January 2019

City and County of Denver

Performance-Based Infrastructure Program

Value for Money Guidelines

DENVER
PERFORMANCE BASED
INFRASTRUCTURE

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1 Introduction

1.1 Purpose

This guide explains the concept of value for money (VfM) and provides general guidance and best practices for conducting a VfM analysis. This document facilitates the City's decision-making whether to procure a project through a performance-based infrastructure (PBI) or traditional procurement method.

The PBI Office is responsible for conducting and assessing the VfM analysis. The Sponsoring Agency is responsible for developing project-specific information regarding capital expenditure (CapEx), operational expenditure (OpEx), and lifecycle requirements and estimates.

1.2 Intended Audiences

This document is intended to be used by the following parties:

- The PBI Office, as a guideline to conduct a VfM analysis
- Sponsoring Agencies, proponents, and developers, to understand the VfM analysis and efficiently develop the project risk register, risk quantification and allocation, and risk management plan
- The general public, project funding providers, and other stakeholders, as an overview of the PBI project evaluation process

1.3 Timing

VfM analysis is conducted in the following program stages (see Figure 1):

- Stage 3: Structuring
- Stage 4: Procurement

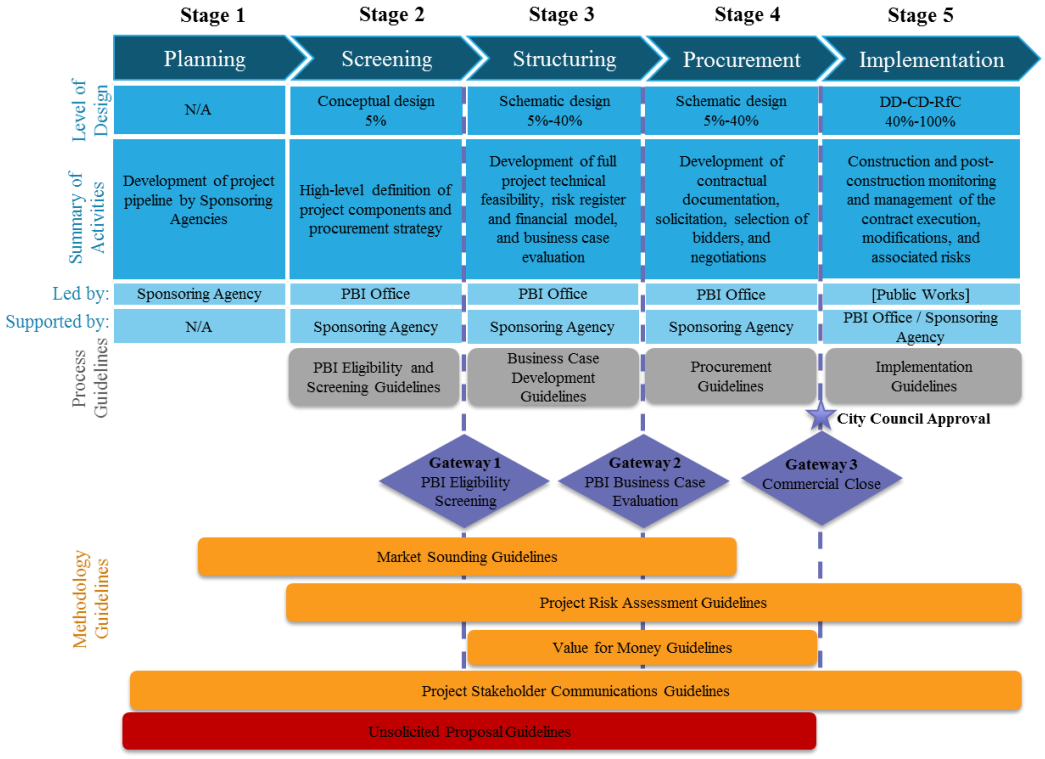

Figure 1: PBI Program framework

Generally, the assessment of VfM progresses along with the project. In Stage 3, a preliminary VfM analysis supports the preliminary business case before the full VfM analysis is completed in support of the final business case.

