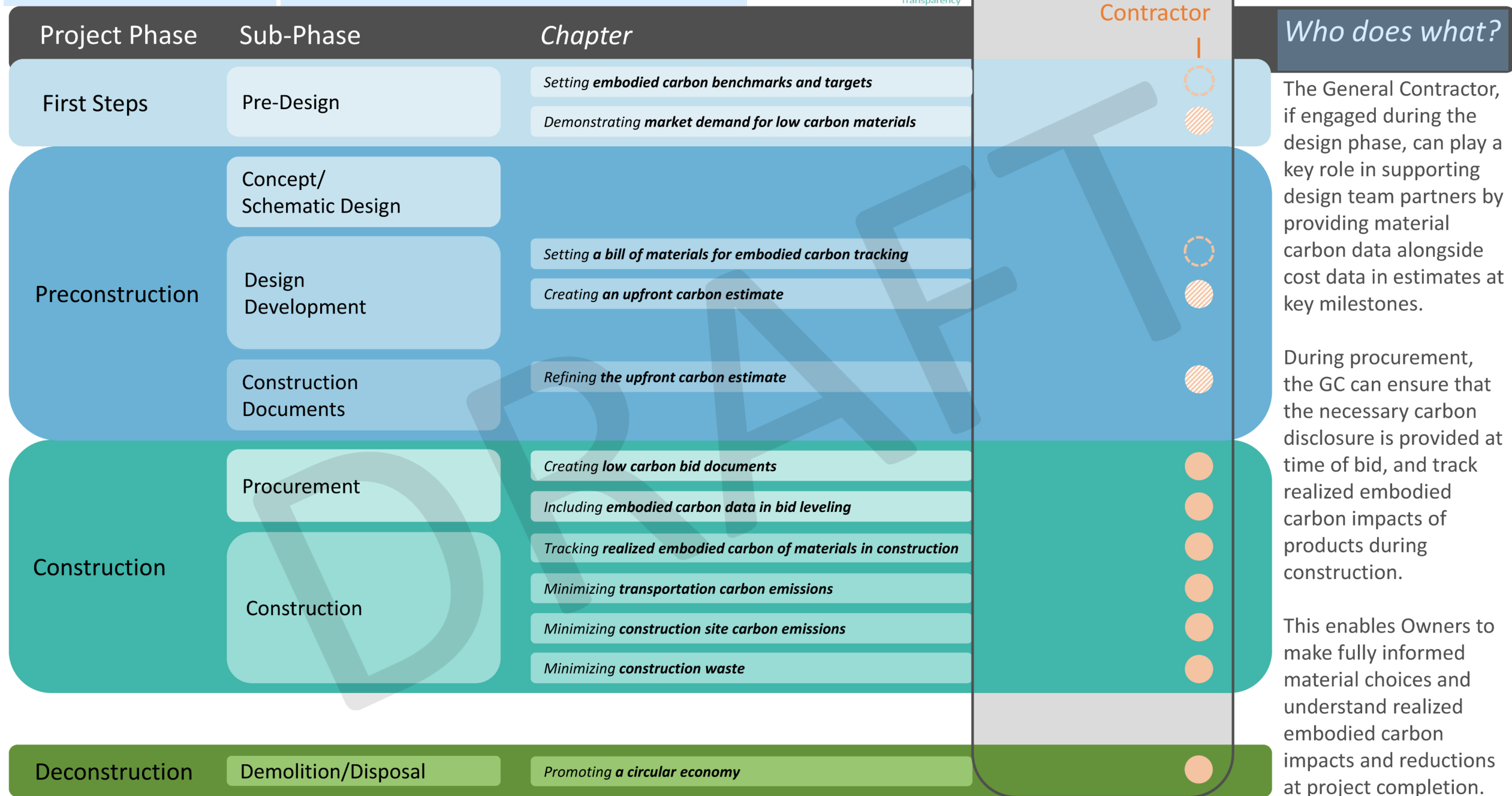
Demolition/Disposal

Promoting **a circular economy**

The Structural Engineer plays a vital role in understanding and reducing the embodied carbon impacts of some of the highest emissions building materials.

They can provide embodied carbon reduction strategies and options to optimize structural materials systems in early design phases, and inform low carbon structural material specifications in the later stages.

Selecting a structural engineer with expertise in building WBLCA and low carbon material specifications can be a key step in reducing embodied carbon.



Project Phase	Sub-Phase	Chapter	A1-A3 Cradle to Gate	A4 Transportation	A5 Installation	B Use	C End of Life
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		Demonstrating <b>market demand for low carbon materials</b>	<input type="checkbox"/>				
Preconstruction	Concept/ Schematic Design	Requiring <b>embodied carbon accounting for projects</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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Construction	Procurement	Creating <b>low carbon bid documents</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
		Including <b>embodied carbon data in bid leveling</b>	<input type="checkbox"/>				
	Construction	Tracking <b>realized embodied carbon of materials in construction</b>	<input type="checkbox"/>				
		Minimizing <b>transportation carbon emissions</b>		<input type="checkbox"/>			
		Minimizing <b>construction site carbon emissions</b>			<input type="checkbox"/>		
		Minimizing <b>construction waste</b>					<input type="checkbox"/>
Operations	Use/Replacement	Minimizing <b>replacement of materials</b>				<input type="checkbox"/>	
Deconstruction	Demolition/Disposal	Promoting <b>a circular economy</b>	<input type="checkbox"/>				<input type="checkbox"/>

## What stages, when?

Embodied carbon is comprised of multiple stages of emissions impacts.

All of these stages are important to consider when looking at embodied carbon reduction across a building's life.

Each stage comprises a different percentage of total impacts and is informed and reduced by various Chapters included in this plan.



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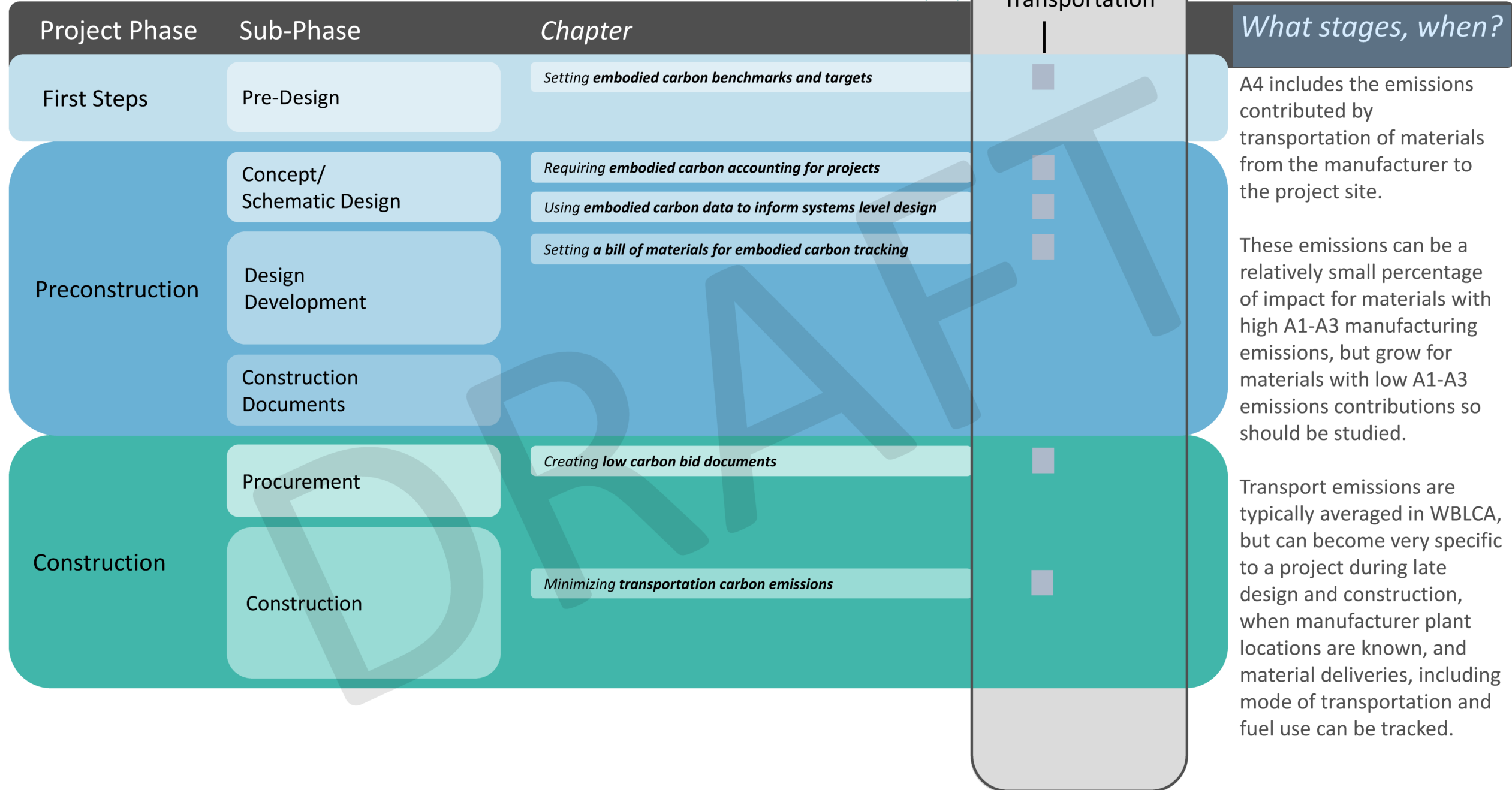
A1-A3  
Cradle to Gate

