

CII Guide to Reimbursable Contracting



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Implementation Resource 260-2

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CII Guide to Reimbursable Contracting

Prepared by

Reimbursable Contracts Research Team

Construction Industry Institute

Implementation Resource 260-2

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Chapter 1: Introduction

1.1. Introduction to the Reimbursable Contracting Guide

Reimbursable contracts are used in the engineering and construction industry to address situations in which fixed price contracts (including variations of lump sum and unit price contracts) are either inappropriate or unattractive commercially. For example, reimbursable contracts provide a mechanism for projects that are faced with a substantial amount of uncertainty, new technologies, a variable labor market, or volatile materials pricing. However, understanding when to use reimbursable contracting, and how to successfully implement a reimbursable contract, requires analyzing a complex set of factors. This guide aims to help decision makers develop an appropriate contracting strategy and, if a reimbursable strategy is chosen, it will help them understand how implementing a reimbursable contract differs from implementing a lump sum contract.

1.1.1. Reimbursable Contracting Defined

A distinguishing feature of reimbursable contracting is the method by which the contractor gets paid. In a reimbursable environment, the contractor is paid by the owner for actual costs incurred during execution of a scope of work, plus a negotiated fee (Clough et al. 2005). Although a target cost is typically established at the outset of the work, costs are generally reimbursed by the owner once a week or once a month. As a result, the contractor bears the burden of providing evidence of expended costs, while the owner bears the burden of verifying these costs.

The alternative to reimbursable contracting is fixed price contracting, an approach in which contractors fix most aspects of the price when a bid is submitted. In fixed price contracting, payment is generally based on monthly inspections that verify which bid items have been completed. Because prices are fixed when the contract is awarded, the contractor does not need to provide evidence of actual costs. In a reimbursable contract, cost and schedule risks are primarily assumed by the owner, whereas in a fixed price contract (i.e., lump sum or unit price) cost and schedule risk are assumed primarily by the contractor. Such distinctions are addressed in this guide, along with numerous recommendations for achieving a successful outcome.

1.1.2. Approach to Writing this Guide

This guide focuses on key differences between reimbursable contracts and other strategies; it identifies issues that should be carefully evaluated when a reimbursable contract is being considered and, if chosen, implemented; and, it presents best practices and lessons learned for implementing a reimbursable contract. It is not intended as an exhaustive manual that describes detailed implementation mechanics and procedures, a reimbursable contract. Instead, it focuses on the principles that should be applied to the reimbursable contracting process. Furthermore, the guide has been developed to address the engineering, procurement, and construction (EPC) and engineering, procurement, and construction management (EPCM) delivery methods. It does not address the delivery methods (e.g., traditional design-bid-build) that administer separate engineering and construction contracts. However, many of the same principles that apply to reimbursable contracting could be applied to other delivery methods.

1.1.3. Research Team Composition and Experience

Research Team (RT) 260 consisted of 27 members in the industrial sector and three academics. Twelve of the 27 companies were owner organizations. Six of these 12 were involved with oil & gas, two were in the chemicals industry, three were pharmaceutical and healthcare firms, and one was a producer of electrical energy. Another 12 companies were contractor organizations that provide engineering, construction, and management consulting services to the industrial sector. The remaining three team members were researchers. (See Figures 1 and 2.) The 24 non-academic team members held a variety of positions within their firms: there were three CEOs, one vice president, one project manager, six contract managers, and six individuals held law degrees. (See Figure 3.) Cumulatively, the research team had over 450 years of experience in engineering and construction contracting, especially in reimbursable contracting.

1.2. Purpose of this Guide

The guide presents key factors that make reimbursable contracting different from other contract strategies, and it identifies numerous other factors that should be considered when a decision is being made on whether reimbursable contracting is appropriate for a specific scope of work.

Accordingly, this guide is aimed at helping CII members and other entities carry out a reimbursable contracting strategy when executing a contract scope of work.

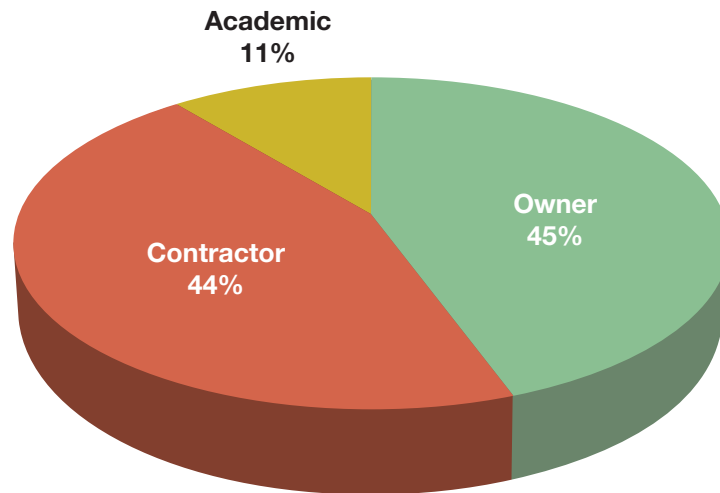


Figure 1. Research team composition

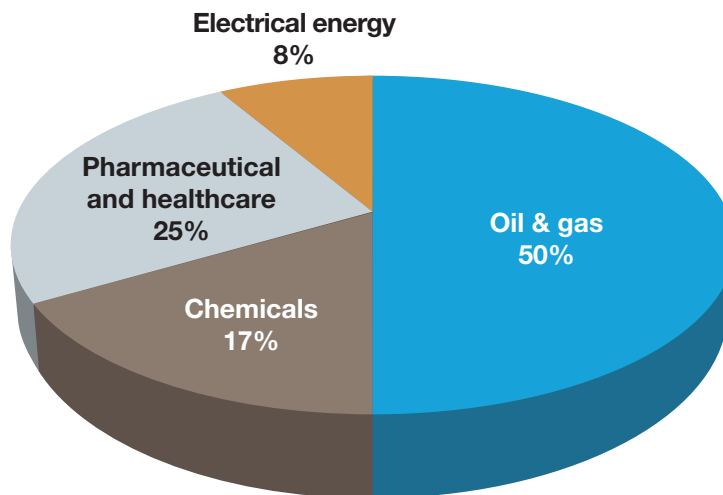


Figure 2. Industrial composition of owners on research team

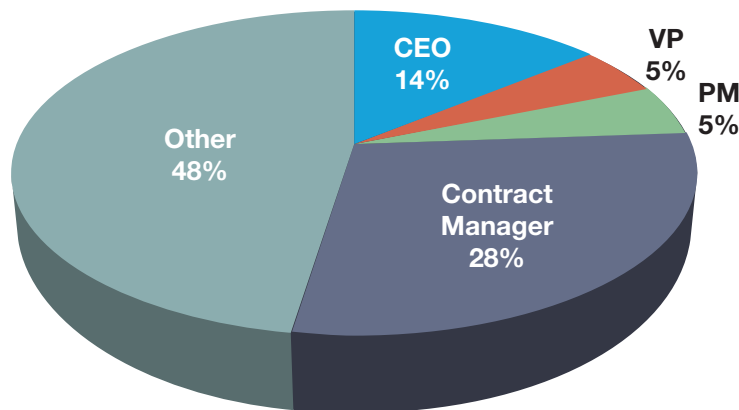


Figure 3. Positions of research team members

1.2.1. Potential Benefits of Reimbursable Contracting

Although both lump sum and reimbursable contracts are used successfully to complete a variety of work scopes, there are often occasions when a reimbursable contract is a better choice than lump sum. For example, when owners want to execute a scope of work before the design has been completed, or when uncertainty and risk are likely to be very high—making lump sum contracting economically unfeasible—reimbursable contracting provides a mechanism for proceeding with the work. Furthermore, when team collaboration is needed to achieve specific owner contract goals (e.g., a cost reduction or completion by a specific date), reimbursable contracting provides an avenue for the owner to better draw upon the expertise of the contractor. In such cases, the contractor is asked to develop the best work solutions by assuming a greater amount of the cost or schedule risk. Finally, reimbursable contracting is appropriate when the owner wants to be much more involved in daily decision making and take more control over time, cost, and productivity. A reimbursable contracting process makes it possible for the owner to track progress alongside the contractor, a capability that would be less likely in a lump sum contract. A number of other potential benefits to using a reimbursable contracting strategy are identified in Section 1.5.

1.2.2. Potential Concerns of Reimbursable Contracting

In addition to its many benefits, reimbursable contracting presents a few pitfalls that can affect both owners and contractors. For example, the owner bears a substantially greater amount of cost risk on a reimbursable contract. As a result, the volume of documentation associated with costs is extensive. This increased volume may require additional owner staff to audit and process the necessary payments. Furthermore, the owner will need to define, in great detail, which costs are reimbursable and which costs are not. Hence, defining the compensation structure is a significant task for the owner, and a lack of definition may result in substantial claims. Finally, a lack of owner involvement in, or experience with, collaborative decision making and control could result in substantial cost and time overruns. To avoid these negative consequences, the owner organization should assign experienced personnel to represent its interests. A number of other cautions are identified in Section 1.5.

