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AGC Playbook on Decarbonization and Carbon Reporting in the Construction Industry

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ASSOCIATED GENERAL CONTRACTORS OF AMERICA

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SECTION 1: INTRODUCTION

PURPOSE OF THIS DOCUMENT AND HOW IT SHOULD BE USED

The construction industry is facing increased interest in carbon reporting, as applied to both corporate activities and construction projects. AGC has prepared this document to support contractors in taking a proactive approach to preparing for requests and requirements related to carbon reporting. This playbook provides a stepwise approach for construction project decarbonization and carbon reporting. It is designed for use by general contractors and subcontractors across the United States of America. The approach is flexible to account for different types of projects (e.g., buildings, highways, transportation, utility, etc.) with varying project delivery systems.

Developed by and for contractors, this playbook aims to provide construction professionals with tools to communicate effectively with project teams and successfully navigate the complexities of carbon reporting, whether driven by voluntary sustainability initiatives or regulatory requirements. This playbook focuses on carbon emissions at the construction project level, narrowing in on actions that enable the collection of project-specific data. While project-level data can support corporate emissions reporting, this document does not go into detail on corporate-level reporting.

This playbook:

- Provides foundational knowledge on carbon reporting and decarbonization.
- Distinguishes between project-level reporting and corporate reporting.
- Provides a four-step process to assign accountability for carbon at the project level.
- Identifies common sources of carbon emissions across the project life cycle.
- Zeros in on the main sources of carbon emissions that contractors may be asked to track and report.
- Addresses the four main construction materials in most federal and state “buy clean” programs.,
- Discusses considerations for setting up an in-house program for project-level tracking and reporting of carbon emissions.
- Provides tools and best practices for a contractor’s in-house program.
- Gives examples of ways to reduce carbon emissions, and
- Introduces corporate emissions reporting.

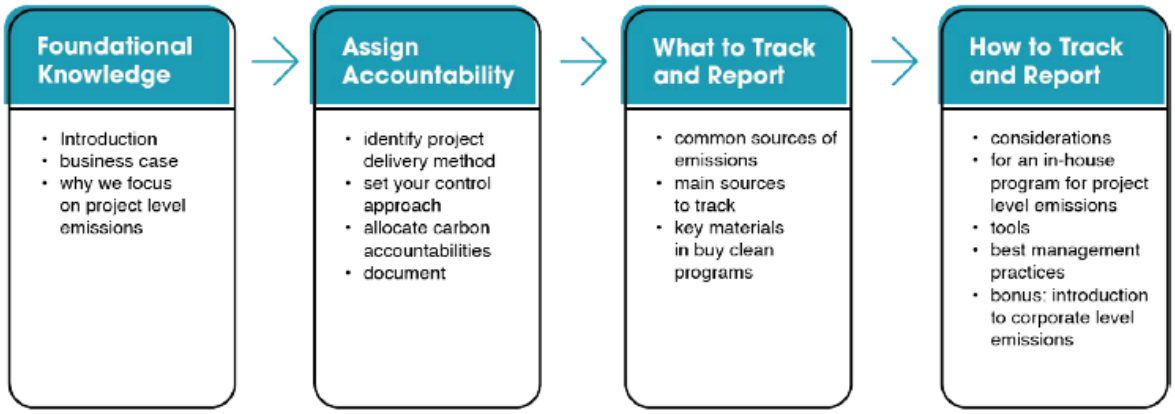


Fig. 1 – Playbook Overview

WHAT DECARBONIZATION IS AND WHY IT IS IMPORTANT

Decarbonization describes an effort to reduce or eliminate the carbon emissions associated with a particular process or product. Within the scope of the construction industry, this could mean looking at the process of construction (e.g., fuel usage for heavy equipment used for land-moving activities) and the resultant constructed project itself (e.g., the materials selected and installed). Project owners with specific carbon emissions reduction goals may be particularly interested in requiring reporting from their contractors and subcontractors.

AGC has previously identified trends within the main construction markets that are driving the momentum towards carbon reporting and decarbonization, see AGC's 2021 Report.(1) Although contractors do not decide what and where to build, they are partners in modernizing infrastructure, improving climate resilience, and reducing carbon emissions in the major market sectors (building, federal and heavy, highway and transportation, utility infrastructure, etc.) as discussed below.

BUILDING SECTOR

In the United States, buildings consume nearly 40 percent of the nation's energy to power our buildings—this includes lighting, heating and cooling, appliances and electronics. Accordingly, our buildings accounted for 31 percent of the nation's total man-made greenhouse gas (GHG) emissions in 2022.(2) According to the American Institute of Architects (AIA 2030 Challenge), embodied carbon is projected to be close to half of the total emissions from the building sector from 2020-2050.(3)

FEDERAL AND HEAVY SECTOR

The U.S. General Services Administration (GSA) has $3.9 billion worth of unmet maintenance and modernization needs.(4) Federal buildings also include military facilities, prisons, border stations and embassy compounds. Furthermore, our nation's dams, levees, and pumping stations are an important source of energy generation, water storage for drinking and irrigation, and flood control; yet they are increasingly unsafe and unreliable.(5) This infrastructure also helps build resilience in our communities.

HIGHWAY AND TRANSPORTATION SECTOR

Currently, transportation emissions are almost exclusively from the combustion of fossil fuels. In 2022, transportation contributed 29 percent of total manmade GHG gas emissions.(6) Traffic congestion wasted 3.3 billion gallons of fuel in 2017, adding 8.8 billion hours to travel times in urban areas.(7) Research shows that the right mix of traffic congestion mitigation, speed management and traffic

smoothing measures would lower total carbon dioxide (CO2) emissions from vehicles by as much as 30 percent.(8)

UTILITY INFRASTRUCTURE SECTOR

Our nation's drinking water and wastewater infrastructure, particularly the aging network of systems that convey this precious resource, are in critical need of attention. In 2010, the U.S. Environmental Protection Agency (EPA) and the Congressional Budget Office warned of a massive investment gap over the next twenty years within the drinking water and wastewater sector.(9) A recent study shows the annual investment gap is expected to reach $434 billion by 2029.(10) Leaking pipes and crumbling infrastructure are responsible for billions of gallons of lost water every day (11) and, in many parts of the country, wet weather events regularly lead to overflowing systems that release waste and chemicals into the environment—damaging aquatic ecosystems and causing human illness.

In 2022, emissions from electricity generation accounted for 25 percent of GHG emissions. Notable, the share of electricity generation from sources other than fossil fuel combustion increased from 20 percent in 2008 to 40 percent by 2022, comprising nuclear and renewable energy sources.(12)

CLIMATE COMMITMENTS AND NET ZERO GOALS

The Federal government has made climate change a national priority and is advancing numerous policy initiatives that will impact the construction industry and its markets.(13) In addition to regulatory initiatives (see below), Federal agencies are adopting green guidelines and standards for new construction and major renovation. Agencies also are looking at incorporating procurement strategies to reduce the carbon footprint associated with construction materials. This initiative spans different types of construction (e.g., building and highway/transportation) with the U.S. General Services Administration (14) and the Department of Transportation (15) seeking to use materials with fewer emissions. At the time of this writing, the U.S. EPA is preparing a labeling program and other tools to support this effort.(16) The Inflation Reduction Act authorized much of this work.

On the private side, many Fortune Global 500 companies have published targets related to climate change, including net zero goals or emission reduction goals.(17) More organizations are establishing specific environmental, social, and governance (ESG) goals as the pressure to act on climate is mounting. Multiple frameworks and tools have developed within this domain. For the contractor, this can create a lack of consistency between project owners. Until clear market leaders in carbon tracking and reporting tools emerge and solidify, contractors may need to be able to collect carbon-related data and report it using multiple tools based on owner requirements.

REGULATORY PRESSURES

In March 2024, the U.S. Securities and Exchange Commission (SEC) finalized a rule to require publicly traded companies to provide investors with information about their exposure to climate-related risks and opportunities.(18) The final rule includes a timeline for reporting of Scope 1 and Scope 2 emissions (see Fig. 2 below) if material for investors. While the SEC rule only applies to public companies, any contractors performing work for publicly traded companies may face requirements to provide climate-related data to remain competitive in that market. (Note: At the time of this writing, the SEC rule is on hold due to legal challenges.)

Fig. 2 – Direct and Indirect greenhouse gas emissions as defined in the GHG Protocol

The Federal Acquisition Regulation that governs contract work with the Federal Government is also undergoing changes related to sustainable procurement. At the time of this writing, the FAR Council, which leads the administration of the FAR, has proposed reporting requirements for businesses seeking to be awarded a federal contract.(19) The proposed rule introduces two new categories for federal contractors, "significant contractors" and "major contractors." Significant contractors with $7.5 - $50 million in federal contract obligations in the prior fiscal year would be required to inventory GHG Scope 1 and Scope 2 emissions and complete an annual GHG emissions inventory. Major contractors with more than $50 million in federal contract obligations would have the same reporting requirements as significant contractors but would also have to report on Scope 3 emissions and develop a climate-based target for reducing emissions, among other requirements. At the time of this writing, this rule is not final, but it demonstrates the importance the federal government is placing on GHG emissions associated with federal purchases, properties, and actions.

Several states, such as California, and cities have implemented or are actively considering embodied carbon policies and climate commitments that also would apply to construction projects in those jurisdictions. In 2023, California passed two bills (Senate Bills 253 and 261) that require reporting of climate-related emissions data and risk from companies that do business in the state.

> ** Resource Tip: Carbon Leadership Forum (CLF) maintains an Embodied Carbon policy map that shows all the current and upcoming embodied carbon policies for reference.*

MARKET PREPARATION

As more owners and developers are required to report on carbon data, contractors are increasingly seeing some form of sustainability program requirements or carbon tracking stipulations within Requests for Proposals (RFPs). This playbook is designed to equip contractors to respond to those requests and remain competitive.

PROJECT-LEVEL AND CORPORATE-LEVEL CARBON REPORTING

Some construction companies may choose to gather data and report on sustainability efforts at both the project level and corporate level. Project-level reporting can help a company assess the performance of its construction projects, such as building energy-efficient buildings, installing renewable energy systems, or using low-carbon materials. Corporate-level reporting can help a company track and manage GHG emissions from its own operations across its project portfolio, such as total fuel consumption,

electricity use, waste generation, or employee travel. By using both approaches, a company can gain a comprehensive understanding of its GHG performance and impact and take action to reduce its emissions.