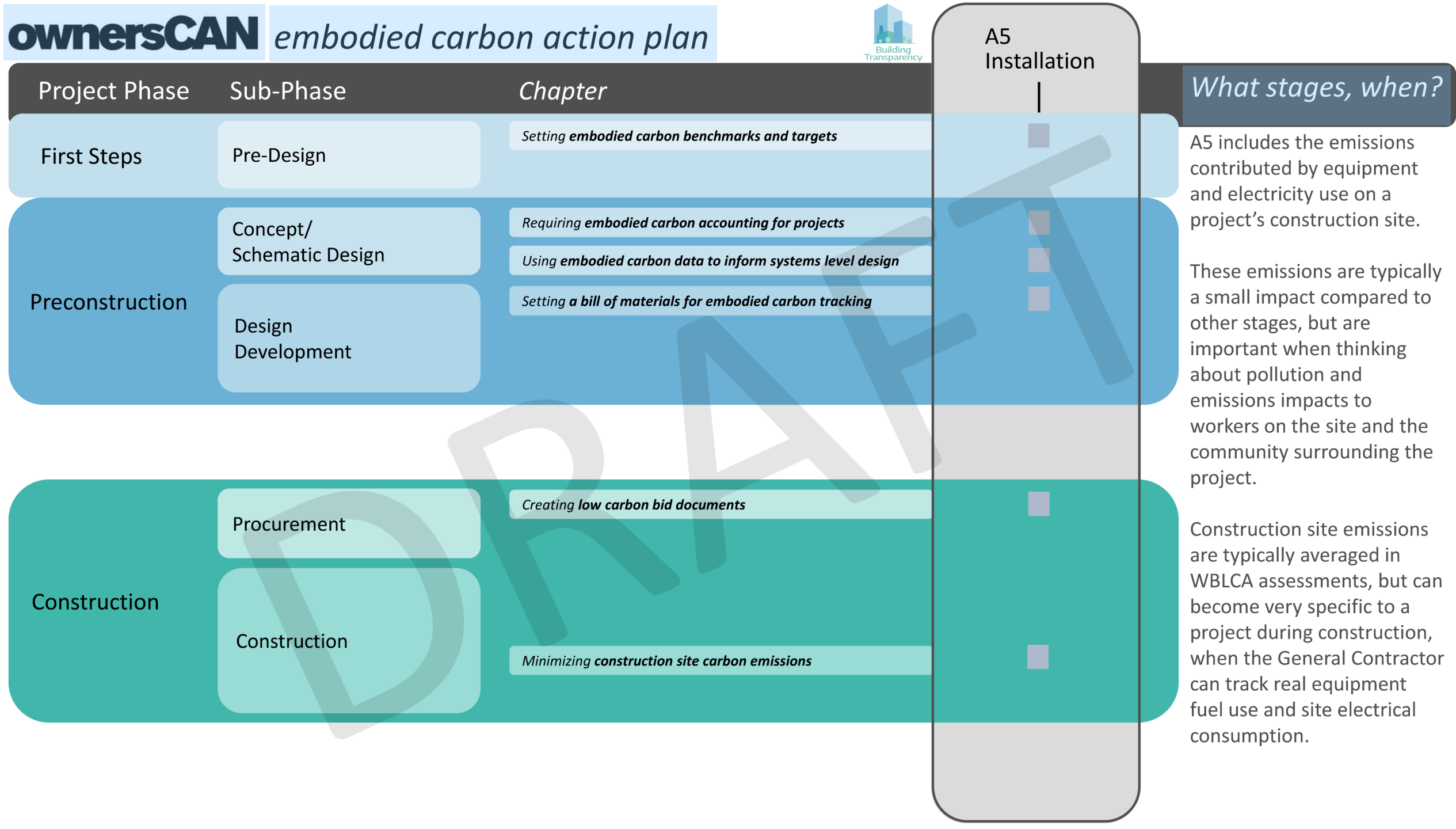
*What stages, when?*

A1-A3 are the emissions associated with the cradle to gate manufacturing of a product, and comprise the largest percentage of emissions impacts for major building materials.

Including reduction of A1-A3 emissions in an embodied carbon reduction plan is critical to encourage the manufacture of low carbon building materials, as well as enable tracking of realized embodied carbon emissions at the product level.

By specifying and procuring materials that report lower A1-A3 impacts, it also incentivizes manufacturers to understand their supply chain emissions and include material reuse, reducing their product emissions.





Project Phase	Sub-Phase	Chapter
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B  
Use  
|

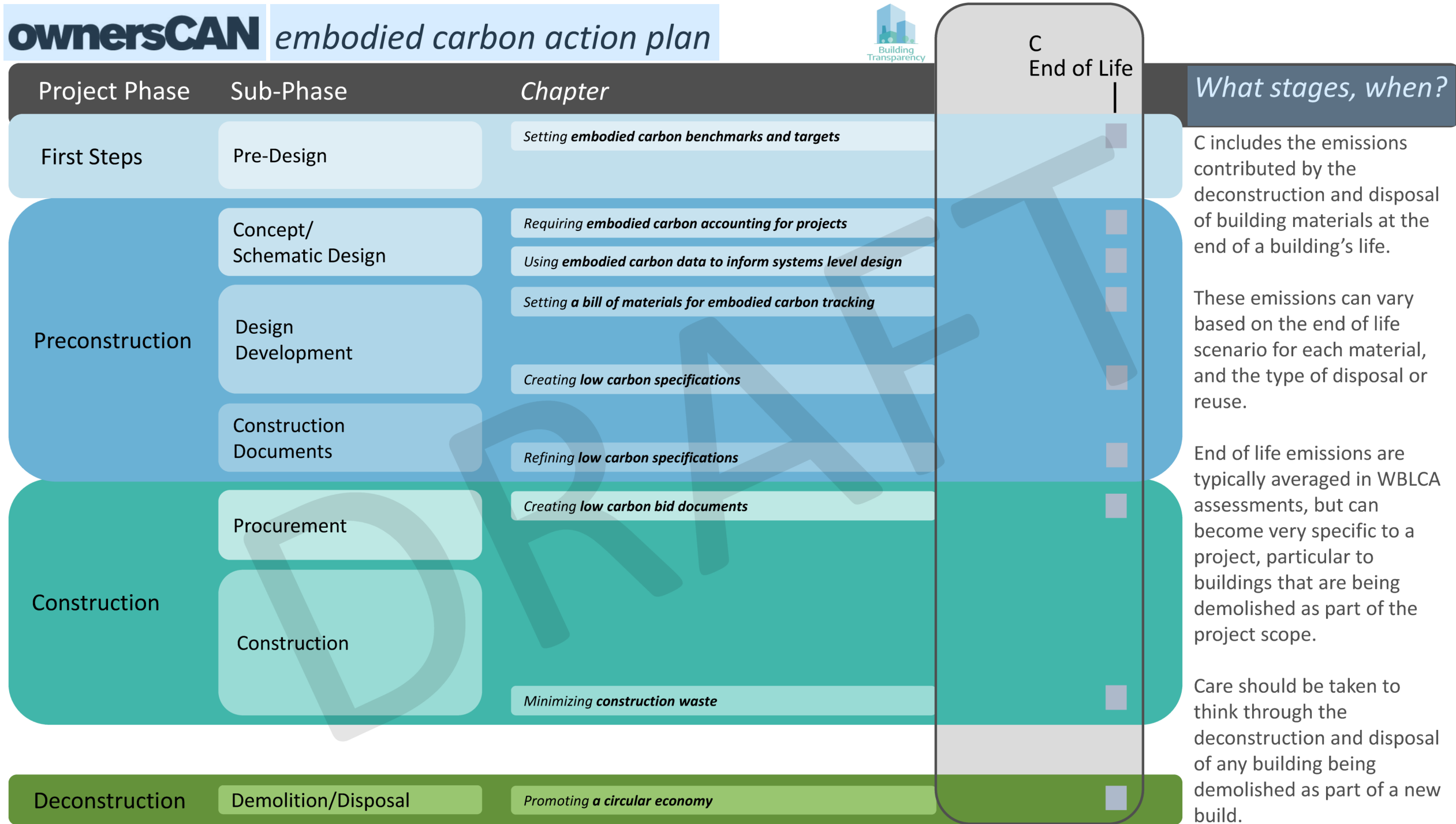
## *What stages, when?*

B includes the emissions contributed by material replacements during a building's use phase.

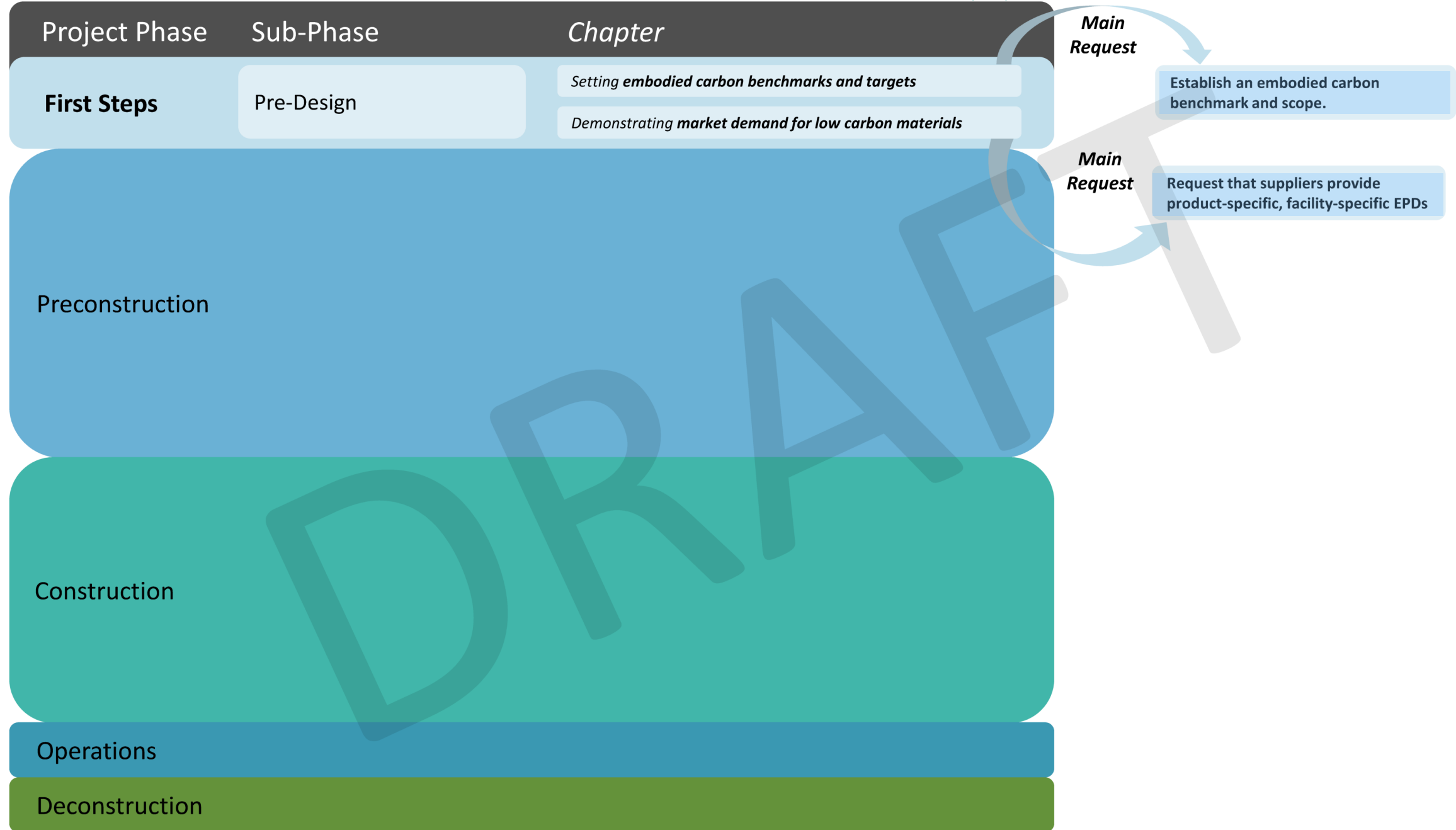
These emissions can become a substantial amount of the total emissions impact depending on performance and service life of the materials installed, and the Owner's typical replacement cycles for materials like interior finishes.