The VfM analysis may also be updated in the Procurement Phase due to possible changes in cost estimates, the risk register, and risk allocation and management plans. At a minimum, the VfM analysis is updated before Commercial Close to reflect the terms of the Project Agreement.

The level of development of the project over the course of Stages 3 and 4 is shown in Table 1. This indicates the typical level of development of designs and cost estimates required to pass Gateway 2 and Gateway 3. The cost estimate accuracy range is based on the cost estimate classification system recommended practice of the American Association of Cost Engineers.

Table 1: Recommended level of design and cost estimates through Stages 3 and 4

Item	Stage 3: Structuring		Stage 4: Procurement
	Pre-Feasibility and Preliminary Structuring	Feasibility Studies and Business Case	
Level of design development	Design completion of <5%	Design completion of approximately 5%	Design completion of approximately 15%
Cost estimate accuracy range	Low: -30% to -60% High: +40% to +120%	Low: -20% to -50% High: +30% to +100%	Low: -15% to -30% High: +20% to +50%

2 Value for Money Methodology

The VfM analysis seeks to capture the relationship between cost and value for different procurement methods:

- The cost element consists of the costs incurred over the life of the project, also referred to as whole-life cost, which may include the CapEx, OpEx, lifecycle cost, transaction costs, and financing cost.
- The value element quantifies the quality and performance level of the project over time, which may include cost inefficiencies/efficiencies, risks, and other adjustments.

VfM is defined as the difference in risk-adjusted costs borne by the public sector between procuring a project through a traditional versus a PBI procurement. The comparison is over the lifecycle of the project.

In quantifying the VfM of a project, a risk-adjusted cash flow model is developed for each procurement option to capture the sources and uses of funds.

Typically, the traditional procurement method refers to design-bid-build, but in practice it may also reflect the approaches the Sponsoring Agency has historically used. PBI often refers to a design-build-finance-operate-maintain delivery method, but it may refer to other methods with similar characteristics of risk transfer and contracts that are performance-based and long-term.

The methodology for a VfM analysis varies due to the complexity and uniqueness of each project. The following elements are essential to any VfM analysis:

- Public Sector Comparator (PSC) that estimates the cash flows of traditional procurement over the life of the project. This estimate must include adjustments such as retained risk, competitive neutrality, and residual value, if applicable.
- PBI Model that estimates the cash flows of a PBI procurement method over the same time period. This estimate also includes adjustments such as retained

risk, construction efficiencies, operations, maintenance, and lifecycle adjustments, if applicable.

When conducting and interpreting the VfM analysis, decision-makers should keep the following caveats in mind:

- Social benefits are intangibles that are not usually quantified in a VfM analysis.
- Cost adjustments in the VfM analysis should be based, to the extent possible, on assumptions linked to industry benchmarks and/or empirical data.

As an example, Table 2 summarizes the net present value (NPV) of similar components between the two models. Figure 2 displays the table in graphical form to better illustrate the VfM.

Table 2: Sample VfM table comparison — for illustration only

Sample Public Sector Comparator		**Sample PBI Model**	
CapEx	$200m	CapEx (w/ adj.)	$160m
Transaction Costs	$15m	Transaction Costs	$25m
Financing Cost	$0m	Financing Cost	$30m
OpEx (less: revenue)	$120m	OpEx (less: revenue & efficiency)	$110m
Lifecycle Cost (w/ adj.)	$75m	Lifecycle Cost	$65m
Retained Risk	$65m	Retained Risk	$15m
Competitive Neutrality	$5m	-	-
Total PSC Cost	**$480m**	**Total PBI Model Cost**	**$405m**
Sample Value for Money (VfM)		**$75m**	**16%**