A company can gather several types of data at the project level, including material transportation, installation emissions, equipment usage, commuting emissions, water usage, and waste generation. This playbook goes into more detail on this topic in Section 3. These data points are indicators of sustainability performance gathered at the project level, and they can also be used in aggregate to assess sustainability performance at the corporate level. For example, fuel use can be tracked at the project level and rolled up into corporate reporting. This playbook introduces corporate reporting in Section 4.

USING THE GREENHOUSE GAS PROTOCOL FRAMEWORK

This playbook relies on the Greenhouse Gas Protocol (20) framework for calculating emissions related to a project, covered further in the next section. The GHG Protocol is recognized as the leading standard for assessing carbon emissions and is widely used by the contractor members contributing to this playbook. The GHG Protocol allows for varying business models and types of companies, which is an important consideration for the construction industry due to the diversity of project types and project delivery systems. As explored in Section 2, the scope of a company's control on a project will influence what GHG emissions it can report – or be held accountable for tracking and reporting – to the project team. Contractors not following the GHG Protocol will also find this playbook to be a valuable reference.

SECTION 2: ESTABLISHING PROJECT CARBON FOOTPRINT ACCOUNTABILITIES

INTRODUCTION

This section offers guidance on how to establish carbon footprint accountabilities among companies involved in construction projects, using the GHG Protocol as a framework. The information contained herein applies to both horizontal (e.g., roads) and vertical (e.g., buildings) construction. The GHG Protocol allows different approaches to determine carbon footprint accountabilities, based on the type and degree of control each company involved in a project may have to reduce carbon emissions. The aim is to ensure that each company involved in a project understands the components of a project's carbon footprint for which they may be held accountable for tracking and reporting.

NOTE: Users of this playbook that are not seeking alignment with the GHG Protocol can still use the process in Section 2 to figure out amongst the project team who is responsible for the tracking and reporting of which emissions. See Sections 3 and 4 for more information on tracking and reporting on construction sites.

This section aims to:

- Create an actionable, stepwise framework for establishing carbon footprint accountabilities on construction projects that defines minimum accountabilities and helps identify opportunities to provide value-added decarbonization services.
- Provide guidance that can be used by different types of companies engaged in the construction of horizontal and vertical infrastructure.
- Provide guidance specific to the different types of construction project delivery methods and how these different methods affect carbon footprint accountabilities.
- Empower companies to account for carbon emissions and minimize double counting.

Regardless of how carbon footprint accountabilities are allocated, the general contractor is uniquely positioned to be an important partner in carbon footprint accounting. This is because the contractor purchases and receives the materials specified for use during construction and installation. The gathering of this project-specific information may be an additional professional service facilitated by the contractor.

4 STEPS FOR DETERMINING PROJECT CARBON FOOTPRINT ACCOUNTABILITIES

Contractors can consider the following four steps when determining the carbon footprint accountabilities for a construction project:

Fig. 3 – Four-Step Process for Determining Carbon Accountabilities

CONFIRM DELIVERY METHOD FOR PROJECT (STEP 1)

The project delivery method employed on a project affects how responsibility and authority is allocated, including for a project's carbon footprint. The summary below briefly explains how the major types of project delivery methods impact the key aspects that affect carbon footprint accountability.

Design—Bid—Build. In this project delivery method, the owner identifies the project location and provides the contractor with contract documents that specify design, construction materials, and building systems equipment. The owner contracts with a licensed design professional to generate contract documents and the design professional is typically involved in contract administration. The owner possesses the financial authority to approve lower carbon options recommended by the contractor. The contractor controls construction means and methods.

Design—Build. In this project delivery method, the owner provides the design-build contractor with design requirements and budget. The design-build contractor provides both design and construction services. The owner retains design veto rights and financial authority to approve lower carbon options recommended by the design-build contractor. The design-build contractor controls construction means and methods.

Developer—Design—Build. There are two general sub-categories for this type of project delivery method:

> Build to Suit: In this project delivery method, the owner or long-term tenant provides developer- design-build contractor with project location, preliminary design requirements, and budget. The design-build contractor provides design and construction services. The owner or tenant retains design veto rights and financial authority to approve lower carbon options. The design-build contractor controls construction means and methods.
>
> Speculative: In this project delivery method, the developer-design-build contractor identifies the project location, performs design and construction services, controls construction means and methods, and is either the majority investor or in partnership with the majority investor in the project. Collectively, they have the financial authority to approve lower carbon options; in most cases, this may be decided by the majority investor. Please note that sometimes the owner is also the developer and sometimes the developer is a separate company providing a service to an owner.

Construction Management. Whether the construction manager is at-risk or an agent to the owner, the construction manager provides project and program management services to an owner. The owner first selects the project location, defines project design requirements, and a budget for the project. The owner retains design veto rights and financial authority to approve lower carbon options recommended by the contractor or designer.

CONFIRM CONTROL APPROACH AS DEFINED BY GHG PROTOCOL (STEP 2)

The GHG Protocol provides different options for how a company determines what activities fall within its carbon footprint boundary. This begins with selecting one of the "control approaches" or the "equity share" method; both are explained below. The GHG Protocol requires that a company use a single control approach, so a contractor should select the control approach most suitable to its company, which may include non-construction businesses such as real estate development, architectural and engineering design, real estate management, and real estate investment. This single control approach

should be used at the project level and across all non-construction-related businesses to create a consolidated carbon footprint for the company.

Each construction company needs to select one of the following approaches:

Financial Control. An organization has financial control over a construction project if it can direct the financial and operating policies of the project and will be the primary beneficiary of the project (either using the asset or through economic gain from the sale of the asset). For construction projects, "financial policies" are project budgets and "operating policies" relate to project location, schedule, design requirements, specification of materials and building systems, and construction means and methods. Those that are the primary beneficiaries of a construction project are the organizations that will use the asset (e.g., owners and tenants) or will gain economic benefits from the sale or lease of the asset (e.g., owners and investors).

Operational Control. An organization has operational control over a construction project if it has the full authority to introduce and implement its operating policies at the project. For construction projects, this means the contractor is able to recommend and implement lower carbon options for materials, construction means and methods, and building design and operations. The GHG Protocol acknowledges that the company utilizing the operational control approach may not "necessarily have authority to implement all decisions" and that approvals of other project partners that have control of project financial decisions may be necessary.

Equity Share. Companies pick either one of the above control approaches (i.e., financial or operational) or they can choose to be guided by the Equity Share approach. This approach establishes carbon footprint accountabilities based on the equity or ownership share project stakeholders have in a project. In cases where there is a difference in percent equity/ownership and the percentages by which the economic benefits (e.g., profits) are allocated, the percentage of economic benefits is used to allocate carbon footprint. This can occur, for instance, when one project stakeholder takes on more risk for a greater percentage of the profits.

ALLOCATE PROJECT CARBON FOOTPRINT ACCOUNTABILITIES AMONG PROJECT STAKEHOLDERS (STEP 3)

Use Table 1 of this playbook to help project teams allocate carbon footprint accountabilities using the GHG Protocol. If a contractor is working on a project where carbon accounting is to occur, then it will be necessary to identify those responsibilities in advance, especially if there is a contractual requirement. Based on the delivery method and control approach, it is a straightforward process to determine how to allocate the project Scope 1, 2, and 3 emissions among project stakeholders. Table 1 identifies the minimum accountabilities as well as opportunities where contractors can provide optional, value-added decarbonization services. Because of the variety of delivery methods, Table 1 supports allocating accountability for the embodied carbon of materials and building systems equipment, the operational construction site emissions, and the post-turnover operational carbon emissions of the asset.

ACCOUNTABILITY AMONG STAKEHOLDERS

It is important to recognize that different companies constructing projects together may utilize different control methods. Without an upfront discussion of accountabilities, this can result in either gaps in accountability or double counting of emissions. Contractors can engage in conversation along with other project stakeholders to identify and agree on the allocation of project carbon emissions. This ensures

that the most appropriate accountability for emission sources is established in advance. The allocation of carbon footprint accountability is spread across the project stakeholders, including general contractors and subcontractors.

Owner. This includes the client requesting and compensating the contractor for the construction of a project for their use, as well as investment companies providing equity in exchange for a financial return from the asset in the future (either through net operating income or from the sale of the asset).

General Contractor. This is the entity contracted by the owner to complete a construction project. For large projects, this is the general contractor. For smaller projects, this can be a trade-specific contractor.

Subcontractor. This includes the trades and service providers that are contracted to the general contractor.

MINIMUM ACCOUNTABILITIES BY CATEGORY OF EMISSIONS

When discussing accountability, it is important to distinguish between situations where a contractor may be best positioned to *gather data* about emissions (such as those associated with materials used) versus situations where they are taking *accountability* for those emissions (such as those associated with energy use onsite). Contractors can safeguard themselves by exercising caution when assuming responsibility for carbon accountabilities that are outside their control on a project.

Table 1 looks at emissions from three broad categories:

- Embodied carbon of the materials used (A1-A4*) – This category is typically considered Scope 3 for owners and contractors alike. Under most project delivery methods, when the financial control approach is used it is the owner that has accountability for the embodied carbon of materials because they dictate the budget and design requirements for the project and have veto rights over design recommendations. When the operational control approach is used, the party that has the authority to introduce and implement lower carbon options typically has the accountability for these emissions; most often this will be the general contractor. Regardless of which party has accountability for these emissions, it is typically the general contractor that is in the best position to gather data on these emissions.

- Construction activities operational carbon (A5) – This category includes emissions associated with jobsite energy and fuel use, chemical processes, waste hauling, jobsite commuting, and (if a building project) building operations before turnover. Under most delivery methods, contractors that utilize the operational control approach have accountability for these emission sources. Contractors that utilize the financial control approach are accountable for these emission sources when they have financial control over the project (i.e., they approve project budgets). When a contractor that utilizes the financial control approach is involved in a project where they lack financial control, the party that has financial control would typically be accountable for these emissions. It is important to recognize that because different project partners may utilize different control approaches, it could be decided among project partners that the contractor should take responsibility for these emissions and be given the authority and budget to take actions to reduce or eliminate these emissions. Subcontractors to the general contractor may be required to take accountability for their onsite fuel use.

- Post-turnover operational carbon through the end life of the project (B6 and C1 through C4) – This category remains solely the responsibility of the project owner and the general contractor would have no minimum accountability associated with the project.