Use emissions are typically averaged in WBLCA assessments, but can be calculated more specifically when product options are known and product specific emissions factors can be used to multiply by the anticipated number of replacements.





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Project Phase

Sub-Phase

Chapter

First Steps

**Preconstruction**

Concept/  
Schematic Design

*Requiring **embodied carbon accounting** for projects*

*Using **embodied carbon data** to inform systems level design*

**Construction**

**Operations**

**Deconstruction**

Describe intent to minimize embodied carbon in project.

Include tracking and reducing embodied carbon in project team requirements.

Conduct a whole-building life cycle analysis (WBLCA) to optimize design and materials

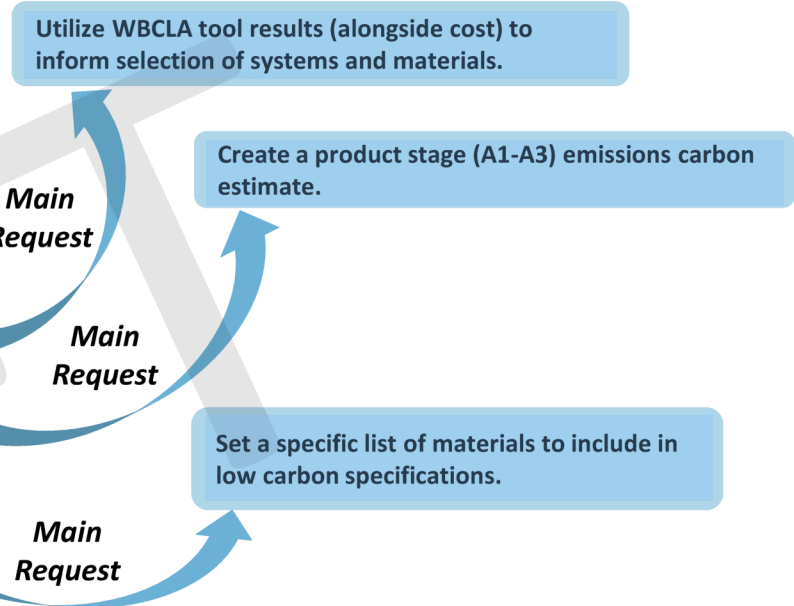
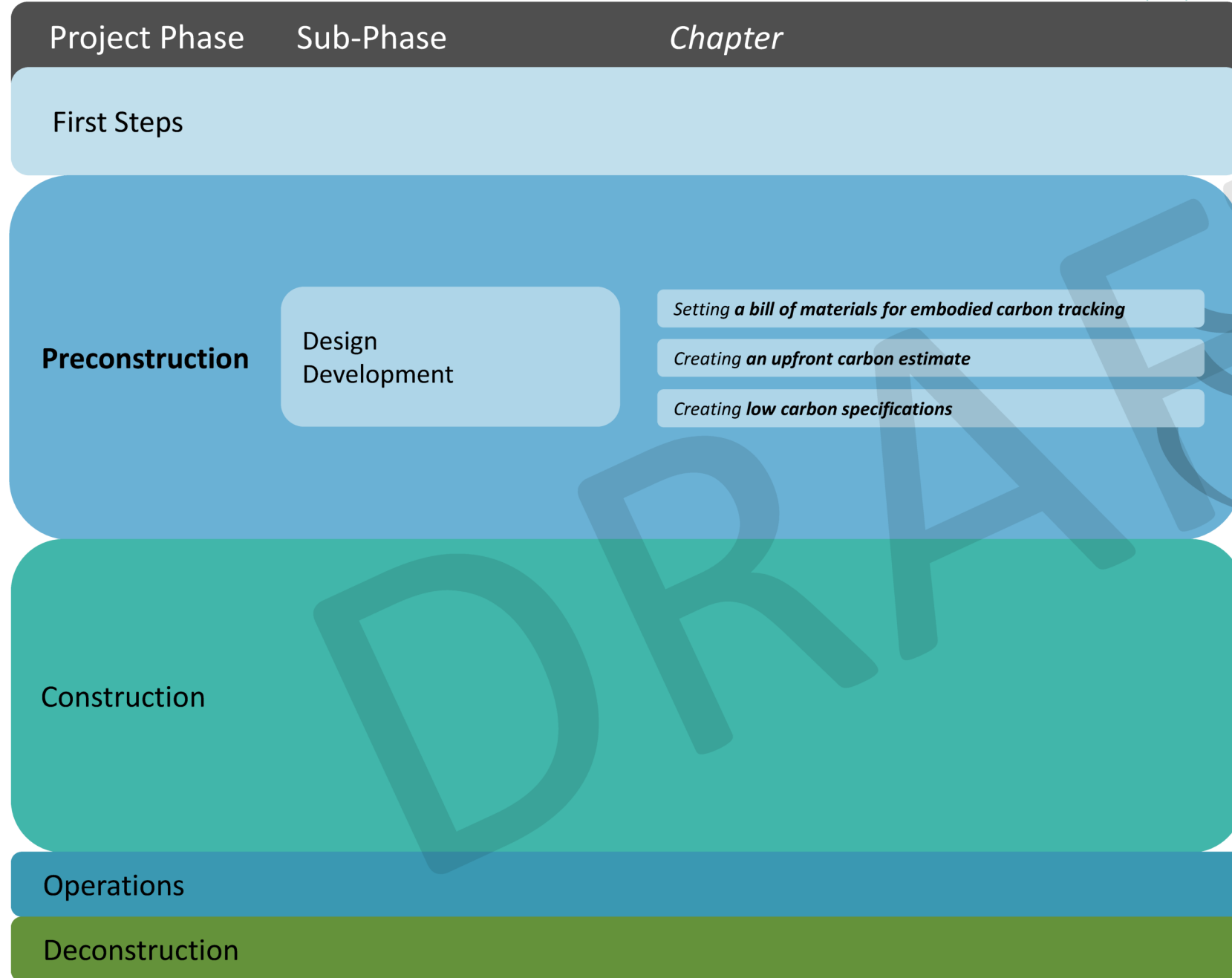
**Main Request**

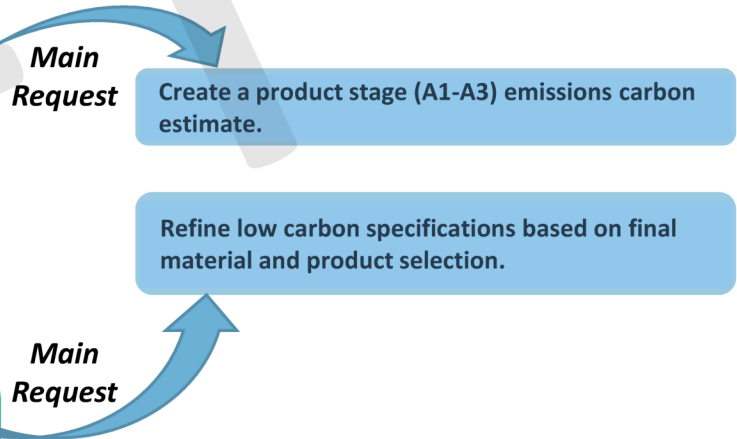
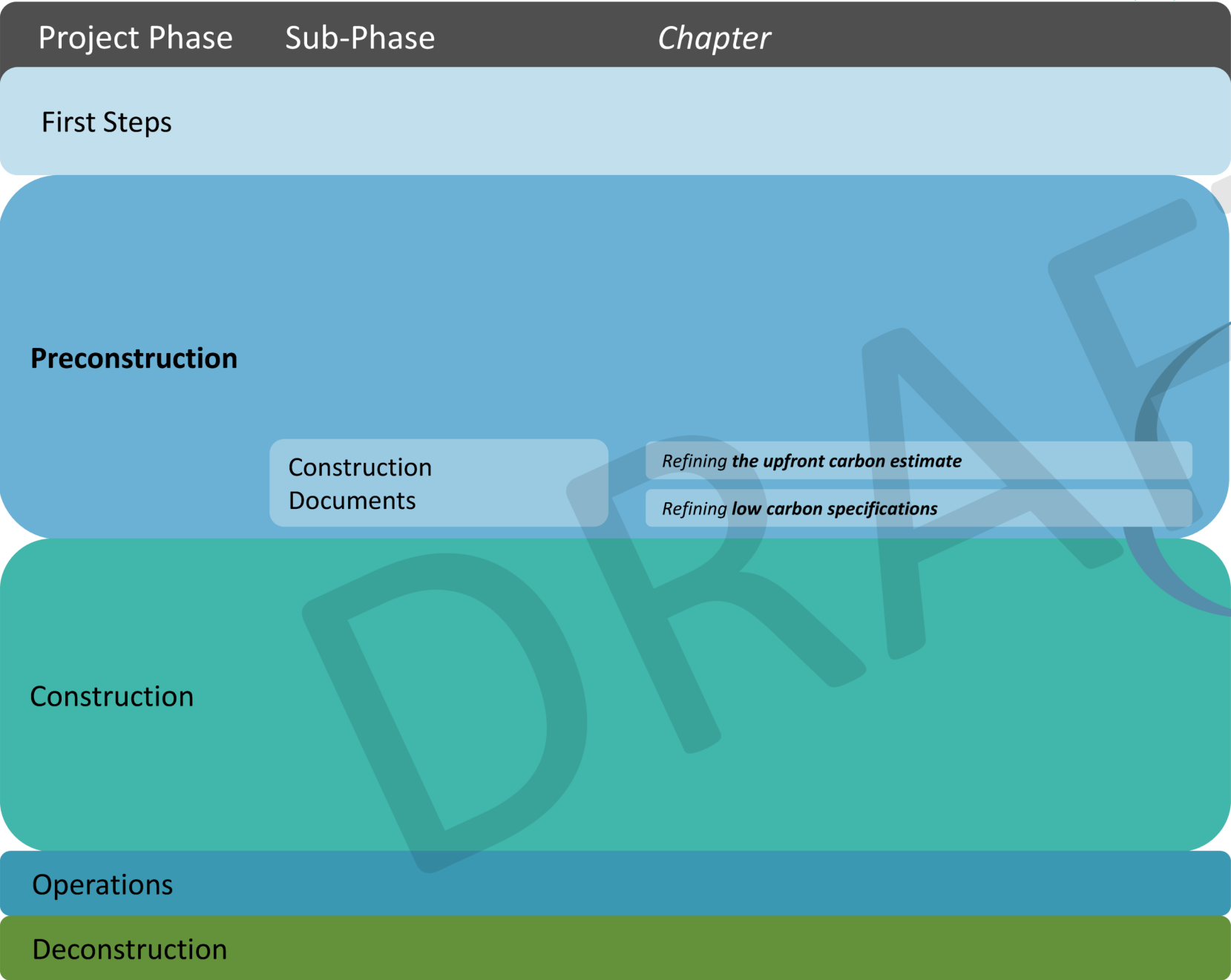
**Main Request**

**Main Request**

DRAFT







Project Phase

Sub-Phase

*Chapter*

First Steps

Preconstruction

Construction

Operations

Deconstruction

Procurement

*Creating **low carbon bid** documents*

*Including **embodied carbon** data in bid leveling*

**Main  
Request**

Create standard embodied carbon bid language for included material categories.