1.2.3. The Intended Audience for this Guide

This guide targets experienced construction professionals that have a working knowledge of various contracting strategies. It is not intended as an

exhaustive manual on implementing and administering reimbursable contracts. There are numerous excellent references that already address the fundamentals of contracting, such as *Cost-Reimbursement Contracting* by Cibinic and Nash (2005) and *Owner's Tool for Project Delivery and Contract Strategy Selection User's Guide* (Construction Industry Institute, 2003). As such, this guide is not targeted at the novice user. Instead, it seeks to highlight critical information that should be considered by professionals who have, as a minimum, a basic understanding of contract methods. The guide's target audience and the potential ways its different intended readers might use the information are as follows:

- Executive-level owners or contractors who are interested in implementing cost reimbursable contracting and who wish to try to make it more accessible to their entire project team
- Decision makers on the owner's project team, when trying to choose between fixed price, unit price, or cost reimbursable contracting for executing a particular scope of work
- Decision makers on the contractor's project team, to organize various discussion points on why a particular customer should consider a reimbursable contracting strategy
- Personnel already involved in a cost reimbursable contract or who are about to implement one
- Other members of a project team who have a working knowledge of project delivery methods and contracting strategies

1.3. Goals and Objectives of this Guide

This guide was designed to answer the following essential question:

What makes a reimbursable contract successful for both the owner and the contractor?

Consequently, the research team used team member expertise, focused questionnaires, and in-depth case studies to assemble the list of factors, considerations, differences, best practices, and lessons learned that are compiled in this guide. The stated **goals** of the research were the following:

1. Differentiate reimbursable contracting from lump sum contracting for EPC projects.
2. Identify characteristics of successful reimbursable contracting practices used on EPC projects.

To accomplish the goals, the following specific **objectives** were identified:

- Identify and define the key factors that distinguish reimbursable contracts from lump sum contracts.
- Identify the factors that influence the successful implementation and outcome of reimbursable contracts.
- Identify variations that exist in reimbursable contracting commercial models and explain how these variations affect all stages of the reimbursable contracting process.
- Develop guidance and tools for implementing reimbursable contracts to improve the chances for positive outcomes.
- Provide best practices and lessons learned for implementing reimbursable contracts, and identify the expected outcomes of effective implementation.
- Produce a guide that will help CII members select, implement, or improve reimbursable contracting practices on EPC projects.

1.4. Relationship of Reimbursable Contracting to Project Success as Defined by the Owner and the Contractor

Owner perspective. In a reimbursable contracting environment, an owner organization will often experience a high level of contractor cooperation and collaboration, in contrast to its experience in lump sum contracting environments. Cost information will not be withheld or restricted because the owner has the contractual right to such data. Likewise, scheduling data is more freely available in a native file format to allow the owner to test different scenarios and determine critical path progress. the contractor immediately implements any required or requested changes, since all cost and schedule impacts are recoverable. If there is an unforeseen event, there is rarely a dispute as to which party is at fault or who contributed to its severity. Failures in reimbursable contracts are often a result of the owner's failure to understand and manage the project's risks. **The successful owner in a reimbursable contract environment must understand the nature of the reimbursable contract and actively participate in the monitoring of the work in order to avoid cost and schedule impacts.**

Contractor perspective. Contractors who enter into reimbursable contracts may believe they are relatively free of risk. However, a contractor organization may underestimate the cost recovery associated with its overhead, or find

that engagement in a reimbursable contract arrangement prevents pursuit of more profitable lump sum work. The contractor may find the amount of data required by the owner to be overwhelming and outside its project controls capabilities. And, in contrast to the owner's more remote role in the lump sum environment, the owner's involvement with decisions and the progress of the work is constant in the reimbursable environment. **The successful contractor in a reimbursable contract environment must clearly understand the owner's requirements and embrace the participation of the owner in execution decision making.**

Definition of Contracting Success. Based on input from owners and contractors, the following factors define a successful contract outcome:

Owner Success:

- The project met or exceeded safety standards.
- The completed facility met or exceeded specifications.
- The facility operates reliably at or beyond capacity.
- The contract scope of work was completed within **budget** and schedule objectives.
- The volume of resources committed was as planned.
- The contract and scope of work experienced no surprises.

Contractor Success:

- The project met or exceeded safety standards.
- The completed facility met or exceeded specifications.
- The facility operates reliably at or beyond capacity.
- The contract scope of work was completed within **profit** and schedule objectives.
- The volume of resources committed was as planned.
- Completion of the work led to repeat business.

Choice of an appropriate contracting strategy and proper implementation of the chosen strategy will promote contracting success. Inappropriate strategy selection and poor contract administration can lead to failure.

1.5. Key Differentiators that Distinguish Reimbursable Contracting from Other Types of Contract Strategies

Using team expertise, focused questionnaires, and case studies, the team identified the following key factors distinguishing the reimbursable contract strategy from the lump sum and unit rate strategies. These key distinctions are restated in Chapter 9.

-  Specific characteristics of a scope of work will combine to make reimbursable contracting a more suitable contracting strategy than a lump sum or other strategy.
-  The risks on a reimbursable contract are allocated differently than on a lump sum contract because of the essential nature of reimbursable contracting—when the contractor gets reimbursed for costs, the owner bears most of the risks.
-  The success of the cost reimbursement concept depends on clearly defining the cost reimbursement compensation structure.
-  Greater importance is placed on ensuring that key owner and contractor project personnel have experience working in a cost reimbursable environment.
-  Various elements of the bidding process are significantly different for reimbursable work because 1) the contractor is not required to assess lump sum risk, obtain third-party pricing, or develop contingency pricing and 2) the owner may require detailed information about cost elements and mark-ups.
-  Often, more owner resources are required to manage the risks on a reimbursable contract, especially in the areas of project controls, scheduling, and performance.
-  The owner can have much more extensive involvement in execution decision making in reimbursable contracting, including access to records.



Frequent invoice auditing of the contractor by the owner is standard to reimbursable contracting.



The volume of documentation provided by the contractor for invoicing and payment is significantly greater on cost reimbursable contracts.



Reimbursable contracting allows for greater teamwork and more collaborative decision making between the owner and the contractor than is typical in lump sum contracting.



On a reimbursable contract, the owner will have access to and involvement in control aspects of the work that, on a lump sum contract, are the sole domain of the contractor. This need for increased owner involvement requires the parties to agree on reporting expectations and controls tools, systems, and methods.



On a reimbursable contract, the owner sees actual costs and tracks productivity—a level of project monitoring that is significantly greater than would be possible on a lump sum contract.

1.6. Case Study Support for the Key Distinguishing Factors

The research team conducted eight case studies of CII member companies. From these case examples, the team isolated factors that distinguish reimbursable from lump sum contracting, as discussed in Section 1.5 and in Chapter 9. Appendix A summarizes the case studies and describes how each was either consistent or inconsistent with each of the distinguishing factors. This appendix also discusses the outcomes of the contracting process for each case example. A more detailed analysis of the case studies is provided in Research Report 260-11.

1.7. Organization of this Guide

This guide is divided into the following nine chapters:

Chapter 1 presents the purpose of the guide, its goals and objectives, and the relationship of reimbursable contracting to project success as defined by the owner and the contractor. It also discusses the key differentiators between reimbursable contracting and other types of contract strategies.

Chapter 2 summarizes types of reimbursable contracting strategies and other contracting strategies. It also presents a contracting strategy-risk continuum and a glossary of terms

Chapter 3 explains how certain characteristics of projects make them suitable for reimbursable contracting, and presents a project characteristics-contract strategy selection matrix to help owners select an appropriate contracting strategy.

Chapter 4 discusses the risk allocation specific to reimbursable contracting and the differences in risk allocation that exist between lump sum and reimbursable contracts. A risk allocation summary matrix in this chapter shows how risks are commonly allocated in a lump sum and reimbursable contract.

Chapter 5 presents the elements that constitute the process of reimbursable contract development, and the differences in request for proposal development that exist between lump sum and reimbursable contracts.

Chapter 6 summarizes the differences in the contractor selection process that exist between lump sum and reimbursable contracts.

Chapter 7 presents the elements that constitute the contract management of a reimbursable contract.

Chapter 8 summarizes the differences in project controls that exist between lump sum and reimbursable contracts.

Chapter 9 restates the team's key findings.

Appendix A summarizes the case studies.

Appendix B summarizes the project characteristics and definitions.

Appendix C presents a glossary of term.

Appendix D presents additional information and references.