**Life cycle analysis makes use of codes (e.g., AI, A2, A3, etc.) to align with the various phases associated with a project. The playbook goes into more detail about life cycle analysis in Section 3.*

OPPORTUNITIES TO ADD VALUE

Table 1 identifies example opportunities for the general contractor to exceed the minimum and assume responsibility for additional carbon emissions as an added value service to the project. While some contractors may seize opportunities for further decarbonization efforts, not all may possess the capacity or inclination to undertake added responsibility. There are a few reasons why a general contractor may elect to take responsibility for additional carbon emissions. One reason could be a strategic decision as part of their overall business strategy and to differentiate their company in the marketplace. Another reason may stem from negotiated agreements between the project owner and the contractor during discussions on carbon footprint accountabilities.

As with other project requirements, agreement on the allocation of carbon emissions should be addressed in the contract documents (see Step 4 below). As stated above, contractors are advised to safeguard themselves when assuming responsibility for carbon accountabilities that are outside their control on a project.

CONTRACTOR AS DEVELOPER

Lastly, Table 1 explores the carbon accountabilities that come into play when the contractor is a developer on the project (build to suit or speculative) and when the contractor performs construction manager (at-risk and not-at-risk) services. The build to suit contractor (the contractor is not an owner and not a majority investor) scenario is similar to that outlined for traditional or design-build projects. This means that the contractor has limited accountability associated with materials, performing a role limited to jobsite activities, and accountability shifts to the owner for the remainder of the project's life cycle. Under a speculative scenario, where the contractor has partial or full ownership of the project for at least some of the project's life cycle, the extent or duration of the contractor's accountability varies. The construction manager acts as an owner representative, and is not accountable for emissions, but may advise the owner on low-carbon options.

TABLE 1 – A SNAPSHOT OF THE TABLE IS INCLUDED AT THE END OF THIS SECTION. ZOOM IN TO SEE DETAIL

DOCUMENT PROJECT CARBON FOOTPRINT ACCOUNTABILITIES IN CONTRACT DOCUMENTS (STEP 4)

Under this final step, any agreements related to carbon accountability should be fully documented. By going through steps 1-3 above, the contractor will be well-equipped to identify their obligations on a project and avoid carbon reporting assignments that are not within the scope of their control. It is also important that any efforts for further decarbonization (value addition) on the project are clearly understood and mutually agreed upon, especially if they impact the expectations or scope of work for the contractor. Thorough documentation of carbon reporting requirements serves to safeguard the

contractor from discrepancies in expectations. Moreover, the documentation process can highlight any additional professional services that may need to be contracted.

Likewise, it is important for the general contractor to document any flow-down requirements to subcontractors or service providers. If the project team is relying on the general contractor to report or provide carbon-related information that originates from subcontractors or service providers, then it will be crucial to ensure they are also aware of expectations. This includes delineating specific reporting values and providing information on materials (i.e., Environmental Product Declarations). Furthermore, the general contractor may find it necessary to provide resources, such as simple checklists, forms, and toolbox talk training sessions for subcontractors.

Summary of Key Items to Document:

1. Accountabilities for emissions sources
2. Responsibilities for documentation of emissions
3. Flow-down requirements for subcontractors and service providers
4. Preferred method(s) to submit the documentation
5. Process for managing and documenting project changes (see below)

MANAGING CHANGES: CHANGE ORDERS AND VALUE ENGINEERING

During construction projects, changes to the project can be made that could affect the carbon performance of the project "as designed." These changes can come in the form of change orders and value engineering. In general, these changes should not affect the allocation of carbon footprint accountabilities across project partners, but they can impact the overall carbon performance of the project. Any resultant changes may be important if a specified level of carbon performance is expected to fulfill project obligations (e.g., financial or otherwise). If necessary to safeguard the carbon performance of a project, then project teams can establish a review process for handling change orders and other value engineering decisions. In this way, any changes in carbon performance can be discussed and agreed upon by the project partners that have project carbon footprint accountabilities. To protect the contractor in any future evaluations of the "as designed" versus "as built" carbon footprints, a contractor can fully document these agreements and include them as part of the official project record.

The project team could consider a tiered approach or waiver process for minor changes to avoid inefficiencies. For example, the EPA's interim criteria (21) for low-embodied carbon materials qualifying under the Inflation Reduction Act set thresholds for materials, to provide agencies with various routes to achieve the overall goal of using lower-embodied carbon materials, while still accounting for local markets and materials availability. In another example, the GSA included a waiver process for its procurement of low-embodied carbon asphalt and concrete.(22) The contractor may wish to include any "carbon review" of the changes within their existing framework for change orders to further streamline the process.

It is important to note here that contractors performing work with public owners such as the GSA or the U.S. Department of Transportation (or a state department of transportation) must follow specific processes for change orders or value engineering, as prescribed by the owner.

Table 1: Allocation of Carbon Footprint Accountabilities for a Construction Project

3 Emission Sources		2 General Contractor Company's GHG Control Approach	1 Carbon Footprint Accountability Designations Based on Project Delivery Method: Design - Bid - Build (3rd Party Construction) & Design - Build	
Embodied Carbon			**Minimum Accountability**	**Contractor Opportunity for Value Added (Example)**
Materials (A1,2,3)	Asphalt, Concrete, Steel, Flat Glass, and other priority materials for the project	Financial Control	Owner (S3)	General Contractor (S3): Assumes responsibility for all embodied carbon emissions for materials and equipment specified by owner regardless of control method
		Operational Control	General Contractor (S3)	
Systems Equipment (A1,2,3)	HVAC, Electrical, Plumbing	Financial Control	Owner (S3)	
		Operational Control	General Contractor (S3)	
Transport to Site (A4): Materials and Systems Equipment (e.g., HVAC)	Shipping to Site	Financial Control	Owner (S3)	General Contrator (S3): Assumes responsibility for all transport emissions to site.
		Operational Control	General Contractor (S3)	
Construction Activities Operational Carbon				
Onsite Energy Use (A5)	Electrical Use (Utility Provided or Onsite Generation)	Financial or Operational Control	General Contractor (S2)[1], Owner (S3)	General General Contractor assumes responsibility for all onsite energy and fuel use (S1,2); regardless of whether they have operational or financial control of the project
Onsite Fuel Use (A5) (Procured by General Contractor)	Onsite Vehicle, Equipment and Generators	Financial or Operational Control	General Contractor (S1)[1], Owner (S3)	
Onsite Fuel Use (A5) (Procured by Subcontractor)	Onsite Vehicle, Equipment and Generators	Financial or Operational Control	Subcontractor (S1)[1], Owner (S3)	
Chemical Use Emissions Onsite (A5)	Onsite Concrete Batch Mixing, Other	Financial or Operational Control	General Contractor (S1)[1], Owner (S3)	
Waste Management (A5)	Transport to Landfill or Recycling/Reuse Facility	Financial or Operational Control	General Contractor (S3)[1]	
Jobsite Worker Commuting (one-way commute)	Workers driving to worksite	Financial or Operational Control	General Contractor (S3)[1]	
Building Operations Prior to Turnover (A5)	Electricity and Onsite Fuel Combustion to Operate	Financial or Operational Control	General Contractor (S1,2)[1], Owner (S3)	
(1): Contractors utilizing the 'financial' control approach are responsible for these emissions when they have financial control of the project; otherwise the party with financial control of the project is responsible for these emissions.				
Post Turnover Operational Carbon				
Annual Onsite Energy Use (B6)	Electricity Use	Financial or Operational Control	Owner (S2)	General Contractor (S3): General Contractor offsets all operational carbon emissions either at turnover or annually for either a defined period or the life of the asset (up to 60 years).
Annual Onsite Fuel Use (B6)	Onsite Fuel Use/Combustion	Financial or Operational Control	Owner (S1)	
Use of Sold Product (Lifetime Emissions) (B6)	Electricity and Onsite Combustion to Operate	Financial or Operational Control	Owner (S3) (if sold)	
End of Life (C1 thru 4)	Demolition or Disassembly	Financial or Operational Control	Owner (S3)	

Developer - Design - Build				Construction Manager (At Risk and Not at Risk)
Build - to - Suit (General Contractor is not Owner or Majority Investor)		Speculative (General Contractor is Owner or Majority Investor)		Acting as Owners Rep
Minimum Accountability	**Contractor Opportunity for Value Added (Example)**	**Minimum Accountability**	**Contractor Opportunity for Value Added (Example)**	
Owner / Majority Investor (S3)	General Contractor (S3); For all Materials and Equipment Specified by Owner regardless of control method	General Contractor (S3)	N/A: Already General Contractor (S3) Responsibility	Not accountable for any carbon emissions associated with building construction and operations. Can advise owner on low carbon options and best practices.
General Contractor (S3)				
Owner / Majority Investor (S3)		General Contractor (S3)		
General Contractor (S3)				
Owner / Majority Investor (S3)	General Contractor (S3): Assumes responsibility for all transport emissions to site.	General Contractor (S3)		
General Contractor (S3)		General Contractor (S3)		
General Contractor (S2)[1], Owner/Majority Investor (S3)	General Contractor assumes responsibility for all onsite energy and fuel use (S1,2)	General Contractor (S2)	General General Contractor assumes responsibility for all onsite energy and fuel use (S1,2)	
General Contractor (S1)[1], Owner / Majority Investor (S3)		General Contractor (S1)		
Subcontractor (S1), Owner / Majority Investor (S3)		Subcontractor (S1), General Contractor (S3)		
General Contractor (S1)[1], Owner / Majority Investor (S3)		General Contractor (S1)		
General Contractor (S3)[1]		General Contractor (S3)		
General Contractor (S3)(1)		General Contractor (S3)		
General Contractor (S1,2)[1], Owner / Majority Investor (S3)		General Contractor (S1,2)		
Owner (S2)	General Contractor (S3): General Contractor offsets all operational carbon emissions either at turnover or annually for either a defined period or the life of the asset (up to 60 years).	Owner (S2), General Contractor (S3)	N/A: Already General Contractor (S3) Responsibility	
Owner (S1)		Owner (S1), General Contractor (S3)		
Owner (S3) (if sold)		Owner (S1,2), General Contractor (S3)		
Owner (S3)		Owner (S3)		

SECTION 3 – WHAT TO TRACK ON PROJECT SITES

PURPOSE OF THIS SECTION

Calculating the carbon footprint of a project requires significant effort. This section aims to simplify this process by explaining key concepts, discussing sources of emissions, and providing insights on managing and scaling the calculations of a project-level carbon footprint. A project's life cycle includes various stages, including raw materials extraction, construction and installation, operations and use, renovations, and, ultimately, demolition and disposal. This playbook focuses primarily on the emissions stages that contractors are likely to track and report: emissions from the manufacture of construction materials and emissions from construction activities. These stages are often referred to as Upfront Carbon "Product Stage" (life cycle stages A1-A3) and Upfront Carbon "Construction Process Stage" (life cycle stages A4-A5).