**Main  
Request**

Utilize embodied carbon data, alongside cost data, to inform selection of bidders.

Project Phase

Sub-Phase

Chapter

First Steps

Preconstruction

**Construction**

Construction

Tracking *realized embodied carbon* of materials in construction

Minimizing *transportation carbon emissions*

Minimizing *construction site carbon emissions*

Minimizing *construction waste*

Operations

Deconstruction

*Main Request*

Create an as-built project to report realized embodied carbon.

*Main Request*

Implement a materials sourcing and fuel plan with suppliers of major materials.

*Main Request*

Implement a site emissions reduction plan.

*Main Request*

Implement a construction waste diversion plan to reduce materials to landfill.

Project Phase

Sub-Phase

Chapter

First Steps

Preconstruction

Construction

Operations

Use/Replacement

*Minimizing replacement of materials*

Deconstruction

**Main  
Request**

During Design Phase, include  
analysis of durability and  
performance of materials in  
selection process.

**Main  
Request**

During Use Phase, promote longer  
replacement cycles of materials.



Project Phase

Sub-Phase

Chapter

First Steps

Preconstruction

Construction

Operations

**Deconstruction**

Demolition/Disposal

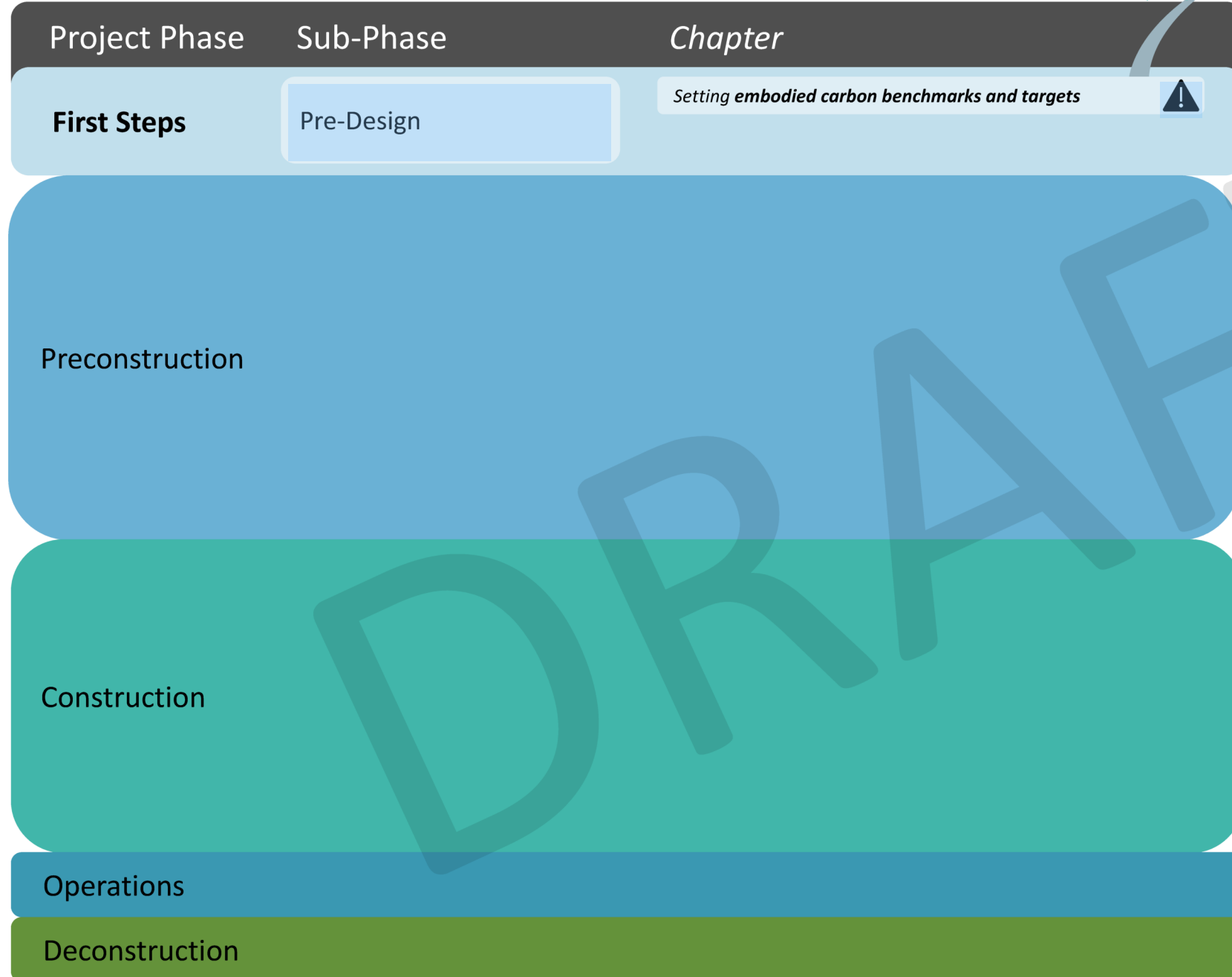
*Promoting a circular economy*

**Main  
Request**

During Design Phase, promote materials salvage, reuse and deconstruction for new and existing buildings included in scope.

**Main  
Request**

During construction phase, require high percentage diversion from landfill.



**Main Request**

Establish an embodied carbon benchmark and scope.

**Key Action(s)**

Utilize completed projects with material quantity and material data to backcast projects into a selected embodied carbon analysis tool, or group of tools.

**Key Step(s)**

1. Select the embodied carbon analysis tool(s) you will use as a standard accounting method, for both benchmarking and project specific work.
2. Create a list of materials to include in embodied carbon accounting scope.
3. Locate project data (material quantities and selected materials data) to create representative projects.
4. Utilize reported embodied carbon kgCO2e/sf for backcasted projects to set project benchmarks.
5. Utilize outputs from selected tools (if possible) to inform embodied carbon reduction targets and material optimization.

**Resource(s)**

Whole building life cycle assessment tools:

Tally: <https://www.choosetally.com/>

One Click: <https://www.oneclicklca.com/>

Athena: <https://calculatelca.com/>

Supply Chain Low Carbon Specification and Procurement/Carbon Estimating Tools:

EC3: [www.buildingtransparency.org/en](http://www.buildingtransparency.org/en)

CLF Embodied Carbon Benchmark Study: <https://carbonleadershipforum.org/embodied-carbon-benchmark-study-data-visualization/>

Case Studies:

[Hudson Pacific Approach to Embodied Carbon](#)

Project Phase

Sub-Phase

Chapter

First Steps

Pre-Design

Setting *embodied carbon benchmarks and targets***Common Roadblocks:**

1. Lack of knowledge/expertise in embodied carbon accounting tools.
2. Access to embodied carbon accounting tools (many have license fees or require user training/expertise)
3. Access to historical building data (material quantities/procured materials)

**Suggestions:**

1. It's ok to start with imperfect data, or start with limited scope of buildings and/or materials. The key is to simply start!

Preconstruction

Construction

Operations

Deconstruction

Project Phase

Sub-Phase

Chapter

First Steps

Pre-Design

Demonstrating **market demand** for low carbon materials

Preconstruction

Construction

Operations

Deconstruction

Main  
RequestRequest that suppliers provide  
product-specific, facility-specific EPDs

Key Action(s)

Letter to suppliers from all key project/organizational stakeholders requesting suppliers begin producing product specific, facility specific Type III, third party verified EPDs, *with the ultimate goal of EPDs demonstrating "optimization"*.

Key Step(s)

1. Create list of suppliers you typically specify/procure/purchase from.
2. Use the EC3 tool to determine if they have product specific EPDs in place.
3. Set up calls or meetings with suppliers who do not have product specific EPDs to educate them on embodied carbon and request EPDs.
4. Send official EPD request letter to suppliers to formalize ask and build the business case for investment in EPDs.

Resource(s)

Template EPD request letter:

<https://drive.google.com/file/d/1yowdbzau3lF1y93Rw9-dBgSk10xVTMwF/view?usp=sharing>

Video on how to use EC3 tool to find EPDs:

<https://www.youtube.com/watch?v=8epWK74-quQ&t=171s>

Project Phase

Sub-Phase

Chapter

First Steps

Pre-Design

*Demonstrating market demand for low carbon materials***Typical Roadblocks:**

1. Lack of knowledge of embodied carbon/EPDs by suppliers.
2. Cost of EPD production/verification.
3. Historic lack of digital standardization of EPD format.

**Suggestions:**

1. Use resources like BT's "[how to get an EPD](#)" to educate manufacturers and suppliers.
2. Use BT's "[Template EPD request letter](#)" to standardize the ask.
3. Request EPDs be in [openEPD](#) format to enable quick and accurate translation of EPDs into the EC3 (and other tools) database.