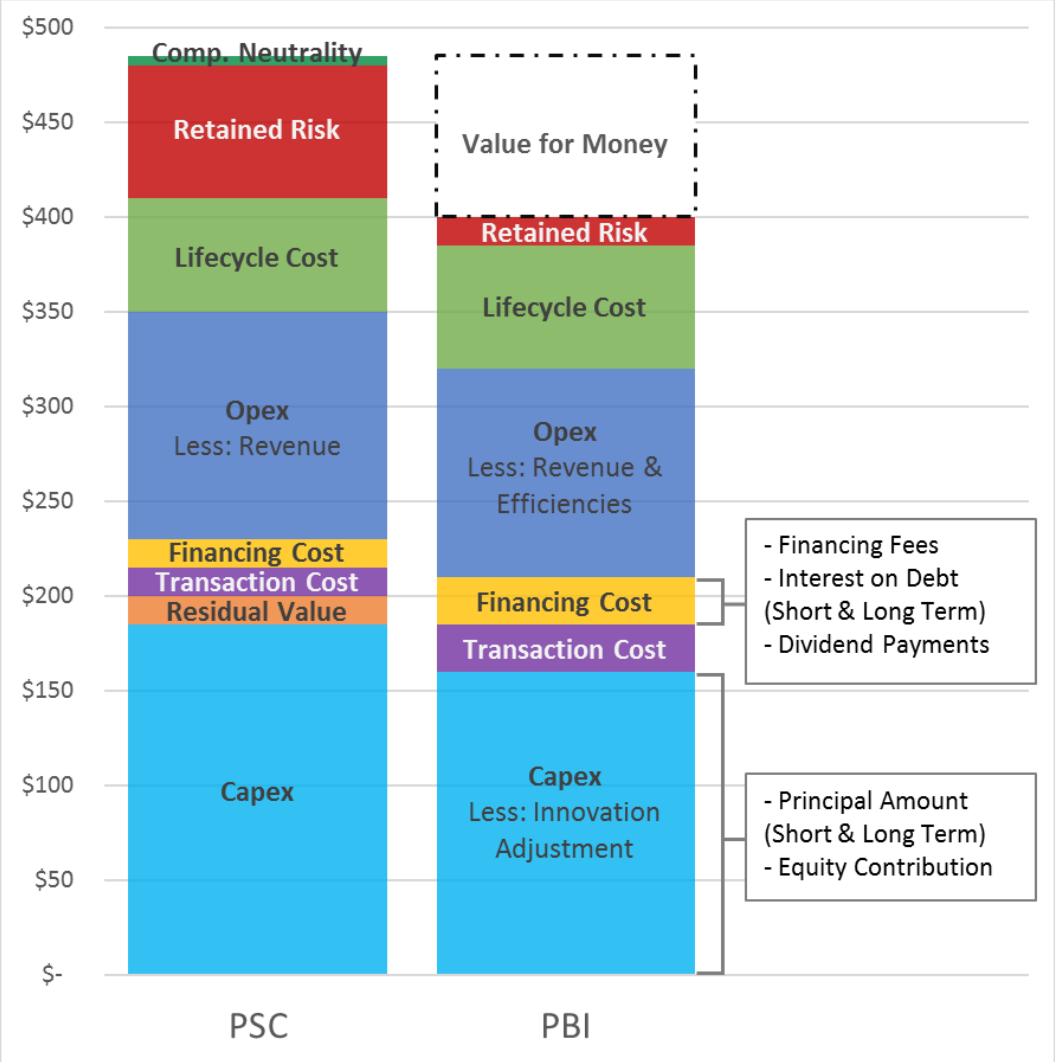

Figure 2: Sample VfM graphical comparison — for illustration only

3 Public Sector Comparator

The PSC consists of a base project cost, which includes estimates for construction, operations, maintenance, and lifecycle costs. The base cost is supplemented by secondary costs associated with delivering and funding the project, such as transaction and financing costs, if applicable.

Transaction costs consist of ancillary costs incurred in the procurement and delivery of the project, while financing costs account for the cost of borrowing. In the PSC, borrowing may be excluded if the public entity typically uses a pay-as-you-go model. See Section 3.5 for a more detailed discussion.

Additional adjustments may be made to the PSC that affect decisions at key gateways, such as the following:

- Retained risk adjustment, which quantifies the risks borne by the public sector for the specific procurement method
- Competitive neutrality adjustment, to take account of differences in tax treatment and insurance coverage paid under the PBI procurement that flow back as a benefit to the public sector but are otherwise not valued
- Residual value adjustment, which quantifies the diminished condition of the asset due to deferred maintenance

Table 3 summarizes the key components typically considered in a PSC. Figure 3 illustrates an example of a simplified public sector cash flow (uses of funds), which illustrates the typical year to year variations in spending.