The figure below provides an overview of the life cycle stages of a typical construction material/product. This diagram also illustrates the common life cycle assessment phases referenced throughout this playbook. It also demonstrates why the growing focus on the embodied carbon of materials, as most of the embodied carbon of a material occurs during production and installation. Even though the contractor may not be directly accountable for emissions associated with construction materials used or installed on a project, the project team may rely on the contractor to gather relevant information about these materials.

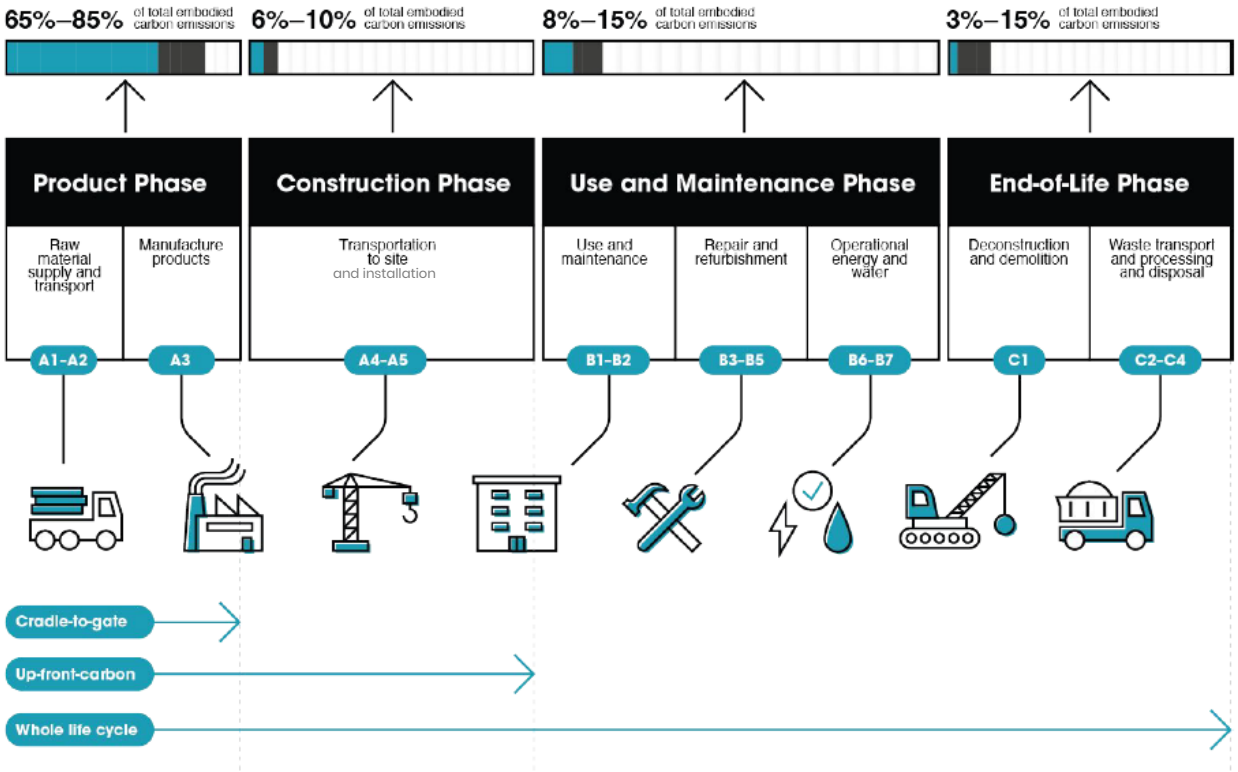


Fig. 4 – Life Cycle Phases of a Construction Material – From RMI.Org. Source link.

**Note: Emissions produced outside the A1-A5 stages are not typically included in a construction company's carbon inventory and, therefore, are not discussed in this playbook.*

Carbon emissions on a construction project come in various forms, influenced by factors such as type of project, size, geographic location, construction methods, material selection, and the project's environmental goals. While this playbook identifies common sources of emissions during construction, it does not cover all possible sources.

This section focuses on the emissions attributed to a construction project within the boundaries described above, rather than describing all emissions that comprise a construction company's total corporate carbon footprint. Section 4 provides a brief introduction to corporate-level reporting.

UPFRONT CARBON "PRODUCT STAGE" - A1-A3

The first stage of carbon to consider for a new construction project is the "upfront carbon product stage" of the materials used–i.e., a measure of the carbon emitted during the process of making a product that is later used or installed on a construction project. This stage includes material extraction, transportation, and manufacturing. Much of the information about the carbon emissions associated with the material is included in an Environmental Product Declaration (EPD). Contractors can request EPDs from the manufacturer when procuring the material. This stage includes three phases:

- A1 – Raw Material Extraction or Processing of recycled materials
  - This includes but is not limited to, fuel emissions from machinery and vehicles, energy to extract, and excess waste product disposal.
- A2 – Transportation to and between manufacturing locations
  - This includes but is not limited to, vehicle fuel emissions and packaging required to transport raw material.
- A3 – Manufacturing of product
  - This includes but is not limited to, energy consumed to power factory equipment, heat or cool process water, process waste, and package material.

**A note on the above descriptions. A contractor will not be required to make A1-A3 calculations for a material unless they have facilities that produce materials (such as an asphalt plant). Manufacturers create EPDs that contain the necessary information. This description is simply to help provide an understanding of how carbon is emitted during the production of a material.*

These three stages make up the total embodied carbon of a construction material before it is transported to a jobsite. The embodied carbon of a material is expressed in carbon dioxide equivalent units (CO_2e) and reflects the "global warming potential" of the product. This "upfront carbon product stage" is one of the first places an owner, design team, or contractor can begin to compare similar products and identify specific products that may offer a lower total embodied carbon value. One of the best ways to compare similar products is by reviewing the manufacturers' EPDs—but it is important to note limitations on the comparability of EPDs. Only similar materials, with similar performance, should be compared—not materials with different performance, or materials with EPDs that are based on different underlying systems (e.g., an asphalt EPD cannot be compared to a concrete EPD).

ENVIRONMENTAL PRODUCT DECLARATIONS

EPDs provide information about a product's environmental impact throughout its life cycle. EPDs play a crucial role in enabling the project team to make informed decision-making on materials by offering data-driven insights into a product's environmental performance. However, as noted above, EPDs are

only helpful in comparing similar products (e.g., asphalt to asphalt and not asphalt to concrete) that are based on the same or equivalent product category rules.

There are several ways to find an EPD (or learn about materials):

- Manufacturer Websites: Many manufacturers provide EPDs for their products on their websites. These are often found in sections related to sustainability, environmental data, or product specifications.
- EPD Databases and Materials Related Tools: There are databases where manufacturers voluntarily register their EPDs. These platforms allow users to search for specific products or materials and access their EPDs.
    - Building Transparency - Embodied Carbon in Construction Calculator (EC3): www.buildingtransparency.org
    - Athena Sustainable Materials Institute - EcoCalculator (for both commercial and residential materials): https://www.athenasmi.org/our-software-data/ecocalculator/
    - Mindful Materials - Product Portal (in Beta): https://portal.mindfulmaterials.com/
    - Urban Land Institute (ULI) - Materials Movement (2024) report
    - ULI Embodied Carbon (2019) report
- Industry Associations: Some industry associations and environmental organizations compile and provide access to EPDs for various products within specific sectors. They might offer databases or directories containing EPDs.
- Consulting Firms and Research Institutions: Consulting firms and research institutions focusing on sustainability often conduct assessments and publish EPDs for various materials and products. Exploring their reports or websites might lead to relevant information.
- Request from Manufacturers: If you cannot find an EPD for a specific product, consider reaching out directly to the manufacturer. They might have the information available or be willing to provide it upon request.

Remember, when searching for an EPD, ensure it covers the specific product or material in question and includes the relevant A1-A3 carbon data and other environmental impacts that need to be evaluated. With embodied carbon accounting still a growing field, there are still some areas where an EPD or tracking of embodied carbon is not as simple. EPD databases are still growing throughout the industry. In September 2023, the EPA announced an additional $100 million in funding to support EPD creation. The EPA is also in the process of creating more tools to help manufacturers develop EPDs.(23)

Common Elements of an EPD (Not a Complete List)

- Contact and Supplier Information
- Product Information
    - Material Type
    - Photographs
- EPD Declaration Number
- EPD Type (e.g., plant/facility specific, supplier specific, or national industry average)
- EPD Publication and Expiration Dates
- Product Category Rule or Standard Used in Development of the EPD
- Information on Third-Party Review
- Environmental Impacts of Declared Units
    - Global Warming Potential

- Ozone Depletion Potential
- Acidification Potential
- Total Waste Disposed
- Consumption of Freshwater

As shown in Figure 4 Life Cycle Phases of a Construction Material at the beginning of this section, the upfront carbon product stage (A1-A3) can make up between 65-85 percent of the total carbon emissions of a construction material/product's life cycle. These raw or recycled materials and the process to make new products are the building blocks of our built environment. The emissions associated with construction materials are driving a shift, in the market and in sustainability rating tools, to source lower embodied carbon materials to help in reducing the carbon footprint of the built environment. By having early conversations about materials, a project team can set realistic targets for embodied carbon reduction based on market availability.

KEY MATERIALS

Federal agencies and state governments have been considering or enacting "buy clean" programs to require the sourcing of low embodied carbon construction materials. These buy clean programs most commonly focus on concrete, steel, glass, and asphalt.(24) A subset of these materials has been shown to make up 23 percent of total global emissions: concrete, steel, and aluminum.(25) For example, California's Buy Clean Act, enacted in 2017, focuses on structural steel, concrete reinforcing steel, flat glass, and mineral wool board insulation. Keeping buy clean program in mind, contractors may want to start with establishing a process for collecting carbon emissions information on the asphalt, concrete, flat glass, and steel used in their projects, when appropriate. That process should accommodate growth in the materials covered. Federal agencies have already expressed interest in expanding their list of initial materials. Drywall and insulation may be emerging materials for inclusion in buy clean programs. Contractors can expect the list of materials covered by buy clean programs to grow.