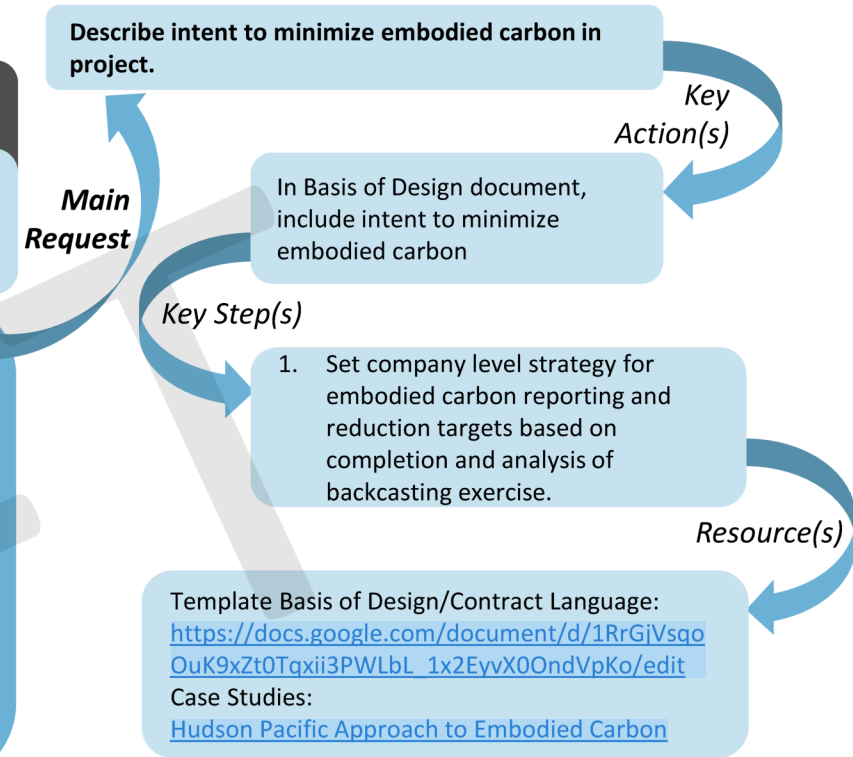
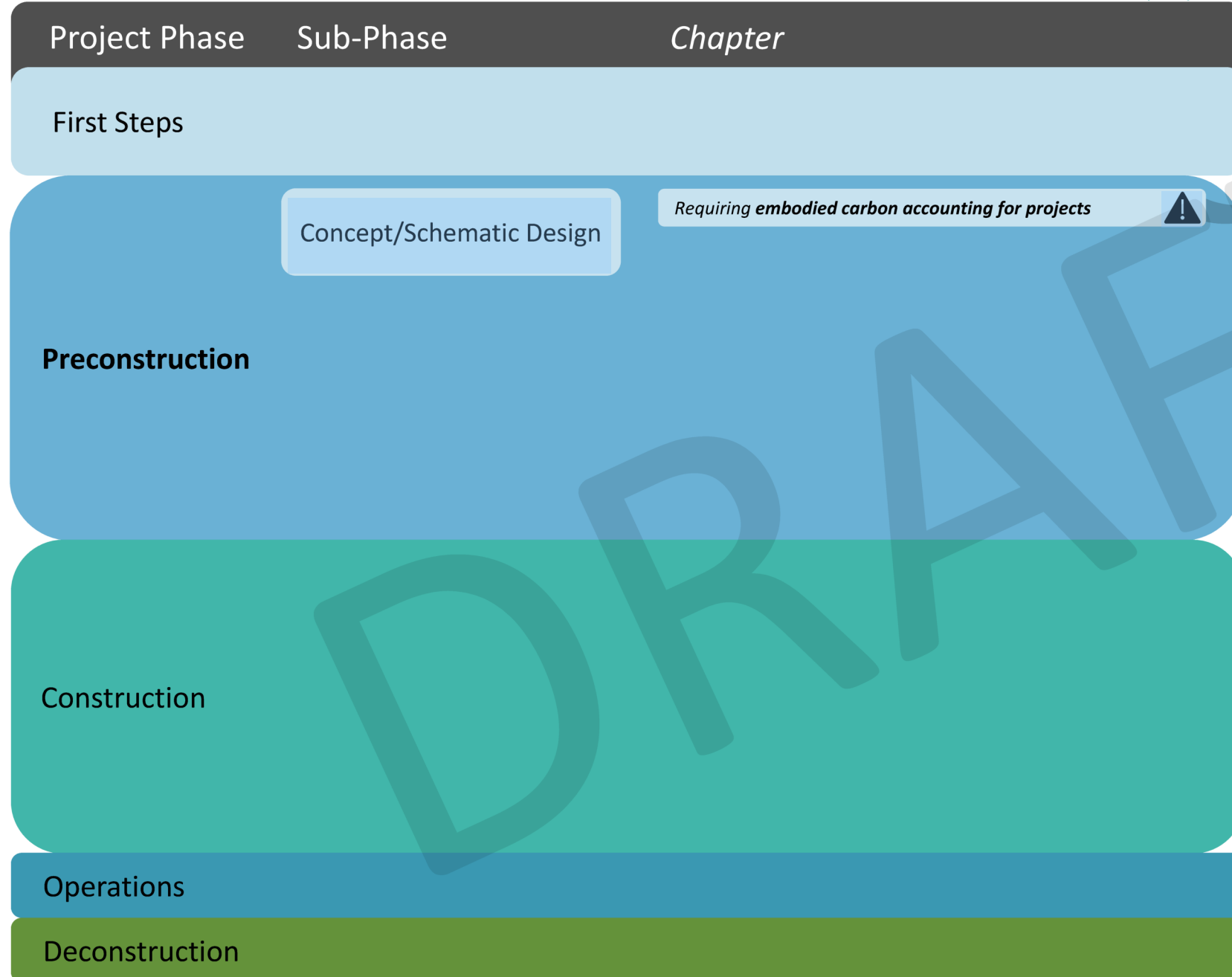
Preconstruction

Construction

Operations

Deconstruction





Project Phase

Sub-Phase

Chapter

First Steps

Preconstruction

Concept/Schematic Design

Requiring *embodied carbon accounting* for projects

Construction

Operations

Deconstruction

**Typical Roadblocks:**

1. Lack of Owner knowledge or experience with embodied carbon accounting.

**Suggestions:**

1. Use the ownersCAN Embodied Carbon Action Plan (ECAP) to align on embodied carbon requirements.
2. Request to join ownersCAN biweekly calls to learn from and share with a consortium of Owners at various stages of their embodied carbon journey.
3. Sharing is caring!

Project Phase

Sub-Phase

Chapter

First Steps

Concept/  
Schematic Design

Requiring *embodied carbon accounting for projects*



**Main  
Request**

Include tracking and reducing embodied carbon in project team requirements.

**Key  
Action(s)**

Include requirements for tracking and reducing embodied carbon in RFPs and contract language for project partners (AEC, etc).

**Key Step(s)**

1. Include questions around experience in completing Whole Building Life Cycle Assessment (WBLCA) and Low Embodied Carbon Specification and Procurement in RFP requirements and scoring.
2. Include requirements for completing WBLCA and Low Embodied Carbon Specification and Procurement in contracts with project partners (AEC, etc).

**Resource(s)**

Template RFP Language: *ownersCAN to finalize*  
Template AEC Contract Language: *ownersCAN to finalize*  
Case Studies:  
[Hudson Pacific Approach to Embodied Carbon](#)

**Preconstruction**

**Construction**

**Operations**

**Deconstruction**

Project Phase

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First Steps

Concept/Schematic Design

Requiring *embodied carbon accounting* for projects

Preconstruction

Construction

Operations

Deconstruction

**Typical Roadblocks:**

1. Lack of Owner knowledge or experience with embodied carbon accounting.

**Suggestions:**

1. Use the ownersCAN Embodied Carbon Action Plan (ECAP) to align on embodied carbon requirements.
2. Request to join ownersCAN biweekly calls to learn from and share with a consortium of Owners at various stages of their embodied carbon journey.
3. Sharing is caring!

Project Phase

Sub-Phase

Chapter

First Steps

Concept/  
Schematic Design

Using *embodied carbon data* to inform systems level design !

**Preconstruction**

**Construction**

**Operations**

**Deconstruction**

**Main  
Request**

**Conduct a whole-building life cycle analysis (WBLCA) to optimize design and materials**

**Key  
Action(s)**

Include completion of WBLCA in project team scope and deliverables.

**Key Step(s)**

1. Assign a team member to manage the WBLCA
2. Complete a WBLCA at conceptual and schematic design milestones.
3. Study material systems using WBLCA tools and optimize choices based on results.

**Resource(s)**

ownersCAN to share case study(s) of use of WBLCA tool in early design to optimize design and materials



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First Steps

Concept/  
Schematic Design*Using embodied carbon data to inform systems level design* 