Chapter 2: Overview of Contracting Strategies

2.1. Definition of Contracting Strategy

In this guide, “contracting strategy” refers to a strategy for structuring the allocation of risk among the parties involved through contract terms and conditions. These terms and conditions include cost, schedule, and performance risks. Part of the contracting strategy includes selection of a pricing basis for the contract. Three primary types of contract pricing bases used in the engineering and construction industry include lump sum, unit price, and cost reimbursement.

2.2. Types of Reimbursable Contracting Strategies

In reimbursable contracts, the contractor is paid for actual costs incurred for execution of a scope of work, plus a negotiated fee as the contractor’s profit (Clough et al. 2005). Five types of reimbursable contracts, as described by Cibinic and Nash (2005) and Clough et al. (2005) are presented below. A combination reimbursable/lump sum contract—called a convertible reimbursable contract—is also presented.

2.2.1. Cost Plus Percentage Fee Contract

The cost plus percentage fee (CPPF) contract is a reimbursable contract that provides for a fee paid to the contractor, determined as a percentage of the actual cost of the work. This percentage may be a fixed amount or may vary in accordance with a prescribed sliding scale arrangement. This type of contract is particularly well suited for work of which the scope and nature are poorly defined at the time of contracting.

2.2.2. Cost Plus Incentive Fee Contract

The cost plus incentive fee (CPIF) contract is a reimbursable contract that provides for an initially negotiated fee to be adjusted later (on the basis of a formula calculating the relationship of total allowable costs to total target costs). Fee adjustment may also involve other performance parameters. This contract type specifies a target cost, a target fee, minimum and maximum fees, and a fee adjustment formula. The formula provides, within limits, for increases in fee above target fee when total allowable costs are lower than target costs. It also provides for decreases in fee below target fee when total allowable costs exceed target costs. Such increases or decreases are intended to provide incentives

for contractors to manage the contracts effectively. When total allowable cost is greater than or less than the range of costs within which the fee-adjustment formula operates, the contractor is paid the total allowable costs, plus the minimum or maximum fee. Figure 4 shows the correlation between cost and fee.

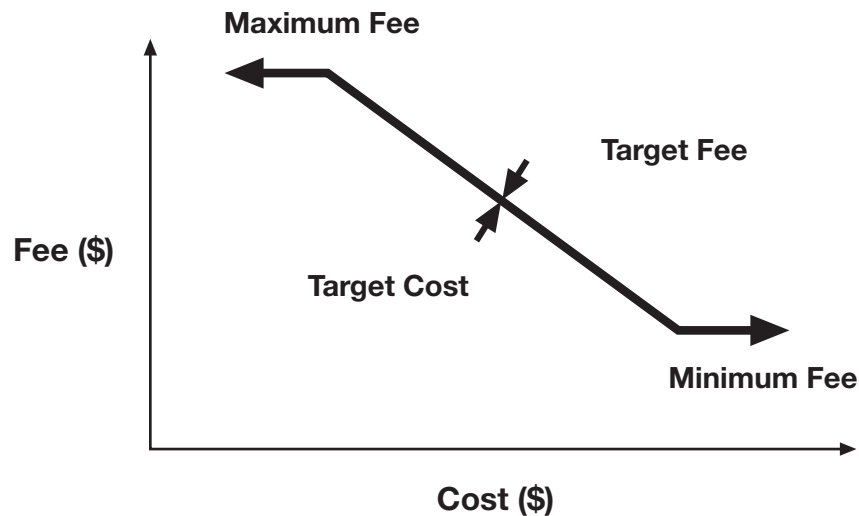


Figure 4. Cost Plus Incentive Fee

2.2.3. Cost Plus Award Fee Contract

A cost plus award fee (CPAF) contract is a reimbursable contract that provides for a fee consisting of 1) a base amount fixed at inception of the contract and 2) an award amount that the contractor may earn in whole or in part during performance and that is sufficient to provide motivation for excellence. (This incentive may be applied to such areas as quality, timeliness, technical ingenuity, and cost-effective management.) The amount of the award fee to be paid is determined by the owner's judgment of the contractor's performance in terms of the criteria stated in the contract. This determination is made unilaterally by the owner and is not subject to the disputes clause. This type of contract is used primarily by public owners, for whom the lump sum contract is not suitable due to uncertain conditions. This contract type is not generally used by other owners.

2.2.4. Cost Plus Fixed Fee Contract

A cost plus fixed fee (CPFF) contract is a cost-reimbursable contract that provides for a negotiated fee to the contractor that is fixed at the inception of the contract. The fixed fee does not vary with actual cost, but may be adjusted as a result of changes in the work to be performed under the contract. This

contract type permits contracting for efforts that might otherwise present too great a risk to contractors, but it provides the contractor only a minimum incentive to control costs.

2.2.5. Cost Plus with a Guaranteed Maximum Price Contract

A cost plus with a guaranteed maximum price (CPGMP) contract is a cost-reimbursement contract that provides for a guaranteed maximum cost to the owner. The contractor guarantees that the project will be constructed in full accordance with the drawings and specifications, and that the cost to the owner will not exceed some total upset price. In return for its services, the contractor receives a prescribed fee. An incentive for the contractor to keep costs below the guaranteed maximum is sometimes provided by a bonus clause stating that the contractor and the owner will share any savings. If the cost is over the guaranteed maximum, the contractor gets no additional payment. The GMP is usually subject to adjustment for changes in scope.

2.2.6. Convertible Reimbursable Contract

This type of reimbursable contract is a two-step arrangement which begins on a reimbursable basis and continues until the project is more clearly defined and the drawings and specifications are completed to an already agreed-upon state. Once these conditions obtain, the contract is converted to a lump sum arrangement based upon a predetermined definitive estimate. In the event that the parties are unable to reach agreement on the lump sum, the contract may allow the parties to proceed on a reimbursable price basis.

2.3. Other Contracting Strategies

The alternative to a reimbursable contracting strategy—an approach in which most of the costs are reimbursed by the owner—is one in which most aspects of the price are fixed. Two fixed price strategies are described below.

2.3.1. Lump Sum Contract

In a lump sum contract, the contractor agrees to perform all the work stipulated in the contract by charging the owner a fixed sum of money. The contractor bears the risk of cost overruns, rather than the owner. This type of contract is suitable for a project in which the scope of work can be described with a high level of certainty at the time of contracting. A lump sum contract may also include unit rates and reimbursable elements related to changes in the work.

2.3.2. Unit Price Contract

In a unit price contract, the contractor agrees to perform each item of work stipulated in the contract at a fixed price per unit of work, and payment is made to the contractor based on actual quantities of work accomplished. The owner therefore retains the quantity risk, but, otherwise, prices are fixed. This type of contract is appropriate for projects that, although they involve known work types and specifications, the quantities of work they will require cannot be accurately forecast at the time of contracting.

2.4. Summary of Contracting Strategies for Case Studies

Table 1 identifies the case studies completed for the research and the type of contracting strategy used by each case study company. The case studies are discussed in greater detail in Appendix A.

Table 1. Contracting Strategies Used by Case Study Participants

Contracting Strategy	Case Studies							
	1	2	3	4	5	6	7	8
Cost Plus Percentage Fee								
Cost Plus Incentive Fee								
Cost Plus Award Fee								
Cost Plus Fixed Fee								
Cost Plus Fixed Fee with GMP								

2.5. Conclusion

This chapter presented the various contracting strategies that are typically used for engineering, procurement, and construction (EPC) projects. It discussed reimbursable and fixed price contracting strategies, distinguishing five types of reimbursable contracts: 1) cost plus percentage fee; 2) cost plus incentive fee; 3) cost plus award fee; 4) cost plus fixed fee; and 5) cost plus fee with a GMP. A combination reimbursable/lump sum contract, called a convertible reimbursable contract, was also presented. Two types of fixed price contracts were discussed: lump sum and unit price. This chapter set the stage for understanding the types of contracting strategies available to owners, while the next chapter will discuss how particular contracting strategies are selected and will describe the relationships between project characteristics and contracting strategies.

Chapter 3: Contracting Strategy Selection

3.1. Introduction to Contracting Strategy Selection

An important step to implementing a contract is to decide which contracting strategy will be best suited to the characteristics of a particular scope of work. Hence, this chapter discusses the process of determining whether reimbursable contracting is the right approach.

CII and its members have several tools for selecting a contracting strategy:

- CII Implementation Resource 165-2, *Owner's Tool for Project Delivery and Contract Strategy Selection User's Guide*
- this *CII Guide to Reimbursable Contracting*
- company-developed checklists and road maps.