Fig. 5 - Common construction materials included in Buy Clean programs

Two other factors that will influence the materials tracked on a project are the owner and type of construction. An individual project owner may want the contractor to track and report additional materials based on the significance of that material for their specific project, regardless of any federal or state buy clean program. Materials also will vary based on project type (e.g., hospital, stadium, or highway). The Concrete Centre provided a graphic in their 2012 Embodied Carbon Report (Figure 6 below) illustrating the influence of different materials on the overall makeup of a project's embodied carbon—comparing building projects. The superstructure and substructure made up most of the embodied carbon of materials used, but other aspects, such as roofing, ranged from 5-11 percent depending on the project type. In light of this, a company may want to establish standard practices for how to collect information on various materials specified for their projects. This may be limited to concrete, steel, glass, and asphalt initially, to reflect buy clean programs. However, an individual company's internal list may evolve in response to its project portfolio or trends specific to its market.

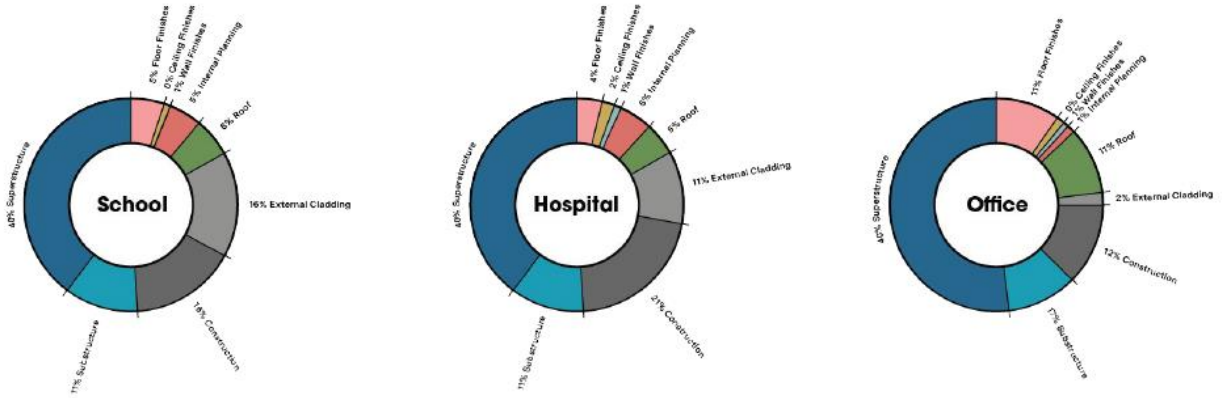


Fig. 6 - Distribution of materials between different building projects. Source: Embodied Carbon Report, The Concrete Centre, 2012.

What the contractor is likely tracking under A1-A-3

- Materials information for the project "as built" – Even though a contractor would not typically be accountable for A1-A3 emissions, the project team will most likely look to the general contractor to gather or verify materials information. The number of materials that fall into this category is determined by the project owner. If significant, this could be an added professional service that the contractor can provide, especially if the project requires tracking multiple materials.

UPFRONT CARBON "CONSTRUCTION PROCESS STAGE" – A4-A5

As previously mentioned, A4-A5 refers to construction process stage carbon. The A4 and A5 phases capture (1) the transportation of materials to the jobsite and (2) the construction installation process. These stages can be found in some, but not all, EPDs. While the EPA notes that construction emissions (mostly from fuel use) account for 1-2 percent of total U.S. emissions,(26) the limited findings available from projects that tracked greenhouse gas emissions have shown that emissions associated with construction activities themselves can vary greatly. The variability of construction makes it hard to extrapolate project data into useful or accurate percentages for the construction phase. Several project-specific variables impact emissions—project location affects the transportation of materials, while project type and site conditions impact equipment operation, water usage, and waste management. Recent articles have advanced the possibility that materials transportation and construction could be anywhere from 10-30 percent of upfront (A1-A5) embodied carbon emissions for a material (with materials extraction and manufacturing making up the remaining portion of that phase of the product's life cycle).(27, 28, 29) Notwithstanding the lack of data, projects teams face real pressure to account for all life cycle emissions, and construction is a key piece of that puzzle, so contractors may be asked to provide emissions data on A4 and A5 emissions.

MATERIALS TRANSPORTATION TO CONSTRUCTION SITE

In addition to gathering carbon information on materials used on a project, the contractor may be expected to track and report emissions associated with the transportation of the material(s) and components to the construction site. This stage is referred to as A4 embodied carbon. It specifically accounts for the energy expended and the resultant emissions associated with transporting raw materials, components, and finished products from the locations where they are manufactured to the construction site. A4 is included in the assessment of overall embodied carbon of a building or infrastructure project, as it factors in the environmental impact of transportation activities. Minimizing

A4 embodied carbon involves strategies such as sourcing materials locally, using more efficient transportation methods, and optimizing supply chains to reduce the travel distance for materials.

What the contractor is likely tracking under A1-A-4

- *Key materials used on a project (A1-A3)*
- Transportation of materials and components to the project site (A4)

CONSTRUCTION

Phase A5 embodied carbon is the carbon associated with the actual construction process including:

- **Assembly and Installation**: This involves the labor, energy, and emissions associated with putting materials together to construct the building, including processes like construction, fitting, and assembly.
- **On-site Processes**: This includes energy consumption for on-site machinery, tools, and equipment used during the installation process.
- **Construction and Demolition Waste**: Waste generated during pre-construction demolition and the installation that might contribute to emissions during disposal.

Strategies to reduce emissions during this phase include: optimizing installation methods, using more efficient equipment, minimizing waste, and employing other related sustainable practices. See Section 4 for additional best management practices.

The following is a table, organized by phase of construction, depicting possible emission sources that fall within the A4 and A5 stages.

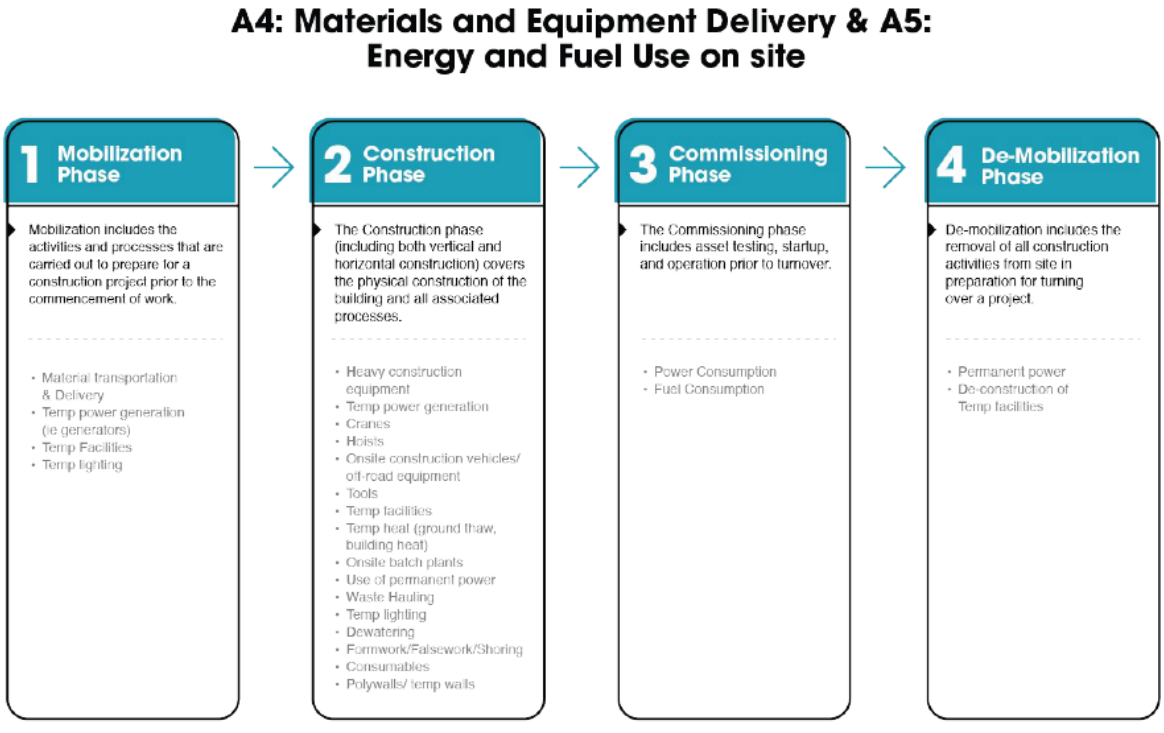


Table 2: Possible Sources of Carbon Emissions on Project Sites

While the list in Table 2 is extensive, there are a few sources that stand out for contractors to focus on when starting to track A4 and A5. Emissions data from EPA, referenced above, as well as the elevation of Scope 1 and Scope 2 reporting within the market suggests that fuel use from construction equipment and other onsite energy use are important construction phase emissions to capture. Construction emissions would include the power and fuel consumed during mobilization, commissioning, and demobilization. Waste management and water use during construction are two other areas that could fall under construction means and methods where project teams may look to contractors to provide emissions data.

Other activities that a contractor could track on a project, but not included in Table x, include commuting, third party inspection visits (for example geotechnical site visits or travel for the design team), equipment maintenance and repair, and factory witness testing. Depending on which method of control a company uses, and the detailed level of reporting required on a project, contractors may need to include one or more of these in their reports to the project team. Jobsite commuting is probably the most common that would be assigned to the contractor to provide; for more information on this, see Section 2.

What the contractor is likely tracking under A1-A-5

- *Key materials used on a project (A1-A3)*
- *Transportation of materials and components to the project site (A4)*
- Emissions associated with project-related activities that fall under construction means and methods, such as: energy and fuel use, water consumption, and waste management. (A5)
- Emissions associated with project-related activities for which the contractor agreed to be accountable, such as: commuting to/from the jobsite. (A5)

OPERATIONAL CARBON "USE STAGE" - B1-B7

Following Upfront Carbon, A1 through A5, there are two more stages that are included in the full picture of embodied carbon. Stages B1 through B6 are called the "Use Stage" (use, maintenance, repair, refurbishment, and replacement). B6 is for operational energy use, which includes all operational carbon after construction, and is excluded in embodied carbon accounting but included in whole life carbon. B7 includes all operational water use and is considered outside the whole life carbon boundary.