Preconstruction

Construction

Operations

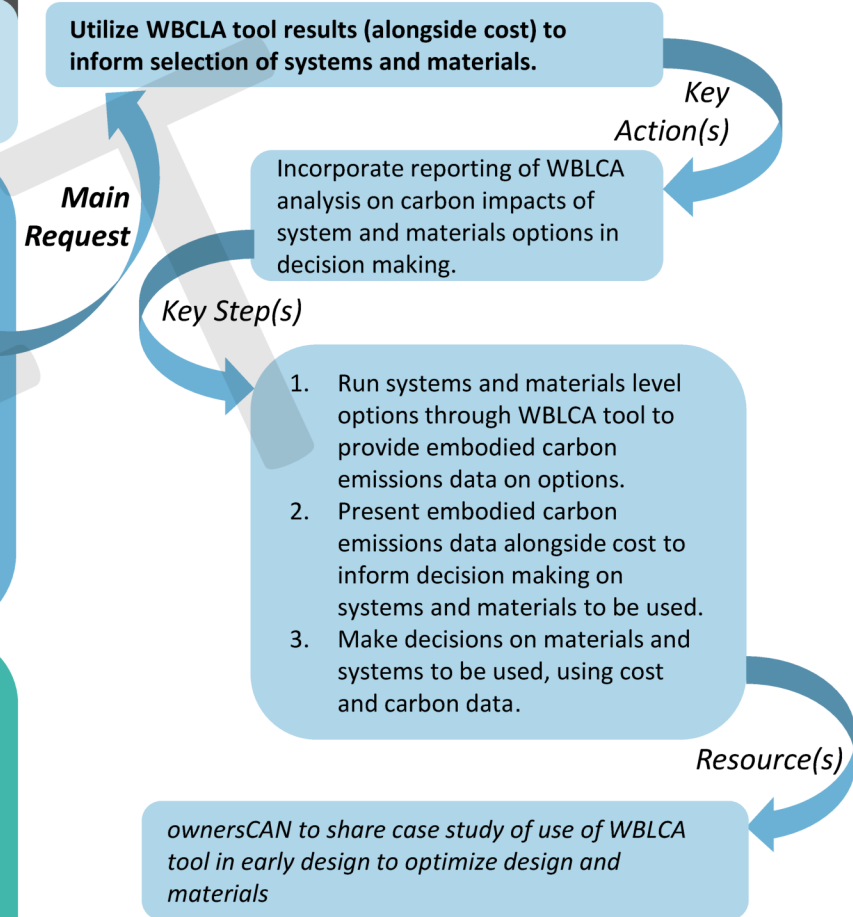
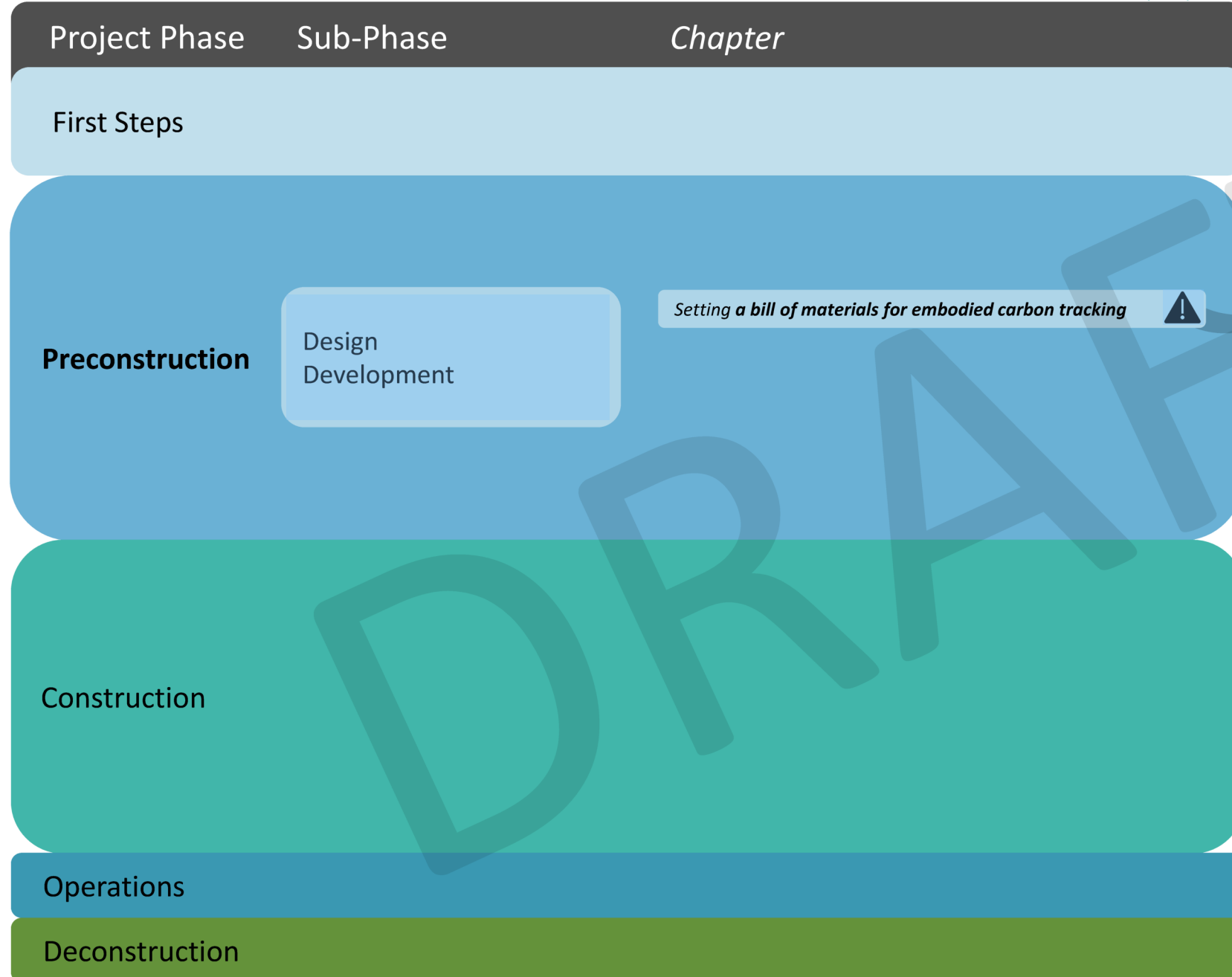
Deconstruction

**Typical Roadblocks:**

1. Lack of Owner knowledge or experience with embodied carbon accounting.
2. Lack of AEC partner knowledge with embodied carbon accounting.

**Suggestions:**

1. Use the ownersCAN Embodied Carbon Action Plan (ECAP) to align on embodied carbon requirements and link to resources/tools/case studies.
2. Join the [Carbon Leadership Forum online community](#) to access consortium of building industry professionals working on embodied carbon.



Project Phase

Sub-Phase

Chapter

First Steps

Preconstruction

Design  
Development*Setting a bill of materials for embodied carbon tracking***Typical Roadblocks:**

1. It's easy to become overwhelmed with the number of materials and options.
2. Different tools use different databases and may return different results.

**Suggestions:**

1. It's ok to start with imperfect data, or start with limited scope of buildings and/or materials. The key is to start!
2. Differences in underlying databases will create different totals, but directionally the data is fairly consistent.
3. Choosing one tool or suite of tools and sticking with them for your portfolio of buildings and embodied carbon accounting can be helpful.

Construction

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Deconstruction

Project Phase

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Chapter

First Steps

**Preconstruction**

Design Development

*Creating a carbon estimate alongside DD cost estimates*



**Main  
Request**

Create a product stage (A1-A3) emissions carbon estimate.

**Key  
Action(s)**

Create an EC3 project for selected materials.

**Key Step(s)**

1. Utilize Construction Estimate or BIM produced materials quantities for inputs into EC3 project.
2. Assign collections of EPDs per material category to create a conservative estimate and an achievable target per material category for the project's product stage emissions.

**Resource(s)**

Video on how to create a project in the EC3 tool:  
<https://www.youtube.com/watch?v=y49z7l6kco8>

Case Studies:

Microsoft Whitepaper: "[Reducing Embodied Carbon in Construction](#)"

Interface/JLL Case Study: "[Embodied Carbon: Interface Basecamp](#)"

Project Phase

Sub-Phase

Chapter

First Steps

Preconstruction

Design Development

Creating a carbon estimate alongside DD cost estimates



#### Typical Roadblocks:

1. Unclear scope.
2. Access to material quantities at this stage of design.
3. Access of regional EPD data depending on where you are.

#### Suggestions:

1. If the Owner, use Building Transparency's [template Basis of Design/Contract language](#) to set bill of materials to include for your AEC team.
2. If using Autodesk software, utilize *EC3's Revit plugin* to import material quantities.
3. If Tally was used for WBLCA work, utilize *Tally's export to EC3 function* to import material quantities.
4. If the General Contractor or Construction Estimator is engaged at this stage, ask them for their detailed cost estimate (or give them a list of materials that you want quantities for) for [hand entry into EC3](#).
5. It's ok to start with a broader geographic collection of EPDs if needed at this stage, and refine over time.
6. If EPD data is missing or light, utilize [BT's EPD request letter](#) to request EPDs from typical material suppliers used in that region.

Construction

Operations

Deconstruction



Project Phase

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First Steps

**Preconstruction**

Design Development

*Creating low carbon specifications*



**Main  
Request**

**Set a specific list of materials to include in low carbon specifications.**

**Key  
Action(s)**

Utilize the EC3 tool to inform materials to include and language to use in specifications.

**Key Step(s)**

1. Utilize EC3 project Sankey diagram to inform high impact material categories, and available emissions reductions.
2. Utilize the EC3 find & compare materials feature to source EPDs for products within material categories that meet performance/design requirements.
3. If products have EPDs already, require them in the specifications.
4. If products don't have EPDs already, request them from suppliers.

**Resource(s)**

Template Specification Language & Matrix:  
<https://app.box.com/s/ipnh3qnnsyxus4507kswctabxnyt9hwI>

Construction

Operations

Deconstruction

Project Phase

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First Steps

Preconstruction

Design Development

Creating *low carbon specifications***Typical Roadblocks:**

1. Unclear scope
2. Lack of embodied carbon knowledge by specifier.
3. Lack of EPDs for the materials included.

**Suggestions:**

1. If the Owner, use Building Transparency's [template Basis of Design/Contract language](#) to set bill of materials to include for your AEC team.
2. If EPDs are not yet available, request (but don't require) them in the specifications, to spur market demand and send Building Transparency's template "[EPD Request Letter](#)" to manufacturers.
3. Utilize Building Transparency's [template specification language](#) to standardize the ask to manufacturers for EPD data

Construction

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First Steps

**Preconstruction**

Construction  
Documents

*Refining a carbon estimate alongside CD cost estimates*



**Main  
Request**

Create a product stage (A1-A3) emissions carbon estimate.

**Key  
Action(s)**

Create an EC3 project for selected materials.

**Key Step(s)**

1. Utilize Construction Estimate or BIM produced materials quantities for inputs into EC3 project.
2. Assign collections of EPDs per material category to create a conservative estimate and an achievable target per material category for the project's product stage emissions.

**Resource(s)**

Video on how to create a project in the EC3 tool:  
<https://www.youtube.com/watch?v=y49z7l6kco8>

Case Studies:

Microsoft Whitepaper: "[Reducing Embodied Carbon in Construction](#)"

Interface/JLL Case Study: "[Embodied Carbon: Interface Basecamp](#)"

**Construction**

**Operations**

**Deconstruction**

Project Phase

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First Steps

Preconstruction

Construction  
Documents

*Refining a carbon estimate alongside CD cost estimates*



Construction

Operations

Deconstruction

#### Typical Roadblocks:

1. Unclear scope.
2. Access to material quantities at this stage of design.
3. Access of regional EPD data depending on where you are.

#### Suggestions:

1. If the Owner, use Building Transparency's [template Basis of Design/Contract language](#) to set bill of materials to include for your AEC team.
2. If using Autodesk software, utilize *EC3's Revit plugin* to import material quantities.
3. If Tally was used for WBLCA work, utilize *Tally's export to EC3 function* to import material quantities.
4. If the General Contractor or Construction Estimator is engaged at this stage, ask them for their detailed cost estimate (or give them a list of materials that you want quantities for) for [hand entry into EC3](#).
5. It's ok to start with a broader geographic collection of EPDs if needed at this stage, and refine over time.
6. If EPD data is missing or light, utilize [BT's EPD request letter](#) to request EPDs from typical material suppliers used in that region.

Project Phase

Sub-Phase

Chapter

First Steps

**Preconstruction**

Construction  
Documents

*Refining low carbon specifications*

**Main  
Request**

**Refine low carbon specifications based on final material and product selection.**

**Key  
Action(s)**

Utilize the EC3 tool to inform materials to include and language to use in specifications.

**Key Step(s)**

1. Utilize EC3 project Sankey diagram to inform high impact material categories, and available emissions reductions.
2. Utilize the EC3 find & compare materials feature to source EPDs for products within material categories that meet performance/design requirements.
3. If products have EPDs already, require them in the specifications.
4. If products don't have EPDs already, request them from suppliers.

**Resource(s)**

Template Specification Language & Matrix:  
<https://app.box.com/s/ipnh3qnnsyxus4507kswctabxnyt9hwl>

**Construction**

**Operations**

**Deconstruction**

Project Phase

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First Steps

Preconstruction

Construction  
Documents

*Refining low carbon specifications*



Construction

Operations

Deconstruction

#### Typical Roadblocks:

1. Unclear scope
2. Lack of embodied carbon knowledge by specifier.
3. Lack of EPDs for the materials included.

#### Suggestions:

1. If the Owner, use Building Transparency's [template Basis of Design/Contract language](#) to set bill of materials to include for your AEC team.
2. If EPDs are not yet available, request (but don't require) them in the specifications, to spur market demand and send Building Transparency's template "[EPD Request Letter](#)" to manufacturers.
3. Utilize Building Transparency's [template specification language](#) to standardize the ask to manufacturers for EPD data



Project Phase

Sub-Phase

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First Steps

Preconstruction

Construction

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Deconstruction

Procurement

Creating **low carbon bid documents**



**Main  
Request**

Create standard embodied carbon bid language for included material categories.