These tools, along with a detailed review of potential risks, can be used to **identify the contracting strategy** that is most suitable for the characteristics of the project and the risks associated with it. This necessarily entails understanding the unique characteristics and risks of the project, which are generally defined during the front-end planning process. In addition to using these tools, the next section identifies the relationship between the contracting strategies (defined in Chapter 2) and risk allocation (discussed in Chapter 4). When selecting a contracting strategy, each party must identify (1) how much risk they are willing to assume, and (2) the various characteristics of projects that might influence the selection of a particular strategy. This chapter will guide users through the process of determining the characteristics of any scope of work, in order to select the appropriate contracting strategy. Chapter 4 discusses risks and risk allocation in greater detail.

3.2. Contracting Strategy – Risk Continuum

On a lump sum contract, the **contractor** assumes the majority of the cost and schedule risk. However, on a cost plus percentage fee contract, the **owner** assumes the majority of the cost and schedule risk. Figure 5 provides an overview of all major contract strategies (as identified in Ch. 2) and their associated risk ownership. On the right side of the continuum are contract strategies that are fully reimbursable (i.e., CPPF). Moving along the continuum to the left, risk aspects of the contract strategy gradually become more fixed.

While Figure 5 provides a sense of the risk variations between contract types, it is important to keep in mind that the owner's risk may actually be substantially higher when a lump sum approach is used. This will be the case if, in fact, the contracting strategy is inappropriate for the project. For example, using a lump sum contracting strategy on a project that has significant uncertainty may result in substantial changes to the scope and increases in cost. Consequently, selection of an appropriate contracting strategy is critical to project success.

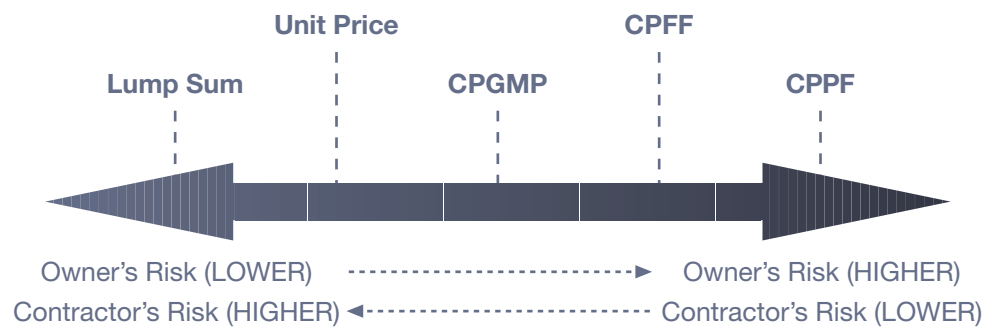


Figure 5. Diagram of cost risk associated with major contract types

In practice, many project parties adopt hybrid contract strategies, rather than implementing fully reimbursable contracts from start to finish of a scope of work. Most large projects are broken into several phases and contracts; on these types of projects, earlier phases are often executed with reimbursable contracting, while, as the scope of work becomes more defined in later phases, lump sum contracting becomes more appropriate.

3.3. Characteristics of Projects That Make Them Suitable for Reimbursable Contracting

Prior to selecting the contracting strategy, the stakeholders should be aware of the characteristics of projects that make them particularly well suited for a given contract type. Such a determination is typically based on several factors. The following four categories summarize the most common characteristics of projects that make them suitable for reimbursable contracting: 1) uncertainty/risk, 2) time, performance, and quality, 3) owner involvement, and 4) timing issues. These characteristics are incorporated into Table 2, which the reader can use to select appropriate contract strategies.

3.3.1. Uncertainty/Risk

Reimbursable contracts are suitable for use on projects with numerous unknown or unquantifiable risks—risks that are subject to greater than usual uncertainty, and thus make it difficult for a contractor to price the work with any degree of accuracy. Such risks cause the contractor to include a substantial contingency sufficient to cover the estimated costs associated with known and unknown risks. Following are examples of this type of risk:

- Scope is poorly defined or undefined.
- Quantities are uncertain.
- New technology is involved.
- Project is very large (dollars, work hours, labor, etc.).
- Project is one of a kind.
- Project is complex.
- Many risks are unknown or unknowable.
- Potential exists for large scope changes.
- Project location is remote, volatile, or unusually challenging.
- Project environment is volatile.
- Financial markets are volatile.
- Material markets are volatile.
- Political and socio-economic conditions are volatile.

3.3.2. Time, Performance, and Quality

Reimbursable contracts are suitable for use on projects on which the time, performance, and quality objectives outweigh the relative cost. Following are examples of such project conditions:

- Project schedule is paramount.
- Time control and time constraints are concerns.
- Long-term performance/quality is a significantly higher concern than cost.
- Time to market is critical to market entry or to maintaining market share.

3.3.3. Owner Involvement

Reimbursable contracts are suitable for use on projects on which the owner wants to have daily, weekly, or constant input into the decision making process and on which the owner desires regular feedback from the contractor. Additionally, the owner who chooses to employ reimbursable contracting is especially interested in promoting positive long-term relationships among contract parties, or eliminating or minimizing adverse relationships. Following are examples of such owner dispositions:

- Owner desires maximum involvement.
- Owner has significant oversight capabilities and resources.
- Owner desires to control contingency.
- Cooperation is desired, with minimal conflicts or adversarial relationships.
- Qualified contractor relationships exist that can provide increased project cost and schedule certainty.

3.3.4. Contract Strategy Selection and Timing Issues

A key consideration in selection of the appropriate contracting strategy is the timing impact of the different strategies. A **lump sum contract** will require that the owner have relatively well-developed scope and specifications, meaning that the contracting process will necessarily be *later in the project cycle*. In addition, lump sum contracting will usually require substantially more time for the bidding process. This is true because the contractor is taking on substantial cost risk that often requires obtaining subcontractor bids for key portions of scope. Conversely, because a **reimbursable contract** does not require a firm scope and specifications, it can logically be entered into *earlier in the project cycle* than is possible with a lump sum contract. Further, it will generally require less time to bid than a lump sum contract would require, since the contractor's risk is limited to appropriately defining the cost reimbursement basis. To the extent that fixed elements of compensation are introduced—such as fixed fees or GMP—this advantage over the lump sum strategy is reduced.

3.4. Project Characteristics – Contract Strategy Selection

Identified in Table 2 are the characteristics and two contract types that are typically used to contract for EPC/EPCM work: fixed price (either lump sum or unit price) and cost reimbursable. The project goals and characteristics

should be aligned with the type of contract strategy that is most appropriate for achieving the goals or for accommodating the characteristics identified in the table. Appendix B lists project characteristics that are common on EPC/EPCM projects, and provides definitions of these characteristics. Table 2 and Appendix B are intended to help readers select the most appropriate contract strategies for their project by allowing them to think through the particular goals and characteristics of each one.

3.4.1. How to Use the Selection Matrix

Table 2 is a matrix of project goals and characteristics, derived from EPC/EPCM contracting experts who identified the contract type that they believed was most appropriate for the various project goals and characteristics. Each expert was asked to identify which contract strategy would most likely be used given a particular goal or characteristic.

A proportional weight was assigned to each contract strategy, calculated as 1) the number of expert respondents that selected fixed price, divided by total responses, or 2) the number of expert respondents that selected reimbursable contracting, divided by total responses. These values provide an indication of which strategy would be more appropriate for the particular characteristic identified in the table, where a value of at least 0.67 indicates one strategy is favored over the other, a value of 0.33 or less indicates one strategy is less desirable than the other, and a value between 0.33 and 0.67 indicated both were about equally favored.

For example, if 10 experts answered the first question, with eight choosing reimbursable contracting and two choosing fixed price, then the reimbursable contract strategy was assigned a weight of 0.8 while fixed price was assigned a weight of 0.2. The purpose of the weighting was to identify whether respondents were more likely to implement a reimbursable contract or a fixed price contract for a given project characteristic (such as “Scope is poorly defined or undefined”), or whether either type of contract strategy might be appropriate. These weights may aid a decision maker’s determination that a particular contract strategy is more appropriate for the project’s specific characteristics. However, as mentioned, several characteristics may be combined to create a scenario in which one contracting strategy is clearly a better option than another.

To use the table as an aid to determine which contracting strategy might be a more appropriate option, the user should check all of the boxes in Column 2 to indicate which of the characteristics are present on the project in question.