END OF LIFE CARBON "END OF LIFE STAGE" - C1-C4 AND D

Stages C1- C4 encompass the End-of-Life Carbon for a product or material and are called the "End of Life" stage (de-construction and demolition, transport, waste processing, and disposal). Stage D for a material is typically excluded from consideration in the embodied carbon and whole life carbon of a project. Stage D includes actions such as reuse, recovery, or recycling, and is outside the scope of reporting that is likely to impact contractors.

> ** As mentioned previously, emissions produced in Stages B, C, or D are typically not included in a construction company's carbon inventory and are outside the scope of this document. For more information on emissions in these stages, please refer to the Carbon Leadership Forum's Life Cycle Assessment of Buildings: A Practice Guide.*

SECTION 4: HOW TO TRACK, REPORT AND REDUCE EMISSIONS

The preceding sections of this playbook laid out the process for identifying carbon emissions accountability, highlighted sources of emissions during the construction phase, and discussed other areas where the project team may rely on the contractor to collect emissions data (i.e., materials EPDs). In this section, the playbook provides resources and best practices for gathering and reporting project-level emissions. Throughout this section are examples of ways that a contractor could take steps to further reduce emissions if they are in the position to choose that option.

As we move through this section, keep in mind that the emissions contractors will be tracking are likely related to:

- A1-A3: Materials used on the project and quantities.
- A4: Transport of materials to the jobsite.
- A5: Fuel, electricity, and gas used during construction.
- A5: Water used during construction.
- A5: Waste generated and transport of that waste to the facility/landfill, and
- A5 Transit of craftworkers to and from the site (jobsite commuting).

Even though this playbook is focused on project-level reporting, this section closes with an introduction to corporate-level reporting.

BASIC, IN-HOUSE APPROACH TO REPORTING PROJECT-LEVEL EMISSIONS

In recognition that many construction firms will seek to establish an in-house program to report GHG emissions on their projects, this section of the playbook includes resources to help that process. This section provides factors to consider with staffing needs, a simple emissions calculator, and thoughts on reporting software and consultants. It also provides some best management practices for gathering and reporting of emissions.

STAFFING NEEDS

As part of the process of reporting emissions, a company may decide to add staff or assign responsibilities to existing staff with the necessary skill set. Companies may choose to overlay any carbon reporting requirements over the existing framework on projects, but staff will be needed to help manage the program. Some staff duties would include establishing procedures, communicating with project managers, assisting project teams with gathering and reporting data, interfacing with project teams on carbon issues, aggregating data across projects for internal use, quality checking project level information, and training. These tasks are data heavy, but awareness of life cycle assessment, sustainability accreditations, and familiarity with how the leading rating systems (e.g., LEED, Envision, or WELL) approach climate and carbon emissions will be helpful.

Below are excerpts from two example job descriptions to highlight the everyday tasks for someone focused solely on sustainability and carbon emissions at the project level, as well as someone who would handle these issues at the corporate level. These positions would best suit companies with a robust sustainability program, internal tracking requirements, and routine projects where clients want to pursue sustainability-related certifications (e.g., LEED, Envision, or WELL).

Project Sustainability Engineer	Corporate Sustainability Manager
Works with project teams to educate them on project responsibilities and help with sustainable building strategies, systems, and standards. Additional focus on carbon reduction, management and data collection.	*Member of corporate team, advances corporate strategy, ensures proper tracking and documentation of sustainability goals, supports community efforts, and collection and reporting of carbon data*
• Benchmark construction related carbon emissions on projects. • Input data entry of preconstruction estimate quantities into embodied carbon benchmarking tool (i.e., EC3). • Create and maintain forms, templates and procedures for emissions reduction and/or building certifications to help projects meet their goals. • Set up and maintain filing system for documentation. • Perform data entry management in tracking spreadsheets using the information provided by project engineers. • Follow up with projects on questions or missing documentation. • Scan data entry performed by others for reasonableness and quality control. • Attend project meetings, take notes, provide guidance to teams with regard to carbon emissions benchmarking and certification. • Create educational materials and organize trainings.	• Serve as culture and data manager on projects related to decarbonization or where project goals include carbon reduction strategy. • Provide and maintain tracking and documentation tools and strategies for goals for which company is responsible. • Support overall decarbonization business strategy with cost, technical, business development and advocacy assistance. • Benchmark construction-related carbon emissions on projects. • Provide training and assistance to sustainability engineers and junior managers. • Track goals and documentation for submittal to reporting bodies. • Benchmark and track performance for internal corporate reporting on construction projects (water, energy, carbon, waste, etc.). • Review documents submitted from construction projects pursuing carbon-related certification for compliance. • Research emerging technologies and new standards in the market.
Experience • Experience with LEED or other similar certifications of projects. • Ideally experience with carbon reporting platform(s). • Knowledge about common terminology used in LEED and other certification programs. • General knowledge of benchmarking used in carbon emissions tracking with regard to construction processes. • Prior experience creating forms, templates and meeting materials. • Ability to work cooperatively and autonomously. • Strong communication skills and attention to details. • Demonstrated passion for sustainability in the built environment.	*Experience* • Knowledge of sustainability, building science, integrated design and green rating systems. • Knowledge of carbon accounting (tracking and reporting)- embodied carbon, business unit GHG inventory. • Relevant market trends and analysis. • Preferred 5+ years of experience in sustainability consulting, construction, architecture, and/or engineering. • Green building certification project experience- 10 projects minimum preferred. • Skilled in team support and collaboration. • Experience in developing and delivering training. • Experience with public speaking. • Experience with sustainability data gathering, goal-setting, and facilitation.

EMISSIONS CALCULATOR – AVAILABLE ON AGC'S WEBSITE

To facilitate tracking and reporting emissions, AGC volunteer members have developed a simple tracker in Microsoft Excel that users can download along with this playbook from the AGC website (www.agc.org/climate-change) and customize. The tracker focuses on construction phase emissions (A4 and A5) and provides prompts for materials transport, dirt hauling, temporary utilities, off-road equipment, concrete pumping, craft and staff, as well as waste and recycling. Users can and should change the data in the yellow highlighted fields within the spreadsheet. However, it is important that users do not change the formulas or adjust any connecting data locations within the spreadsheet (*i.e.*, do not delete the appendix tabs for EPA Emissions Factors and EPA WARM data). Doing so will negatively impact the functionality of the spreadsheet.

CALCULATOR – TO BE MADE AVAILABLE IN PUBLISHED VERSION

Project Client Location	**Construction Activity Carbon Pollution Emissions Report - JTD Thru XX 2023**		
	Total CO2 Footprint (Metric Tons)	% of Total CO2 Emmissions	Total CO2 Reduction (Metric Tons)
Project Total	**372**	**100%**	**0**
A4 - MATERIAL TRANSPORT			
Concrete Material Transport	37	10%	
Rebar Material Transport	3	1%	
Material Transport Subtotal	***40***	***11%***	
A5 - TEMP UTILITIES			
Temp Power - ElectricityRebar	99	27%	
Temp Power - Natural Gas	150	40%	
TEMP UTILITIES SUBTOTAL	***249***	***67%***	
A5 - OFF-ROAD EQUIPMENT AND VEHICLE FUEL			
Existing Building Demolition	4	1%	
General Requirements - Equipment Fuel	11	3%	
Concrete Pumping	16	4%	0
Site Earthwork - Joe Dirt Excavation	3	1%	
Drilling and Shoring Activities - Drill Master Drilling	49	13%	
OFF-ROAD EQUIPMENT AND VEHICLE FUEL SUBTOTAL	***83***	***22%***	***0***

In addition to this emissions calculator, users may benefit from using the following free tools developed by the EPA for reporting.

- Inventory of carbon emission equivalencies (ICE): https://www.epa.gov/energy/greenhouse-gases-equivalencies-calculator-calculations-and-references
- Simplified GHG Emissions Calculator | US EPA
- Guidance on carbon accounting for organizations: https://www.epa.gov/system/files/documents/2022-09/Simplified_Guide_GHG_Management_Organizations.pdf
- Greenhouse Gas Equivalencies Calculator | US EPA

PAYING FOR SOFTWARE TO FACILITATE YOUR REPORTING

The market for carbon reporting software has expanded greatly in recent years. While this playbook is not the appropriate place to list or evaluate "for purchase" software to facilitate reporting, AGC offers the following for consideration.

1. Consider appropriate parameters and requirements: Is software needed to report jobsite emissions to a project owner? Is software needed to report corporate emissions?
2. Explore software capabilities: Does the software support comparison of projects? Can the software help translate and transfer data with the specific (and various) reporting tools project owners use? Can the tool be used to interface with subcontractors and vendors?
3. Consider vendor qualifications: What is the vendor's reputation and market share? Is their software aligned with the construction industry, or does it require add-ons or customizations? What is the fee structure and how does that impact access to project site data in subsequent years?

HIRING A CONSULTANT FOR REPORTING

Similar to when evaluating of software, contractors will want to exercise due diligence in hiring a consultant to assist or perform reporting activities. With the burgeoning carbon reporting market, many consultancy firms specialize in assisting clients, designers, and construction companies in providing carbon analysis and accounting. For construction companies, their services are often combined with support for obtaining a sustainability or green certification, when that is also required for the project.

Two examples of how that scope of services might be specified are below. The examples vary depending on whether the consultant is expected to engage in material analysis during design or solely provide management and data collection during construction.