**Key  
Action(s)**

Utilize bid language to inform suppliers of request for or requirement of EPDs.

**Key Step(s)**

1. Utilize the EC3 tool to understand the supplier market and will or won't have EPDs available at time of bid.
2. Do early outreach with suppliers that EPDs will be requested at time of bid, to enable supplier to engage in EPD process early if they choose to.
3. Craft language to meet the current supplier market, either requesting or requiring EPDs alongside cost at time of bidding.

**Resource(s)**

Template Bid Language:

[https://app.box.com/folder/110203883630?s=mam\\_a6l86etdmqevits98w8iiggtv168o](https://app.box.com/folder/110203883630?s=mam_a6l86etdmqevits98w8iiggtv168o)

Project Phase

Sub-Phase

Chapter

First Steps

Preconstruction

Procurement

Creating *low carbon bid documents*

Construction

Operations

Deconstruction

**Typical Roadblocks:**

1. Lack of Contractor Knowledge of embodied carbon/EPDs
2. Access of regional EPD data depending on where you are.

**Suggestions:**

1. Provide Contractor training on embodied carbon and the EC3 tool.
2. Utilize Building Transparency's ["template Bid Leveling Language"](#) to collect available EPD data at time of bid, and incentivize suppliers to invest in and provide EPDs for project materials.

Project Phase

Sub-Phase

Chapter

First Steps

Preconstruction

Procurement

Construction

Operations

Deconstruction

Including **embodied carbon data in bid leveling**



**Main  
Request**

Utilize embodied carbon data, alongside cost data, to inform selection of bidders.

**Key  
Action(s)**

Create standard bid leveling sheet/analysis spreadsheet that includes embodied carbon data.

**Key Step(s)**

1. Include fields for: if bidder provided EPDs; if bidder would commit to providing EPD by end of construction; if bidder would charge the project for EPD cost; GWP/unit of material if EPD provided.

**Resource(s)**

EC3 to include bid leveling sheet by September 2021.  
Case Studies  
Microsoft Whitepaper: "[Reducing Embodied Carbon in Construction](#)"

Project Phase

Sub-Phase

Chapter

First Steps

Preconstruction

**Construction**

Procurement

*Including embodied carbon data in bid leveling*



Operations

Deconstruction

**Typical Roadblocks:**

1. Lack of Contractor Knowledge of embodied carbon/EPDs
2. Access of regional EPD data depending on where you are.

**Suggestions:**

1. Provide Contractor training on embodied carbon and the EC3 tool.
2. Utilize the EC3 tool's bid leveling sheet (*available September 2021*) to provide cost and carbon data from bidders, for bid selection.

Project Phase

Sub-Phase

Chapter

First Steps

Preconstruction

**Construction**

Construction

Tracking realized embodied carbon of materials in construction 

Operations

Deconstruction

*Main Request*

Create an as-built project to report realized embodied carbon.

*Key Action(s)*

Collect as built quantities and embodied carbon data for included materials and input them into the EC3 tool.

*Key Step(s)*

1. Track as built quantities and EPDs as part of the submittal process.
2. Create an as built project in the EC3 tool, input as built quantity data and select EPDs for products installed.

*Resource(s)*

Case Studies: Microsoft Whitepaper: ["Reducing Embodied Carbon in Construction"](#)

Project Phase

Sub-Phase

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First Steps

Preconstruction

**Construction**

Construction

Tracking realized embodied carbon of materials in construction



Operations

Deconstruction

**Typical Roadblocks:**

1. Lack of Contractor Knowledge of embodied carbon/EPDs
2. Access of regional EPD data depending on where you are.

**Suggestions:**

1. Provide Contractor training on embodied carbon and the EC3 tool.
2. It's ok to use conservative or average placeholders for materials without product specific EPDs if needed, but be sure to request them so manufacturers have the market incentive to invest in EPDs for your next project.

Project Phase

Sub-Phase

Chapter

First Steps

Preconstruction

**Construction**

Construction

Minimizing **transportation carbon emissions**



Operations

Deconstruction

**Main  
Request**

**Implement a materials sourcing and fuel plan with suppliers of major materials.**

**Key  
Action(s)**

Create standard supplier bid language and reporting forms.

**Key Step(s)**

1. Track material manufacturing location, distance travelled to site, mode of transportation and fuel type.
2. Identify and implement strategies to reduce material transport emissions (ie. alternative modes of transport, alternative fuels, transportation electrification).
3. Create summary sheet of transport emissions and report monthly to Project Team and Owner.

**Resource(s)**

EC3 to include bid leveling sheet by September 2021.  
Case Studies: Microsoft Whitepaper: "[Reducing Embodied Carbon in Construction](#)"



Project Phase

Sub-Phase

Chapter

First Steps

Preconstruction

**Construction**

Construction

*Minimizing transportation carbon emissions*



Operations

Deconstruction

**Typical Roadblocks:**

1. Lack of Contractor Knowledge of embodied carbon and construction emissions.
2. Resistance by Contractor/Subcontractors to track or supply information needed.

**Suggestions:**

1. Provide Contractor training on embodied carbon and construction emissions.
2. Start with a limited scope to manage resources and encourage engagement and implementation.

Project Phase

Sub-Phase

Chapter

First Steps

Preconstruction

**Construction**

Construction

Minimizing **construction site carbon emissions**



Operations

Deconstruction

**Main  
Request**

Implement a site emissions reduction plan.

**Key  
Action(s)**

Create standard supplier bid language and reporting forms.

**Key Step(s)**

1. Track construction equipment fuel consumption per activity and material scope.
2. Identify and implement strategies to reduce equipment fuel emissions (ie. renewable diesel, alternative fuels, equipment electrification).
3. Create summary sheet of construction equipment emissions and report monthly to Project Team and Owner.

**Resource(s)**

Building Transparency to provide template bid language and reporting forms. Building Transparency to work with GC partners to provide case studies of site emissions reductions.

Project Phase

Sub-Phase

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First Steps

Preconstruction

**Construction**

Construction

Minimizing **construction site carbon emissions**



Operations

Deconstruction

**Typical Roadblocks:**

1. Lack of Contractor Knowledge of embodied carbon and construction emissions.
2. Resistance by Contractor/Subcontractors to track or supply information needed.

**Suggestions:**

1. Provide Contractor training on embodied carbon and construction emissions.
2. Start with a limited scope to manage resources and encourage engagement and implementation.

Project Phase

Sub-Phase

Chapter

First Steps

Preconstruction

**Construction**

Construction

Minimizing **construction waste**



Operations

Deconstruction

*Main Request*

**Implement a construction waste diversion plan to reduce materials to landfill.**

*Key Action(s)*

Create standard supplier bid language and reporting forms.

*Key Step(s)*

1. Track construction waste, including diversion rate.
2. Source separate waste for major material streams to enable higher recycling rate.
3. When creating a demolition plan, look for opportunities for deconstruction and salvage of materials to promote circular economy.

*Resource(s)*

Building Transparency to provide template bid language and reporting forms.

Case Studies: Microsoft Whitepaper: ["Reducing Embodied Carbon in Construction"](#)

Project Phase	Sub-Phase	Chapter
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First Steps		
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Preconstruction		
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Operations		
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Deconstruction		
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Typical Roadblocks:

1. ...

Suggestions:

1. ...

Project Phase

Sub-Phase

Chapter

First Steps

Preconstruction

Construction

Operations

Use/Replacement

Minimizing *replacement of materials*



Deconstruction

*Main  
Request*

During Design Phase, include analysis of durability and performance of materials in selection process.

*Key  
Action(s)*

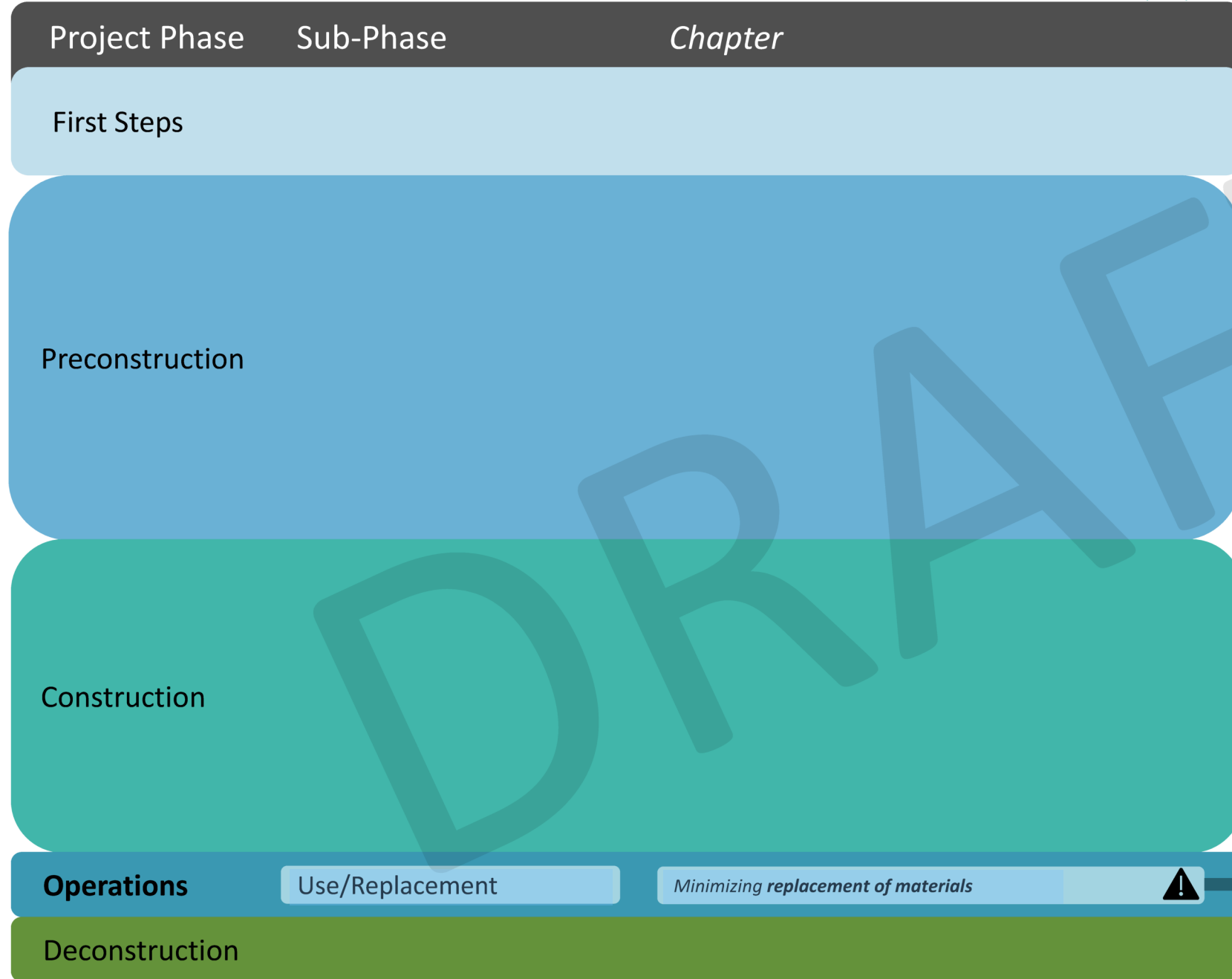
Assess reference service life and durability of major materials to account for replacement cycles during the building use phase.