Table 2. Project characteristics—contract strategy selection matrix

Project Characteristics	Check Box if Characteristic Applies	Proportional Weight	
		Fixed Price	Reimbursable
Uncertainty			
Scope is evolving, incomplete, poorly defined, or undefined.	☐	0.25	0.75
Clear scope definition has been provided.	☐	0.76	0.24
Minimal scope changes are expected.	☐	0.88	0.12
Quantities are uncertain at award.	☐	0.50	0.50
Risk			
Many risks are unknown or unknowable.	☐	0.15	0.85
Most ordinary risks can be defined/anticipated .	☐	0.88	0.12
Potential exists for large scope changes and change orders.	☐	0.47	0.53
Project environment is volatile.	☐	0.29	0.71
Project environment is stable.	☐	0.94	0.06
Financial markets are volatile, including interest rates and access to financing.	☐	0.50	0.50
Financial markets are stable, including interest rates and access to financing.	☐	0.76	0.24
Materials markets are volatile.	☐	0.60	0.40
Materials markets are stable.	☐	0.72	0.28
Properties of the Project			
Project is very large (e.g., in dollars or work hours).	☐	0.57	0.43
Project is one of a kind.	☐	0.53	0.47
Project location is remote, volatile, or challenging.	☐	0.29	0.71
Project involves new technology.	☐	0.13	0.87
Time and Cost Control			
Time control and time constraints are concerns for the owner.	☐	0.50	0.50
Cost control is a major consideration for the owner.	☐	0.61	0.39

Table 2. Project characteristics—contract strategy selection matrix
(continued)

Project Characteristics	Check Box if Characteristic Applies	Proportional Weight	
		Fixed Price	Reimbursable
Owner Involvement and Culture			
Owner would like maximum involvement.	☐	0.07	0.93
Minimal owner involvement is expected.	☐	0.94	0.06
Owner has significant oversight capabilities.	☐	0.29	0.71
Owner has limited oversight capabilities.	☐	1.00	0.00
Owner will control the contingency.	☐	0.56	0.44
Owner’s institutional culture favors greater certainty in cost.	☐	0.83	0.17
Relationships			
Cooperation is desired, with minimal conflicts or adversarial relationships.	☐	0.37	0.63
Others			
A similar project has been completed previously.	☐	0.71	0.29
A constructability review is desired or required.	☐	0.58	0.42
Project requires local foreign labor.	☐	0.53	0.47
Project has a compressed schedule or fast track.	☐	0.55	0.45
Project is a greenfield.	☐	0.45	0.55
Project is a brownfield.	☐	0.45	0.55
The footprint of the site makes the project difficult.	☐	0.17	0.83
Owner is concerned about how the cost will affect the balance sheet.	☐	0.75	0.25
Owner has built a relationship of trust with contractor.	☐	0.20	0.80
Limited financing is available.	☐	0.40	0.60
Summation of Weights		Auto	Auto

Columns 3 and 4 contain, respectively, the weighted scores associated with each contracting strategy. After selecting all of the relevant goals or characteristics of the proposed work, the user should sum the scores in Column 3 and Column 4 for the characteristics that apply. A larger score in Column 3 might suggest that fixed price may be a more appropriate contract strategy, given the goals/ characteristics. Conversely, a larger score in Column 4 might suggest that reimbursable contracting might be a more appropriate choice. A spreadsheet-based tool has been created based on the Table 2. This tool will help decision makers select an appropriate contracting strategy based on the characteristics of a specific project.

A proportional weight was assigned to each contract strategy, where the weight was calculated as 1) the number of respondents that selected fixed price divided by total responses or 2) the number of respondents that selected reimbursable contracting divided by total responses. These values provide an indication of which strategy would be more appropriate for the particular characteristic identified in the table, where a value of at least 0.67 indicated one strategy was favored over the other, a value of 0.33 or less indicated one strategy was disfavored over the other, and a value between 0.33 and 0.67 indicated both were about equally favored.

For example, if 10 experts answered the first question, with eight choosing reimbursable contracting and two choosing fixed price, then the reimbursable contract strategy was assigned a weight of 0.8 while fixed price was assigned a weight of 0.2. The purpose of the weighting was to identify whether respondents were more likely to implement a reimbursable contract or a fixed price contract for a given project characteristic (such as “Scope is poorly defined or undefined”), or whether either type of contract strategy might be appropriate. These weights may aid a decision maker when determining whether a particular contract strategy is more appropriate for the project’s specific characteristics. However, as mentioned, several characteristics may be combined to create a scenario in which one contracting strategy is clearly a better option than another.

To use the table as an aid to determine which contracting strategy might be a more appropriate option, the user should check all of the boxes in column 2 to indicate which of the characteristics are present on the project for which the decision maker must select a contracting strategy. Columns 3 and 4 contain, respectively, the weighted scores associated with each contracting strategy. After selecting all of the relevant goals or characteristics of the proposed work, the

user should sum the scores in Column 3 and Column 4 for those characteristics that apply. A larger score in Column 3 might suggest that fixed price may be a more appropriate contract strategy given the goals/characteristics, whereas a larger score in Column 4 might suggest that reimbursable contracting might be a more appropriate choice.

3.5. Common Characteristics of the Case Studies

A review of the CII Benchmarking and Metrics (BM&M) Database found that **projects that utilized a reimbursable contract, rather than a lump sum contract strategy, tended to be less design percent complete both at authorization and at construction execution.** (See Section 3.6.) Furthermore, Table 3 identifies common characteristics of the eight case studies, which are summarized in both Appendix A and RR 260-11. Further definition of each characteristic is presented in Appendix B.

3.6. Analysis of Project Characteristics from the CII Benchmarking & Metrics Database

Analysis of over 1000 projects in the CII **Benchmarking and Metrics (BM&M) Database** revealed that:

- Projects that implement reimbursable contracts overall have less completion on engineering at the time of project authorization than those implementing lump sum contracts overall.
- Projects that implement reimbursable contracts overall have less completion on engineering at the beginning of construction than those implementing lump sum contracts overall.
- Projects that employ reimbursable contracts for construction have more complexity than those that implement lump sum contracts.
- Projects that employ reimbursable contracts for construction have a lower proportion of construction cost to total project cost than those that implement lump sum contracts.
- Projects that employ reimbursable contracts for construction have a lower proportion of construction duration to overall project duration than those that implement lump sum contracts.

Note: See more information of BM&M data analysis in Research Report 260-11.

Table 3. Common Project Characteristics of the Eight Case Studies

Project Characteristics	Case Studies							
	1	2	3	4	5	6	7	8
Uncertainty								
Scope is evolving, incomplete, poorly defined, or undefined.								
Clear scope definition has been provided.								
Minimal scope changes are expected.								
Quantities are uncertain at award.								
Risk								
Many risks are unknown or unknowable.								
Most ordinary risks can be defined/anticipated.								
Potential exists for large scope changes and change orders.								
Project environment is volatile.								
Project environment is stable.								
Financial markets are volatile, including interest rates and access to financing.								
Financial markets are stable, including interest rates and access to financing.								
Materials markets are volatile.								
Materials markets are stable.								
Properties of the Project								
Project is very large (e.g., in terms of dollars or work hours).								
Project is one of a kind.								
Project location is remote, volatile, or challenging.								
Project involves new technology.								
Time and Cost Control								
Time control and time constraints are a concern for the owner.								
Cost control is a major consideration for owner.								

Table 3. Common Project Characteristics of the Eight Case Studies
(continued)

Project Characteristics	Case Studies							
	1	2	3	4	5	6	7	8
Owner Involvement and Culture								
Owner would like maximum involvement.								
Minimal owner involvement is expected.								
Owner has significant oversight capabilities.								
Owner has limited oversight capabilities.								
Owner will control the contingency.								
Owner's institutional culture favors greater certainty in cost.								
Relationships								
Cooperation is desired, with minimal conflicts or adversarial relationships.								
Others								
A similar project has been completed previously.								
A constructability review is desired or required.								
Project requires local foreign labor.								
Project has a compressed schedule or fast track.								
Project is a greenfield.								
Project is a brownfield.								
The footprint of site makes the project difficult.								
Owner is concerned about how the cost will affect the balance sheet.								
Owner has built a relationship of trust with contractor.								
Limited financing is available.								

3.7. Case Study Example of Contracting Strategy Selection (Case Study 6 in Appendix A)

Background: The case study project was a new under-construction hospital project that began in 2006. The owner is a private company that typically implements lump sum contracts.

Process for Selecting a Reimbursable Contract: The scope of work originally was scheduled to be implemented through a typical Guaranteed Maximum Price (GMP) contract. However, market conditions ultimately prompted a switch to a reimbursable strategy. After the schematic estimate was approved by the company's board of directors, and once the design reached 50 percent complete, a new estimate was prepared. This estimate revealed a budget overrun of \$25 million, due primarily to an overheated construction market and the unwillingness of the contractors and subcontractors to assume the types of risks entailed by the proposed project. When the design documents were 90 percent complete, the cost overage had increased to \$40 million, based on the subcontractors' hard-bid lump sum quotes.

Because of the overheated construction market, lump sum subcontracting became financially unfeasible. As a result, the owner's director of construction recommended that a portion of the work be performed under a reimbursable contracting strategy with an incentive structure, and that the remaining work be performed using a tradition lump sum subcontracting strategy. The lump sum subcontracts were adopted for concrete, steel, and interior finishes, among other parts of the work. In these areas, the quantities of materials and material pricing were relatively certain. The incentivized reimbursable contracts were adopted for the general contractor and four major subcontractors (CRS); these applied to mechanical, electrical, plumbing, and drywall, where there was greater uncertainty. The project was completed and the original \$40 million overage was reduced to a \$12 million overage. This reduction was realized by switching to a combination contracting method that incorporated a significant reimbursable contracting element.