Embodied Carbon Analysis, Management, and Data Collection (Starting in Design Phase)	Embodied Carbon Analysis, Management, and Data Collection (Start of Construction)
• Coordination with [company name] and design partner(s) to assist in vetting proposed materials, conduct iterative analyses at each estimate milestone of options for client consideration, and produce estimated embodied carbon footprint for the major contributors (at minimum concrete, steel, curtainwall, miscellaneous metals, and asphalt for new construction, and drywall, flooring, ceiling systems, and casework for renovations) and for any other materials the client or design team may deem as needed decision areas. • Coordination with [company name] and subcontractors to track and identify opportunities to reduce future emissions in the areas of constructability, waste management, material and staff	• Establish estimated manufacturing embodied carbon emission models in EC3 (or manually using supplier EPDs and EPA coefficient data) to set initial baseline scenarios for carbon outcomes. Establish estimated construction activity emissions (waste hauling, material and staff transportation, jobsite fuel and energy use) if deemed necessary by client. • Provide the *AGC Playbook on Decarbonization and Carbon Reporting in the Construction Industry* and project-specific guidance to subcontractors and suppliers as a reference of the information that will be assessed and collected, and the format in which it will be collated. • Assist in the writing of contract language that informs the expectations of subcontractors to supply carbon-related data.

transportation, jobsite fuel and energy use, as well as educating subcontractors, procurement team members and other supply chain influencers on how emissions could be reduced and will be tracked. • Establish estimated manufacturing embodied carbon emission models in EC3 (or manually using supplier EPDs and EPA coefficient data) to finalize initial scenarios for carbon outcomes. Establish estimated construction activity emissions (waste hauling, material and staff transportation, jobsite fuel and energy use) if deemed necessary by client. • Provide the *AGC Playbook on Decarbonization and Carbon Reporting in the Construction Industry* and any project-specific guidance to subcontractors and suppliers as a reference of the information that will be assessed and collected, and the format in which it will be collated. • Assist in the writing of contract language that informs the expectations of subcontractors to supply carbon-related data. • Facilitate kickoff meetings prior to construction start and as key subcontractors begin their scope. • Provide ongoing support to subcontractors and design team. • As quantity takeoffs are solidified and waste, transportation, energy, and fuel statements are collected, enter the data into the AGC carbon calculator (or utilize EC3). • Attend meetings as needed to explain data collected, any issues in collecting accurate data, and how the project is performing against baseline. • Provide monthly updates to the project lead or designated person(s). • Continue to manage relationships and information gathering throughout construction and then prepare final numbers as part of the closeout phase of the project. • Provide a summary report and all backup documentation at the end of construction.	• Facilitate kickoff meetings prior to construction start and as key subcontractors begin their scope. • Provide on-going support to subcontractors and design team. • As quantity takeoffs are solidified and waste, transportation, energy, and fuel statements are collected, enter the data into the AGC carbon accounting template (or utilize EC3). • Attend meetings as needed to explain data collected, any issues in collecting accurate data, and how the project is performing against baseline. • Provide monthly updates to the project lead or designated person(s). • Continue to manage relationships and information gathering throughout construction and then prepare final numbers as part of the closeout phase of the project. • Provide a summary report and all backup documentation at the end of construction.

This is emerging and developing area of expertise. Contractors will need to do some digging to ensure that any consultant retained has the requisite understanding of construction as well as carbon reporting. The contractor will want to ensure the consultant they will be working with has deep knowledge of the common frameworks and carbon reporting. Note the firm's experience and team members, not just the principles. Ask about the number of projects completed and for references from within the construction industry.

BEST MANAGEMENT PRACTICES: PLANNING FOR SUCCESS IN CARBON REPORTING AND REDUCTION

Following the adage of "you cannot manage what you cannot measure," quality reporting itself comes from good planning, education, and dedication to getting it right. While this playbook provides resources with the goal of providing a streamlined path to tracking and reporting, companies may benefit from building a carbon strategy, both for their business and for the projects they support.

The example best management practices below come from the volunteer AGC members who helped develop this playbook. The following list of best practices is intended to inform your carbon reporting or sustainability efforts. The list includes a great many of the practices that have helped contractors in the past, and all merit your consideration. Each contractor must make an independent determination of what is relevant to and appropriate for its particular situation.

Table 3. Best Management Practices for Carbon Reporting and Reduction

FOCUS AREA	FOUNDATIONAL BEST MANAGEMENT PRACTICES	GENERAL HOW TO'S	PROVIDING ADDED VALUE (HIGHER LEVEL OF EFFORT)
MATERIALS USED ON THE PROJECT: TYPE AND QUANTITY (A1,2,3) **MATERIALS TRANSPORT TO JOBSITE (A4)**	* Track, calculate and report embodied carbon for priority materials (asphalt, concrete, steel, flat glass, and other materials identified in contract) (A1,2, 3) * Identify options for lower carbon materials; utilize where possible (A1,2,3)	**General Contractor** **Tracking and Reporting Embodied Carbon** * Request EPDs and final quantities from subcontractors or suppliers (utilize credible industry averages if product specific data not available) * Multiply quantities by GWP (from EPD) to estimate embodied carbon for each material * Maintain estimates through job completion * Report on embodied carbon based on 'as-builts' **Identify/Utilize Lower Carbon Options** * Utilize publicly available databases, such as EC3 **Subcontractor Requirements** Bid Documents: Include requirements to provide EPDs and material quantities Buyout: Confirm requirements included in scope of work Subcontracting: Include requirements in contract agreements	* Track and calculate embodied carbon for transportation of priority materials to the jobsite (asphalt, concrete, steel, flat glass and other materials identified in contract) (A4) * Identify and utilize lower embodied carbon options for priority materials (A1,2,3) * Source from regional material suppliers (A4) * Integrate carbon accounting into cost estimation * Track costs associated with low embodied carbon footprint materials (A1,2,3,4) * Engage suppliers to support identifying and providing lower carbon material options (A1,2,3)

FUEL, ELECTRICITY AND GAS USED DURING CONSTRUCTION **EQUIPMENT & VEHICLES (A5)**	**Equipment& Vehicles**: * Track fuel, electricity and gas use for all equipment and vehicles used onsite * No vehicle or equipment idling **Jobsite Trailer(s)**: * Track fuel, electricity and gas usage for jobsite trailers * Weatherize trailer to improve thermal insulation	**<u>General Contractor</u>** **Equipment & Vehicles**: * Obtain fuel, electricity and gas reports (monthly) * Track fuel, electricity and gas use in spreadsheet or software * Anti idling policy for project and jobsite signage **Jobsite Trailers**: * Submeter trailer to track energy use * Track energy use in spreadsheet or software * Weatherize trailer: insulate floor and upgrade door/window seals **<u>Subcontractor Requirements</u>** Bid Documents: Include baseline practices and requirements to provide fuel, electricity and gas reports monthly Buyout: Confirm requirements included in scope of work Subcontracting: Include requirements in contract agreements	**Equipment& Vehicles**: * Utilize biodiesel/renewable fuel, solar or electric equipment/vehicles * Utilize Tier III or better engines * Utilize hybrid or all electric or solar equipment and vehicles; no combustion for construction **Jobsite Trailer(s)**: * Power trailer with onsite battery energy storage system * Utilize LED lighting * Occupancy sensors * Install solar * Rent/procure net zero carbon trailer

FUEL, ELECTRICITY, GAS , & WATER USED ONSITE DURING CONSTRUCTION (A5)	* Measure all onsite fuel, electricity, gas and water usage * Determine availability of clean/renewable site power * Reduce use of standby power settings and turn everything off when not in use * Encourage carpooling and public transit for commuting to job site * Provide water refill stations onsite * Conserve water use in construction	**<u>General Contractor</u>** **Measuring & Reporting** * Install electric meter(s), track energy use monthly * Track fuel, gas and water use monthly, obtain invoices/bills * For Tenant Improvement: estimate energy use if not metered * Report site fuel, electricity, gas and water use **Energy Procurement** * Engage utility, determine availability and additional costs (if any) power to the site with clean/renewable power **Energy & Fuel Use** * Jobsite signage to turn off equipment when not in use **<u>Subcontractor Requirements</u>** Bid Documents: Include baseline practices and requirements to measure/report monthly Buyout: Confirm requirements included in scope of work Subcontracting: Include requirements in contract agreements	* Project site is powered 100% by renewable energy or is Net Zero Energy * Onsite renewable power (e.g., solar) * Onsite electric generators * Power site with onsite battery energy storage system * Provide EV charging on the jobsite * Track jobsite worker commuting * Develop a Water Reuse Plan

WASTE GENERATED AND TRANSPORTED TO FACILITY OR LANDFILL (A5)	* Develop and implement construction and demolition waste management plan * Establish a landfill diversion goal for jobsite waste * Track total and diverted waste monthly * Reduce over-ordering and attic stock	**<u>General Contractor</u>** **Waste Management Plan with Landfill Diversion Goal** * Confirm waste diversion goal for project * Include in jobsite training and signage for onsite sorting * Confirm local waste management policy and supplier requirements * Confirm waste to be separated and diverted; provide separate containers for each. Pursue cost credits for recycling (if available). **Tracking & Reporting** * Obtain waste tickets from waste haulers * Provide monthly waste diversion reports **<u>Subcontractor Requirements</u>** Bid Documents: * Include waste management plans and goals * Include monthly reporting Buyout: Confirm requirements included in scope of work Subcontracting: Include requirements in contract agreements	* Reuse materials * Salvage materials for sale or donation * Deconstruct and salvage instead of demolition * Pursue waste certification

CORPORATE-LEVEL GREENHOUSE GAS (GHG) EMISSIONS REPORTING

This section provides resources and information for developing corporate-level GHG emissions accounting. While this playbook focuses primarily on jobsite emissions, this section introduces corporate reporting.

To prepare to calculate corporate GHG emissions, it is important to become familiar with key reporting frameworks and terms. Some of these frameworks and terms were referenced in earlier sections of this report and are repeated here in the context of corporate-level reporting for ease of navigating this document.

Many climate-related regulations and disclosure requirements reference key carbon reporting frameworks. There are two lenses through which companies report climate-related information: (1) climate-related financial risks and (2) GHG emissions accounting and targets. This section focuses primarily on GHG emissions accounting.

KEY FRAMEWORKS

- **Greenhouse Gas Protocol (GHG Protocol)** is a framework that "provides standards, guidance, tools and training for business and government to measure and manage climate-warming emissions."
- The **IFRS Foundation** includes the **International Sustainability Standards Board (ISSB)** which is tasked with developing sustainability disclosure standards. To date, ISSB has issued standards IFRS S1: General Requirements for Disclosure for Sustainability-related Financial Information and IFRS S2: Climate-related Disclosures. More details on these standards can be found here.
    - Many standards reference the **Task Force on Climate-Related Financial Disclosures (TCFD)**. In October 2023, TCFD issued a notice that it had "fulfilled its remint and disbanded." The ISSB standards build off the work of TCFD and other initiatives.