Table 3: Key components of the PSC

Public Sector Comparator	
Base Cost	
CapEx	Construction cost
OpEx	Operations and routine maintenance cost
Lifecycle Cost	Major rehabilitation cost
Financing Cost	
Municipal Financing	No cost if pay-as-you-go basis, or public borrowing costs if bonds or other financing are used
Transaction Costs	
Ancillary Cost	Project management and transaction costs
Risk Adjustment	
Risk Retained by Public Sector	Quantifies shared and non-transferable risk
Base Cost Adjustment (if applicable)	
Residual Value Adjustment	Quantifies diminished condition of asset at hand-back
Competitive Neutrality	
Private Sector Costs in PBI Model	Takes account of items under the PBI procurement that flow back as a benefit to the public sector but are otherwise not valued (e.g., taxes, insurance)

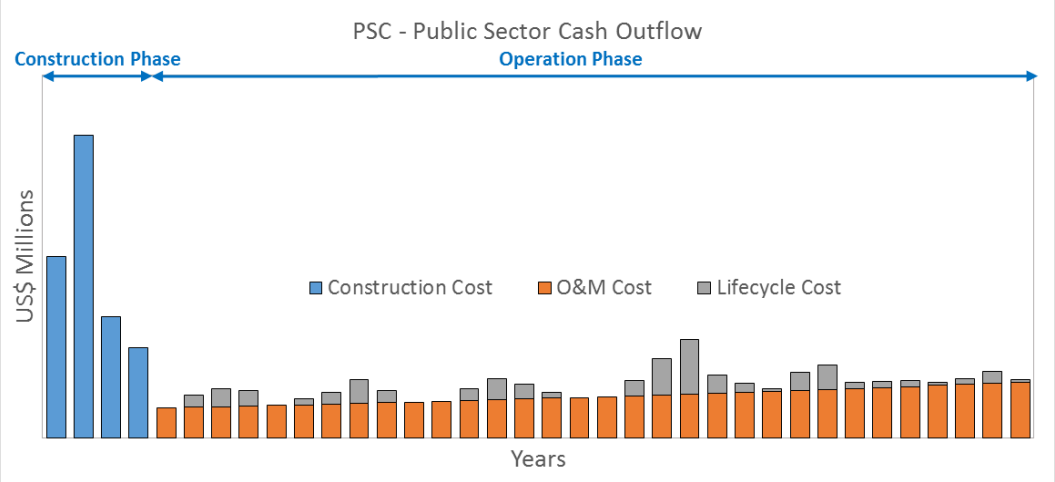

Figure 3: Sample cash flow profile for a typical PSC — for illustration only

3.1 Capital Costs

Capital costs refer to the total cost of construction, also known as CapEx, which includes hard and soft costs associated with construction. Hard costs include materials, labor, and equipment. Soft costs may include design and engineering fees, project management fees, consulting fees, insurance, surety or other bonding costs, and any costs associated with obtaining environmental and regulatory approvals.

The capital cost estimate is developed with assumptions and methods consistent with the Sponsoring Agency's traditional methods.

The cost estimate improves in accuracy as the project progresses due to the increased clarity of the scope and level of design. Cost estimates should include escalation to reflect current market conditions and the estimated construction schedule and spend profile.

3.1.1 Construction Spend Profile

The spend profile, also referred to as an S-curve, is a cumulative cash disbursement as a percentage of the total construction cost over the estimated construction timeframe. It reflects the following typical features on the construction process:

- There is a low rate of spending during the initial stages of construction for mobilization and site preparation.
- As construction progresses, the spend rate ramps up and runs at an optimal pace.
- As construction nears completion, the rate slows down again while final construction punch-list, testing, and commissioning are conducted.

Figure 4 shows an example of an S-curve profile.