Note: See details on Case Study 6 in Appendix A and Research Report 260-11.

3.8. Conclusion

This chapter identified specific characteristics of a scope of work that might lead to selection of a reimbursable contracting strategy. In many cases, time constraints and scope complexity play an important part in strategy selection. Research team discussions, surveys, and case study interviews were used to evaluate the characteristics of projects that might combine in ways that generate unique project risks. Specific categories of characteristics that often influence an owners contracting strategy selection include the following: 1) uncertainty/risk, 2) time, performance, and quality, 3) owner involvement, and 4) timing issues. Some combinations of these characteristics might lead an owner to determine that reimbursable contracting is more suitable for the circumstances, whereas other combinations might indicate that lump sum contracting is appropriate. This chapter presented a tool for systematically thinking through project characteristics and risks so that an appropriate contracting strategy can be selected. This chapter supports the key finding that specific characteristics of a scope of work will combine to make reimbursable contracting a more suitable contracting strategy than a lump sum or other strategy.

Chapter 4: Risk Allocation Strategy

4.1. Introduction to Risk Allocation

Allocation of contractual risks is different for reimbursable and lump sum contracts. Hence, both owners and contractors need first to be aware of differences in risks, and then to craft a risk allocation strategy that is acceptable to both parties under a reimbursable contract.

CII has developed a five-step risk management process that consists of 1) risk alignment, 2) risk identification, 3) risk analysis, 4) risk action, and 5) risk response (CII 2006). (See Figure 6.) While all five steps are important, **risk identification** is the process of documenting the risks that may be appropriately or inappropriately allocated. This step generally lays the foundation for the development of the risk allocation strategy and, hence, is discussed further in this chapter. Specifically, this chapter discusses a number of risks that tend to be frequently misallocated in engineering and construction contracts. It also addresses how differently these risks are allocated or apportioned in both reimbursable and lump sum contracting strategies.

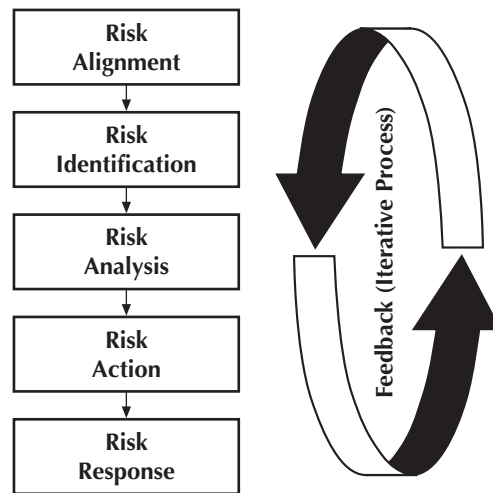


Figure 6. CII Risk Assessment and Allocation Phases (CII 2006)

4.2. Risk Allocation Specific to Reimbursable Contracting

A general rule of thumb in risk allocation is to allocate the risk to the party who is in the best position to control or mitigate the specific risk. There are also a great many risks that can be insured, and, when they are, the party affected by the occurrence of an event or circumstance is protected. In lump sum contracting, these principles are sometimes disregarded, and all or most of the contractual risks are shifted to the contractor. When this strategy is used, a competitive bidding process further shields the owner from cost risks.

In reimbursable contracting, there is a greater burden imposed on the owner to 1) recognize the work-related and contractual risks, and 2) manage

that risk. Contractor selection processes shift from the cost-centric basis that characterizes lump sum contracting to a thorough evaluation of contractor capabilities and performance measures. **A much larger owner organization is required to manage the risks entailed in reimbursable contracting, especially in the areas of project controls, scheduling, administration, and audits.** It is the owner who must also understand staffing levels, productivity, materials delivery, interferences, and safety issues, since the owner bears the risk consequences in reimbursable contracts.

4.3. Risk Identification and Allocation Differences

Although risks may be allocated in an appropriate or inappropriate manner in both lump sum or reimbursable contracts, the following risks are generally negotiated and allocated in the same manner for both:

- indemnity
- insurance
- standard of care
- consequential damages
- intellectual property
- confidential information/data protection
- warranty
- termination.

In 2006, CII completed a research project on Equitable Risk Allocation that identified 107 risks applicable to engineering, procurement, and construction contracts (CII 2006). Of the 107 risks, 14 risks were identified as most frequently **allocated in an inappropriate manner**. These risks include the following:

1. No damages for delay	2. Consequential damages
3. Indemnity	4. Ambiguous acceptance criteria
5. New/unfamiliar technology	6. Force majeure
7. Schedule acceleration	8. Cumulative impact of change orders
9. Insurance allocation	10. Owner-mandated subcontractors
11. Differing site conditions	12. Design responsibility
13. Waiver of claims	14. Standard of care

In addition, the International Association of Contracting and Commercial Management (IACCM) publishes a list of most frequently negotiated terms each year, ranking them in descending order (IACCM 2010). In 2007, the top ten **most frequently negotiated terms** were the following:

1. Limitation of liability	2. Indemnification
3. Price/charges/price changes	4. Intellectual property
5. Termination (cause/convenience)	6. Warranty
7. Service levels	8. Payment
9. Confidential information/data Protection	10. Delivery/acceptance

As a starting point for understanding the how risk allocation differs in lump sum and reimbursable contracts, CII member companies were surveyed on their risk allocation practices in order to find the top 14 most frequently misallocated risks and the top 10 most frequently negotiated terms. Discussed below are significant differences in risk allocation between lump sum and reimbursable contracts. These risks and their allocations are generally allocated in the ways described because of the essential nature of reimbursable contracting—an approach through which the contractor gets reimbursed for costs.

4.3.1. No Damages for Delay

No Damages for Delay clauses severely limit or exclude recovery of damages for owner-caused delays. Differences in allocation include the following:

- On **lump sum** contracts, this risk is sometimes allocated to the contractor.
- On **reimbursable** contracts, the owner bears the costs to mitigate or regain schedule, and this clause is excluded.

4.3.2. Ambiguous Acceptance Criteria

Ambiguous language such as “fit for purpose” and “to the owner’s satisfaction” is a risk that may have significant impacts on both the owner and contractor. Differences in allocation include the following:

- On **lump sum** contracts the contractor has the risk of meeting acceptance criteria.
- On **reimbursable** contracts, the risk to the contractor may be reduced as the contractor’s cost to satisfy the owner’s acceptance criteria is reimbursed by the owner.

4.3.3. New or Unfamiliar Technology

The risk of utilizing new or unfamiliar technology is often placed on the party that specifies or designs it. Differences in allocation include the following:

- On **lump sum** contracts, if a contractor utilizes new or unfamiliar technology in the design not specified by the owner, all development costs are the contractor's responsibility.
- On **reimbursable** contracts, the impact on the contractor of owner specification of new and unfamiliar technology is reduced because the owner agrees to bear all costs incurred by the contractor.

4.3.4. Force Majeure

Force Majeure refers to those risks generally associated with extreme events, or may generally be described as "occurrences beyond the control of the party affected." Typical contract terms allocate such risks to each party and to the extent that party is affected. Differences in allocation include the following:

- On **lump sum** contracts, the contractor is allowed a schedule extension for as long as the force majeure event prevents execution of the work. The contractor is usually required to minimize any delay at the contractor's cost.
- On **reimbursable** contracts, the owner may bear greater risks, including costs to recover lost schedule, demurrage, contractor de-mobilization and mobilization charges, and damage to work in progress.

4.3.5. Schedule Acceleration

The effects of schedule acceleration can lead to significant costs; these costly effects include labor inefficiencies caused by out of sequence work, congestion, or trade interferences. Schedule acceleration may result from schedule recovery or early completion directed by the owner, late delivery of critical path items, or poor project planning. Differences in allocation include the following:

- On **lump sum** contracts, the contractor bears all risks associated with schedule acceleration, unless due to a direction or default by owner.
- On **reimbursable** contracts, schedule acceleration risks are typically allocated to the owner although exceptions may apply in the event of defaults by the contractor.

4.3.6. Cumulative Impact of Change Orders

Cumulative impact of change orders is an indirect risk that occurs when an excessive number of smaller changes or more significant changes not contemplated within the original scope cause a disruption in the work. This disruption leads to, for example, delay of other work, out of sequence work, over-manning, rework, and other impacts that it is not possible to fully appreciate at the time of the individual changes. Restrictive contract language attempts to control or eliminate future re-assessment of change impact. Differences in allocation include the following:

- On **lump sum** contracts, each approved change is typically expected to include all impacts on the work, and the contractor assumes the risk of cumulative impact.
- Because of the nature of **reimbursable** contracts, the owner bears all the risks associated with changes, including the cumulative impacts.