PREPARING CORPORATE-LEVEL GHG EMISSIONS REPORTING USING THE GHG PROTOCOL

Carbon disclosure requirements often state that GHG emissions reporting must follow the GHG Protocol, which is why AGC relied on that framework for this playbook. It is important to become familiar with the GHG Protocol's: A Corporate Accounting and Reporting Standard. This playbook is not a substitute for reviewing the GHG Protocol materials in detail before beginning data collection and reporting efforts, here are some key takeaways from the GHG Protocol's Corporate Accounting and Reporting Standard:

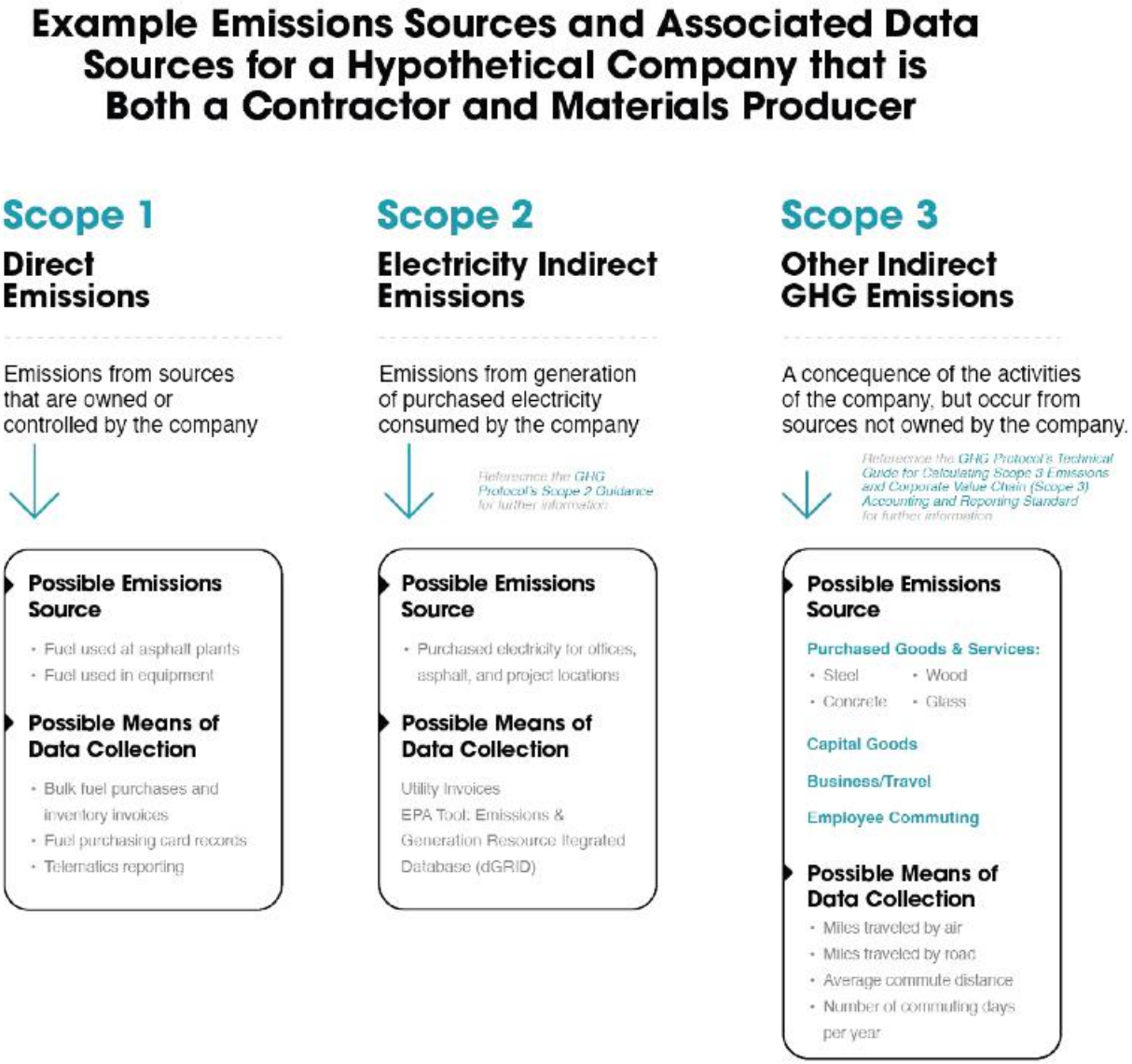
- **Setting organizational boundaries for GHG emissions reporting.** Setting a boundary is determining what will and will not be included in the scope of reporting. Like the discussion in Section 2 of this playbook, it will be important to select either an equity-share approach or a control approach when setting these boundaries. The GHG Protocol provides guidance for making these decisions.
- **Identifying sources of GHG emissions.** Companies must determine their main emissions sources.
- **Calculating GHG emissions.** Companies must use emissions factors to take data collected (e.g., gallons of fuel) and equate it to emissions.
- **Reporting GHG emissions.** Completing a corporate GHG emissions report will include the GHG emissions calculations and supporting information about how the data was collected and any known limitations or discrepancies.

- **Setting GHG Targets.** After completing a corporate GHG emissions report, many organizations will use that information to develop reduction targets.

IDENTIFYING GHG EMISSIONS SOURCES AND DATA COLLECTION SOURCES

Completing a corporate GHG emissions report following the GHG Protocol requires organizations to determine Scope 1, Scope 2, and Scope 3 emissions sources.

The table below is for a hypothetical organization that is both a contractor and a construction materials supplier (e.g., asphalt). The table shows the scopes as defined by the GHG Protocol. It then identifies possible emissions sources for each scope and possible data sources that can be used to help determine emissions resulting from each source. This example is not comprehensive—rather, it helps industry firms assess potential corporate emissions sources. Each organization must complete its own analysis to determine appropriate reporting boundaries and identify emissions and data sources.



CALCULATING AND REPORTING GHG EMISSIONS

Data gathered—including gallons of fuels, kWh of electricity used, tons of product purchased, etc.—does not equate to emissions. Companies must make calculations to take the data points collected and determine resulting emissions. Follow the GHG Protocol for calculation guidance, including how to ensure quality.

Once calculations are made, the next step is to complete a report. A report will include the calculations, an explanation of how those calculations were made, any known limitations in the reporting, and any discrepancies between reporting from previous years.

The last step to finalizing a report is to have it verified. The GHG Protocol includes guidance on how to go about verifying a report.

It is important to closely review any disclosure requirements your report will be used for to ensure your calculations, reporting, and verification follow the criteria outlined in the requirement.

SETTING CORPORATE GHG EMISSIONS REDUCTION TARGETS

For many companies, the next step after completing a corporate GHG emissions report is to set a reduction target. Targets should be supported by plans to achieve them. For example, a target to prioritize hybrid, electric, and clean fuel could include plans to place an order for a certain number of electric vehicles or to initiate a pilot program for new equipment or fuel options.

In this case, and in other goal setting exercises, it is important to focus on actionable items that are feasible for the company to achieve. For example, a contractor should not set goals that are reliant on a project owner, such as to achieve a certain number of green certifications for the projects they build for clients. A more appropriate goal for a contractor to set would be, for example, to set a target for how many staff members have certain green credentials or accreditations, or for how many of the company's offices are certified to a green building standard.

SETTING A BASELINE

To establish reduction targets, companies must identify a baseline year to base those targets upon. For example, if a contractor sets a goal for 95 percent waste diversion for a specific number or type of sites, then they need to perform waste surveys to establish their baseline at that time. Likewise, if the contractor wants to reduce emissions associated with their equipment, they will want to know how many pieces of equipment they own, the ages of that equipment, etc. That information provides the contractor with a frame of reference to come back with plans to reduce emissions through various strategies such as replacement, establishing an anti-idling program, or use of renewables or bio-fuels.

DETERMINING THE BOUNDARY

Similar to determining boundaries for reporting, companies must determine the boundaries for reduction targets (in terms of including Scopes 1, 2, and/or 3). Scope 1 and 2 targets would focus on fuel and electricity or energy consumption. An example of a Scope 3 target could include reducing emissions from commuting (e.g., through incentives for public transit or ride sharing) or offsetting corporate air travel.

TYPES OF TARGETS

Companies must determine the type of target they will set. Below are explanations of different approaches to setting targets.

- **Absolute or normalized intensity targets** -
  Per the EPA, an absolute target will "aim to reduce GHG emissions by a set amount" and an intensity target is "a normalized metric that sets an organization's emissions target relative to an economic or operational variable. Intensity targets allow a business to set emissions reduction targets while accounting for economic growth."
- **Net-Zero or Carbon Neutral** -
  The terms "net-zero" and "carbon neutral" are commonly used in corporate GHG emissions reduction targets. These terms are sometimes mistakenly used interchangeably. **Net-zero** is balancing emissions and removals. **Carbon neutral** generally refers to "counterbalancing CO2 emissions with carbon offsets without necessarily having reduced emissions by an amount consistent with reaching net-zero at the global and sector level."

** Review the SBTi article: Net-Zero Jargon Buster – a guide to common terms for more detail, summarized below. Review the SBTi Net-Zero standard for further detail for setting net-zero targets and see below for more information on SBTi.*

SCIENCE-BASED TARGETS

According to the Science Based Targets initiative (SBTi), scienced-based targets, "provide a clearly defined pathway for companies to reduce greenhouse gas (GHG) emissions, helping prevent the worst impacts of climate change and future-proof business growth." SBTi has a process to follow that can take many months. It requires targets to cover Scopes 1, 2 and 3. SBTi also provides sector-specific guidance. As of March 2024, there is currently no sector guidance for construction.

ADDITIONAL GUIDANCE ON SETTING TARGETS

Refer to these sources for further guidance on setting GHG emissions reduction targets.

- United Nations Climate Change Paris Agreement
- Intergovernmental Panel on Climate Change (IPCC)
- GHG Protocol: A Corporate Accounting and Reporting Standard
- EPA Center for Corporate Climate Leadership: Target Setting
- Scienced Based Targets

REPORTING CLIMATE-RELATED FINANCIAL RISKS

In addition to disclosing GHG emissions, some disclosure requirements require reporting on a company's climate-related financial risks and how they are assessed and managed. Interested organizations may find the following sustainability standards and guidance published by ISSB to be helpful.

- IFRS S1: General Requirements for Disclosure for Sustainability-related Financial Information
- IFRS S2: Climate-related Disclosures published by the ISSB
  - Industry-based Guidance on implementing Climate-related Disclosures Volume 33—Engineering & Construction Services

In summary, to report on climate-related financial risks in alignment with ISSB, companies must explain their governance processes, strategy, risk management approach, and metrics and targets related to sustainability-related risks and opportunities.

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