*Key Step(s)*

1. Identify key materials that are typically replaced during a building's life cycle. (ex. Roofing, Cladding, Flooring, Paint, etc)
2. Include the number of projected replacements and associated embodied carbon in analysis of proposed materials and products.
3. Prioritize use of materials with longer use cycles/fewer replacements during materials and product selection.

*Resource(s)*

....



**Typical Roadblocks:**  
 1. ...

**Suggestions:**  
 1. ...



Project Phase

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Preconstruction

Construction

Operations

Use/Replacement

*Minimizing replacement of materials*



Deconstruction

**Main  
Request**

**During Use Phase, promote longer  
replacement cycles of materials.**

*Key  
Action(s)*

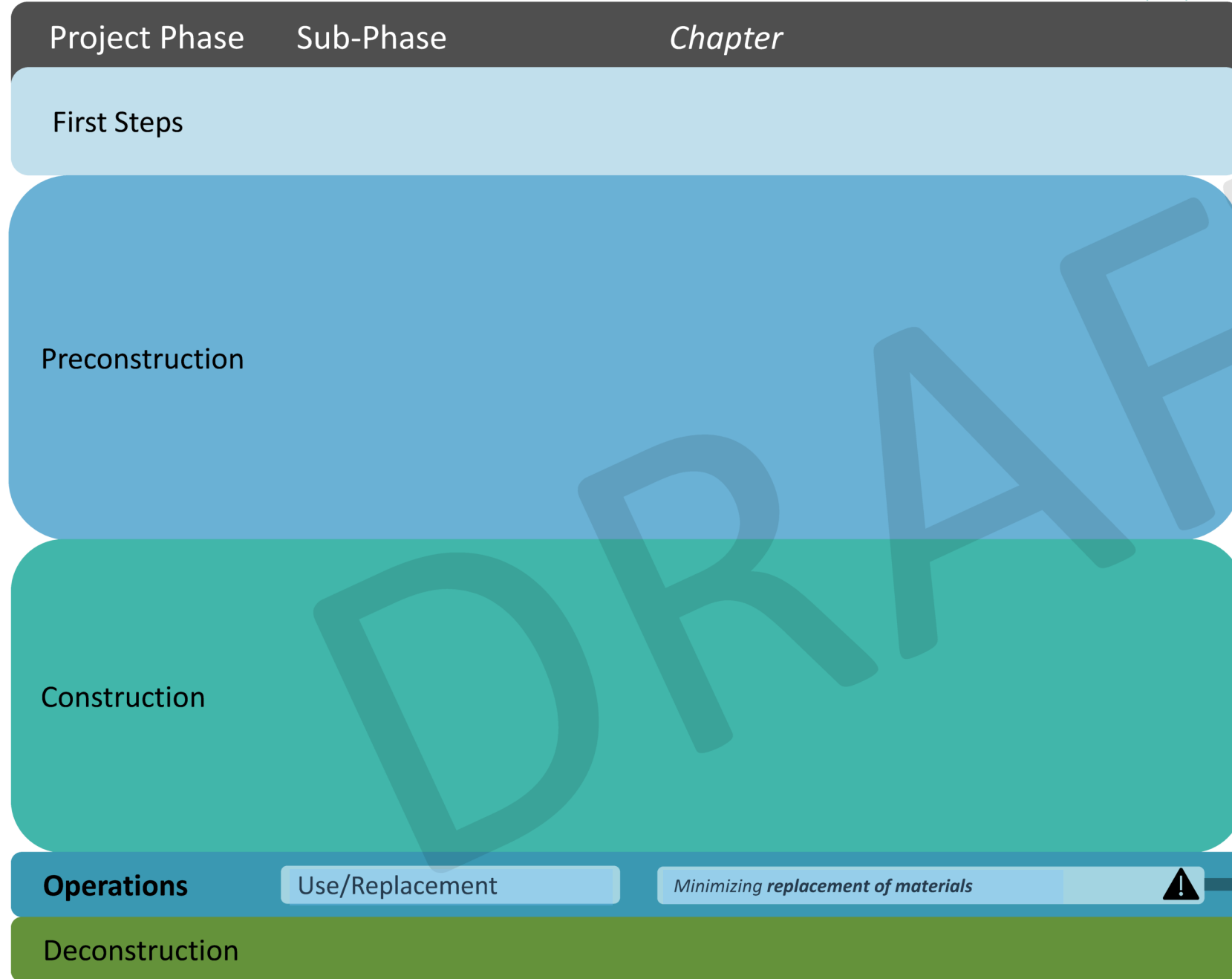
Create standards around replacement  
cycles for key materials.

*Key Step(s)*

1. Assess current standards and practices for determining material replacement during a building's use phase.
2. Commit to replacement cycles based on material or product performance vs a desired change in aesthetic/etc. and build this into building standards.

*Resource(s)*

...



**Typical Roadblocks:**

1. ...

**Suggestions:**

1. ...

Project Phase

Sub-Phase

Chapter

First Steps

Preconstruction

Construction

Operations

**Deconstruction**

Demolition/Disposal

*Promoting a circular economy*



During Design Phase, include analysis of materials salvage, reuse and deconstruction for new and existing buildings included in scope.

*Main Request*

*Key Action(s)*

Include materials reuse and design for disassembly when deciding on major structural and envelope systems, and prioritize materials with high recycled content during product selection and specification.

*Key Step(s)*

1. Look for opportunities for materials reuse for components of new building, and potential to design for disassembly.
2. If demolishing an existing building, study opportunities for materials salvage and manufacturer take back programs.
3. Require high recycled content in specified and procured materials.

*Resource(s)*

...

Project Phase

Sub-Phase

*Chapter*

First Steps

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**Deconstruction**

Demolition/Disposal

*Promoting a circular economy*



**Typical Roadblocks:**

1. ...

**Suggestions:**

1. ...

Project Phase

Sub-Phase

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First Steps

Preconstruction

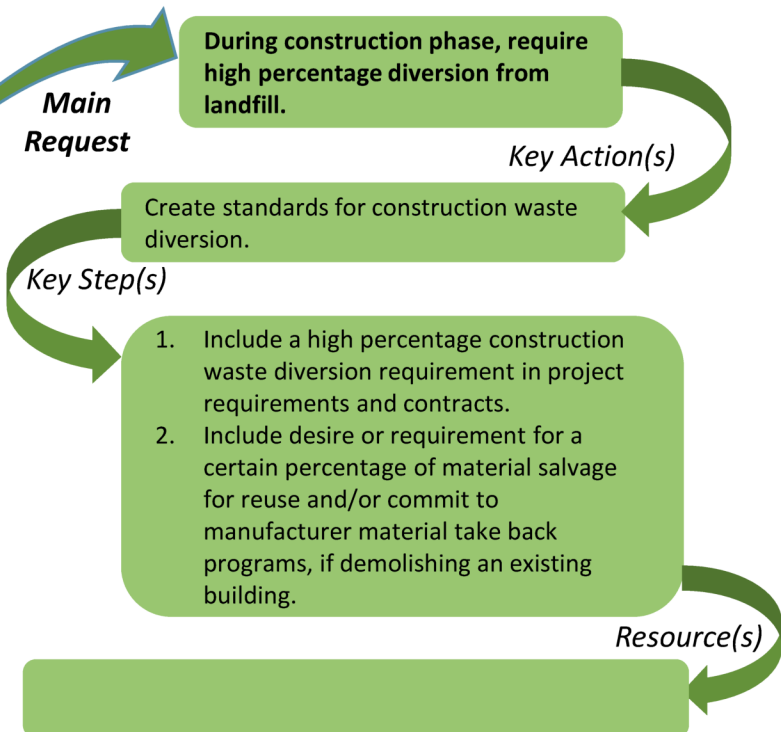
Construction

Operations

**Deconstruction**

Demolition/Disposal

*Promoting a circular economy*



Project Phase	Sub-Phase	Chapter
First Steps		
Preconstruction		
Construction		
Operations		
Deconstruction	Demolition/Disposal	Promoting <i>a circular economy</i>



**Typical Roadblocks:**  
 1. ...

**Suggestions:**  
 1. ...

# ownersCAN embodied carbon action plan

Project Phase	Sub-Phase	Chapter
First Steps	Pre-Design	Setting <b>embodied carbon benchmarks and targets</b>
		Demonstrating <b>market demand for low carbon materials</b>
Preconstruction	Concept/ Schematic Design	Requiring <b>embodied carbon accounting for projects</b>
		Using <b>embodied carbon data to inform systems level design</b>
	Design Development	Setting <b>a bill of materials for embodied carbon tracking</b>
		Creating <b>an upfront carbon estimate</b>
		Creating <b>low carbon specifications</b>
	Construction Documents	Refining <b>the upfront carbon estimate</b>
		Refining <b>low carbon specifications</b>
Construction	Procurement	Creating <b>low carbon bid documents</b>
		Including <b>embodied carbon data in bid leveling</b>
	Construction	Tracking <b>realized embodied carbon of materials in construction</b>
		Minimizing <b>transportation carbon emissions</b>
		Minimizing <b>construction site carbon emissions</b>
		Minimizing <b>construction waste</b>
Operations	Use/Replacement	Minimizing <b>replacement of materials</b>
Deconstruction	Demolition/Disposal	Promoting <b>a circular economy</b>

Currently in *draft form*, this plan outlines the key steps and actions necessary to *reduce embodied carbon* of the buildings we design, construct and operate.

It has been informed by a working group of engaged building owners, developers and operators who are *committed to taking action*.

This is intended to be a *constantly improving resource*.

We welcome feedback and input. Please go to our ownersCAN website and fill out the contact form to submit comments and get on the list for updates related to this plan and other ownersCAN initiatives. Let us know if you are an Owner interested in joining the movement!