4.3.7. Owner-mandated Subcontractors

Contractors are responsible for the performance of subcontractors, regardless of who chooses a subcontractor. Therefore, contractors may assume a greater risk of poor subcontractor performance when using an owner-mandated subcontractor with whom they may have no prior experience. Differences in allocation include the following:

- On **lump sum** contracts, the contractor bears the risk of owner-specified subcontractors not performing or even defaulting on their subcontract. This tends to be true of all subcontractors, regardless of whether they are owner-mandated.
- On **reimbursable** contracts, the owner bears the risk of specified subcontractors and all consequences of late delivery, rework, and a substitute subcontractor to complete the work. This tends to be true of all subcontractors, regardless of whether they are owner-mandated.

4.3.8. Differing Site Conditions

Differing site conditions occur when the actual work conditions do not conform to the work specifications or there are unforeseen circumstances found at the site. Soil conditions and underground obstacles are the most frequent risks of differing site conditions. Differences in allocation include the following:

- On **lump sum** contracts, the contractor frequently assumes these risks.

- On **reimbursable** contracts, these risks are assumed by the owner. Whatever costs or schedule delays are incurred to overcome the differing condition and to meet the work specifications are considered recoverable costs of the contractor.

4.3.9. Design Responsibility

Design responsibility involves the risk of design mistakes and the rework involved to correct a faulty design. This extends to re-engineering, replacement of equipment and materials, field rework, and rip and tear costs required to correct a faulty design after a drawing has been approved for construction. Differences in allocation include the following:

- On **lump sum** EPC contracts, if an “approved for construction” design by the contractor is found to be faulty in the field, the contractor would be required to make corrections at its expense.
- On **reimbursable** EPC contracts, the owner generally bears all risks of design error, including the costs of field re-work, replacement equipment and materials. However, many owners have rejected this on the basis of warranty, and it is highly negotiated in reimbursable contracts. Compromise positions range from contractors re-performing engineering services only at their expense to re-performing engineering services at cost without mark-up for overhead and profit.

4.3.10. Waiver of Claims

Waiver of claims provisions have to do with notice to the other party. A typical delay waiver clause states that a contractor waives any claim for damages or schedule relief if notice is not provided to the owner within a specified time period. Thus, the risk of losing a potential valid claim resides with the contractor. Differences in allocation include the following:

- On **lump sum** contracts, this clause may be included to cut off late claims by the contractor, and the contractor bears the risk of timely notice.
- On **reimbursable** contracts, such notice provisions still exist, but the contractor usually does not waive any ability to claim delay damages. Generally, the owner pays for all delays, however caused, and whether or not notice was given.

4.3.11. Limitation of Liability

Limitation of liability provisions limit the risk exposure of a party, usually in monetary terms. However, they may also include time periods after which a particular liability or obligation no longer applies. Differences in allocation include the following:

- Both **lump sum** and **reimbursable** contracts often contain limits of liability. Contractors usually seek a maximum limitation of liability for any cause arising out of the contractual relationship. Owners may seek certain exceptions to such limitations, such as willful misconduct, or gross negligence, or default termination. Therefore, the difference in risk allocation has to do with the limits of liability. Reimbursable contracts generally have lower contractor limits of liability.

4.3.12. Price/Price Changes

Since price is the essence of any contract, it is not difficult to recognize these provisions as high-risk and highly negotiated. Differences in allocation include the following:

- On **lump sum** contracts, most cost risks are shifted to the contractor; pricing changes are not allowed, other than for scope changes and other defined impacts, e.g., change in law.
- On **reimbursable** contracts, the owner generally bears the cost risk, and pricing reflects underlying costs. Even on reimbursable contracts, though, certain pricing elements are usually fixed, e.g., overhead costs. Therefore, contractors have a certain amount of cost risk. If other pricing elements are fixed, e.g., reprographics charges or fixed fee, the contractors have further exposure to risk, and there are additional change risks for the parties.

4.3.13. Service Levels

Service levels are most frequently gauged in terms of number of services performed per time period, or response time required to react to and achieve a given service request. Service levels do not usually pertain to EPC contracting. However, if an engineering-only contract or an engineering, procurement, and construction management contract (EPCM) is in place, the level of service may become an issue. This mainly involves staffing levels or the abilities of the personnel assigned to the work. Differences in allocation include the following:

- On **lump sum** contracts, the contractor organization typically provides the service level it deems necessary to perform the work and the owner

has limited or no say in who performs the work or how it is performed (e.g. approval of schedule, subcontractors, or right to order recovery, if behind schedule).

- On reimbursable contracts, the owner is at risk for the level of service and must control service level requirements, mandating additional staff or staff replacements to fill the service need.

4.3.14. Payment

Payment terms are very important to both parties. Contractors require payment to maintain their cash flow to fund project expenses, and owners wish to only pay for the services rendered. Retention of a portion of the contract price is allowed to ensure that the work will be completed or to guarantee warranty provisions. Differences in allocation include the following:

- On **lump sum** contracts, payment terms are often tied to physical progress and according to a payment schedule.
- On reimbursable contracts, there is a “pay as you go” methodology; whatever costs are incurred are reimbursed by the owner to the contractor on a predetermined schedule, e.g. weekly, bi-weekly, or monthly.

4.3.15. Delivery/Acceptance

Delivery and acceptance criteria relate to both the scheduled delivery date and the acceptance criteria, which can have significant cost risks associated with late delivery of the work. Differences in allocation include the following:

- On **lump sum** contracts, a delivery date (i.e., completion of the work) is specified, and failure to achieve this date may subject the contractor to damages. In addition, interpreting the acceptance criteria specified in the contract or in the specifications may pose a risk to the contractor, since misinterpretation could cause late delivery.
- On reimbursable contracts, it is the owner who bears the majority of the risks in connection with late completion. In many cases, additional incentives may be provided to achieve a particular completion date.

4.4. Risk Allocation Summary Matrix

Table 4 summarizes how the 14 most frequently misallocated risks and the 10 most frequently negotiated terms are typically addressed by CII members for lump sum and reimbursable contracts. Specifically, the table identifies

Table 4. Risk Allocation Summary Matrix

Risks/Contract Clauses	How much risk was allocated to your company on this reimbursable contract?			How much risk is typically allocated to your company on a lump sum contract?		
	Reimbursable Contract			Lump Sum		
	Contractor carried most of the risk	Risk was shared equally	Owner carried most of the risk	Contractor carried most of the risk	Risk was shared equally	Owner carried most of the risk
4.4.1 No Damages for Delay	0.00	0.25	0.75	0.75	0.00	0.25
4.4.2 Consequential Damages	0.00	0.50	0.50	0.25	0.50	0.25
4.4.3 Indemnity	0.25	0.50	0.25	0.25	0.50	0.25
4.4.4 Ambiguous Acceptance Criteria	0.50	0.00	0.50	0.75	0.00	0.25
4.4.5 New or Unfamiliar Technology	0.25	0.25	0.50	0.00	0.50	0.50
4.4.6 Force Majeure	0.00	0.50	0.50	0.25	0.25	0.50
4.4.7 Schedule Acceleration/Performance	0.00	0.25	0.75	0.00	0.50	0.50
4.4.8 Cumulative Impact of Change Orders	0.25	0.00	0.75	0.25	0.25	0.50
4.4.9 Owner-mandated Subcontractors	0.00	0.75	0.25	0.25	0.50	0.25
4.4.10 Insurance Allocation	0.25	0.50	0.25	0.25	0.75	0.00
4.4.11 Differing Site Conditions	0.00	0.25	0.75	0.00	0.25	0.75
4.4.12 Design Responsibility	0.00	0.00	1.00	0.00	0.25	0.75
4.4.13 Waiver of Claims	0.33	0.00	0.67	0.33	0.00	0.67
4.4.14 Standard of Care	0.33	0.33	0.34	0.50	0.50	0.00
4.4.15 Limitation of Liability	0.00	1.00	0.00	0.25	0.75	0.00
4.4.16 Indemnification	0.25	0.75	0.00	0.25	0.75	0.00
4.4.17 Price/Charge/Price Changes	0.25	0.25	0.50	0.75	0.00	0.25
4.4.18 Intellectual Property	0.50	0.00	0.50	0.50	0.00	0.50
4.4.19 Termination	0.50	0.00	0.50	0.50	0.25	0.25
4.4.20 Warranty	0.25	0.25	0.50	0.50	0.50	0.00
4.4.21 Service Levels	0.33	0.00	0.67	0.33	0.33	0.34
4.4.22 Payment	0.50	0.25	0.25	0.50	0.25	0.25
4.4.23 Delivery/Acceptance	0.00	0.33	0.67	0.00	0.33	0.67
4.4.24 Confidential Information/Data Protection	0.75	0.00	0.25	0.75	0.00	0.25

which party typically carries the most risk for each contract term and for each contract strategy. The table was derived from surveys of and interviews with CII member companies, who identified which party carried the assigned risk for recent reimbursable contracts executed by their respective organizations. Participants were asked to identify which party (owner or contractor) assumed the risk in their recent contracts, and a proportional weight was then assigned to each contract term identified in the table. The weight was calculated by dividing the number of respondents indicating that the owner or the contractor assumed either “little/none” or “equal share” or “all/most” of the risk associated with a particular term by the total number of responses.

These values provide an indication of which party tends to be allocated the greatest amount of risk for each contract term. For example, for *No Damages for Delay* risk, 75 percent of the participants indicated that the owner carries most of the risk in a reimbursable contract, while 25 percent of the respondents indicated that this risk was shared equally in a reimbursable contract. The purpose of the exercise was to provide an indication of how risks are typically allocated in reimbursable contracts. The exercise was repeated for lump sum contracts so that a comparison could be made between the risk allocation in a reimbursable contract and the risk allocation in a lump sum contract. For example, for *No Damages for Delay* risk, 75 percent of the participants indicated that the contractor carries most of the risk in a lump sum contract, while 25 percent of the respondents indicated that the owner assumed most of the risk in this contract type. This allocation is significantly different from that of a reimbursable contract, where owners tended to assume the greatest amount of risk.

As expected, for nearly all contract terms, the owner is allocated most of the risk on reimbursable contracts, while the contractor is allocated most of the risk on lump sum contracts. However, the allocation of risk has some aspects of sharing that should be noted.

4.5. Case Study Example of Inappropriate Risk Allocation (Case Study 3 in Appendix A)

Background: The case study project was a large EPC petrochemical project located in Eurasia. The project involved processing and field facilities, infrastructure, and subsurface wells. It took approximately six years to complete this scope of work.

Process for Selecting Reimbursable Contracting: Among the reasons for selecting a reimbursable contracting strategy were the very large size of the project, its remote location, and the complexity of the design and construction. The project was among the industry's largest frontier mega-projects, and its process design was extremely complex. The construction site was located in a developing Eurasian nation and, because the site was remote, the project required a predominantly rotational foreign labor force. It was executed between 2003 and 2008, under the very heated market conditions of that period. The use of third-country national labor and/or supervisors was constrained because worker licenses were controlled by the local government. The number and quality of skilled construction craftsmen in the region was a known challenge. To meet this challenge, the project team commissioned a craft skills training center to train local labor in basic crafts. Further exacerbating the numerous labor challenges in this region, another even larger project was scheduled immediately after this one. This impending demand placed even greater stress on the limited labor pool. In the end, the project suffered throughout execution, in terms of both sufficient quantity and quality of labor resources.

Ultimately, the project was viewed as both successful (in some respects) and less than successful (in other respects). It was judged a success for safety performance, achieving expected economic returns, developing technology, and using local resources. However, it was judged less than successful in terms of cost and schedule predictability/performance, ability to achieve acceptable construction productivity, material quality, and effective start-up and attainment of stable production rates.

Inadvertent Risk Misallocation: On this scope of work, the owner inadvertently turned an EPCM contract into an EPCM-at-risk, allocating much of the subcontracting risk to the EPCM contractor. In fact, the contractor had a reimbursable contract with the owner, but all of the subcontracts were fixed price contracts. The risk of subcontractors' poor performance should have been assumed by the owner, but it was, in fact, allocated to the contractor. Poor labor productivity was not anticipated in advance, and therefore, this risk was not appropriately allocated. Furthermore, because the contractor assumed the risk of subcontractor performance, indemnification was also inappropriately allocated. Ultimately, the owner felt too much risk had been allocated to the contractor.

Furthermore, the contractor organization underestimated the risks associated with its ability to obtain foreign worker licenses/work permits. In addition to this inability to secure these necessary documents from governmental authorities, the contractor also lacked any influence on Customs. This lack of control impaired the contractor's ability to import materials and equipment into the country. Customs laws changed every year, making it impossible for the contractor to accommodate this risk.

Note: See details on Case Study 3 in Appendix A and Research Report 260-11.

4.6. Conclusion

This chapter presented the 14 most frequently misallocated risks and the 10 most frequently negotiated terms, pointing out how the allocation of these 24 risks and contract clauses were different in lump sum and reimbursable contracts for EPC projects. For example, the owner generally bears the costs to mitigate, regain, or accelerate the schedule in reimbursable contracts, while schedule risk is often allocated to the contractor in lump sum contracts. Furthermore, in lump sum contracts, a faulty "approved for construction" design by the contractor would require corrections at the contractor's expense, but the owner would likely bear this risk in a reimbursable environment. The chapter presented numerous other useful and practical examples of how risks might be allocated in reimbursable and lump sum contracts.

A *Risk Allocation Summary Matrix* was provided as a tool to demonstrate how these 24 risks were typically allocated between owners and contractors in both lump sum and reimbursable contracts. Specifically, this chapter supports the key finding that the risks on a reimbursable contract are allocated in a manner different than on a lump sum contract because of the essential nature of reimbursable contracting; fundamentally, in reimbursable contracts, the contractor gets reimbursed for costs and, as a result, the owner bears most of the risks. Thus, these 24 risks should be carefully reviewed prior to the development of a reimbursable contract. The next chapter will discuss the development of the reimbursable contract and the request for proposal.

Chapter 5: Development of the Contract and Request for Proposal

5.1. Introduction to the Development of the Contract and Request for Proposal

This chapter addresses the development of the contract, including its terms, conditions, compensation structure, and incentives. While the research team found that the success of the cost reimbursement concept hinges on clearly defining the cost reimbursement compensation structure (as noted in Key Finding #3 above), this chapter more broadly covers what the success factors for the cost reimbursable concept. Accordingly, it explains how **the success of the cost reimbursement concept also depends on the development of clear and complete terms and conditions. These terms and conditions should define 1) scope; 2) compensation structure; 3) payment basis; 4) invoicing, record keeping, and auditing; 5) changes; 6) project controls; 7) performance incentives; and, 8) warranty.** The *contract development process* for a reimbursable contract environment must include these eight key elements.

The chapter also addresses the development of the request for proposal (RFP). Key aspects of the *development of the RFP center* around the differences between the amount of detail required on a lump sum RFP and the detail required on a reimbursable RFP.

5.2. Elements of the Contract Development Process

5.2.1. Scope of Work

A reimbursable contract is well equipped to handle a work scope that lacks significant detail, since the owner will reimburse costs associated with all work. A less defined work scope may result from the following factors:

- the delivery of new technology to the marketplace
- the definition of scope prior to initiating or completing engineering
- the need for fast track completion dates.

Generally, one should attempt to produce as detailed a scope of work as possible on reimbursable contracts in order to avoid misunderstandings between owner and contractor. However, in many instances, physical limitations, ongoing operations, schedule constraints, and other limitations do not allow the owner

to provide as much specificity in the scope as would permit a contractor to produce a fixed price. While the overall objective of the project can be definable, it may not be possible to accurately specify the elements of work associated with accomplishing the objective. Such situations are in many instances the driving force behind the preference of a reimbursable contract strategy over a lump sum strategy.

5.2.2. Compensation Structure

The compensation section of a reimbursable contract defines the units of measure and the rate of compensation for such units. In a reimbursable contract, by definition, the owner is reimbursing the contractor on the basis of the quantity of resources used and not on work output. Typically, the owner reimburses costs such as labor, supervision, materials, equipment, third-party expenses, overhead, and profit. The contractor may also identify rate ranges for personnel and multipliers for various salary burdens, overhead elements, and profit. Hence, two **significant differences between lump sum and reimbursable contracts** are the following:

- The rates and pricing that comprise the compensation are not usually provided in detail to the owner in a lump sum contract.
- The owner typically receives more detailed estimated costs and the rate basis in a reimbursable contract.

5.2.2.1. Reimbursement Categories

In a reimbursable contract, each component of compensation should be described in detail to avoid any misunderstanding between the contract parties. Under the general concept of a reimbursable contract, variations on the definition of what is strictly reimbursable are frequently employed. In the purest form, all contractor actual costs are passed along to the owner. However, the contractor generally applies a mark-up to such costs to recover corporate overhead costs that cannot be directly measured, as well as any profit they wish to earn on costs associated with the work. The principle for the establishment of a compensation structure in a reimbursable environment is that **each penny spent on the project by the contractor must be accounted for, and a well-defined compensation structure helps prevent repeated reimbursements of costs.**

However, it is important to note that the reimbursement categories discussed in this chapter may vary from company to company, even within the same