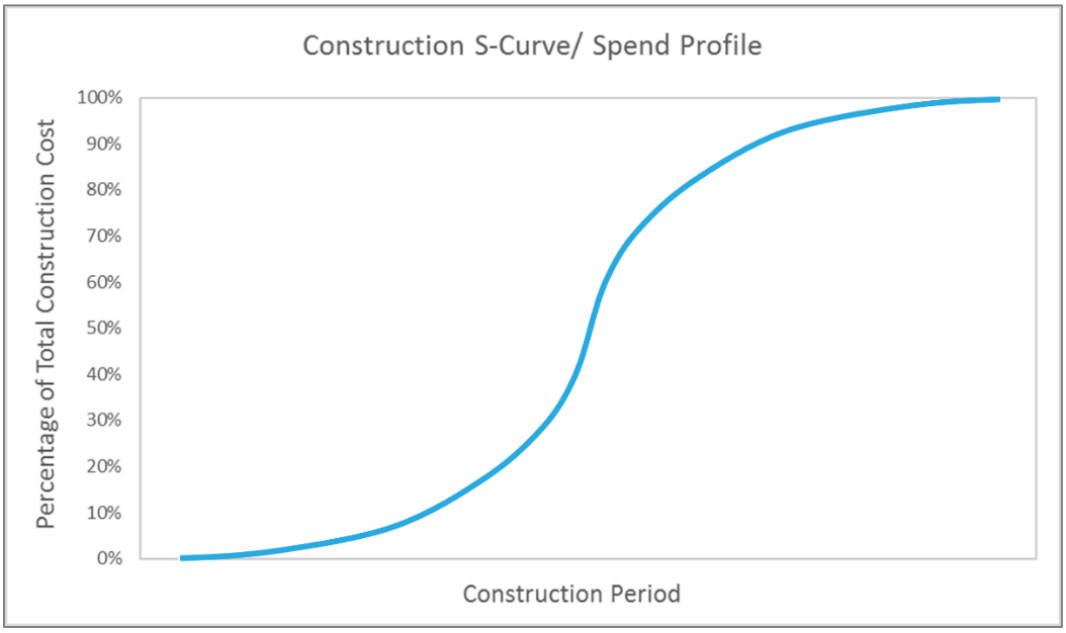

Figure 4: Sample construction S-curve — for illustration only

3.1.2 Contingencies

Contingencies are typically included in the cost estimate as a separate line item, which is a budgeted provision over the baseline cost to absorb risk. The level of contingency carried is typically set taking into consideration the level of design and degree of uncertainty in the cost estimate.

3.2 Operations, Maintenance, and Lifecycle Costs

The operations, maintenance, and lifecycle costs occur during the operational phase to ensure that the asset is functional and performing at an expected or agreed level of service during the life of the project.

Operations and maintenance costs refer to the costs incurred for operating services necessary for the everyday functioning of the asset. Routine maintenance services occur regularly and are required for the on-going normal care and upkeep of the asset.

Lifecycle costs are costs associated with planned major capital replacements, renovations, and refurbishments of the asset's systems, equipment, and fixtures when their useful life has been or is being reached.

In traditionally procured projects, the lifecycle costs are often deferred past the component's useful life due to budgetary constraints, repairs are made on a pay-as-you-go basis, and investments are made when funds are available. If these

conditions exist, the cash flow profile has spikes and the lifecycle cost is not optimized and components or facilities may need to be replaced prematurely.

The lifecycle analysis should capture at least one major rehabilitation cost within the term of the analysis.

3.2.1 Operational Phase Cost Adjustments

Operational phase cost adjustments refer to the quantification of efficiencies or inefficiencies for operations, maintenance, and lifecycle costs associated with delivery under a traditional procurement method.

These adjustments modify the baseline cost estimate in the PSC for the VfM analysis. Typically, because cost estimates are initially developed to represent a traditional method, no adjustments are made to the operational phase costs. The analysis should capture the effects of diminished asset quality and expected useful life due to deferred maintenance, if applicable.

One method of quantifying these effects is to use a residual value adjustment. A standard metric to quantify the residual value is the facility condition index of comparable facilities which are similarly procured. This index measures the health of the asset by considering the estimated cost to complete the deferred maintenance and the overall value of the asset.

The residual value can also be quantified within the risk analysis. This should be developed in consultation with subject matter experts.

3.3 Project Revenues

A project may generate revenues, such as from end users or other commercial uses. These cash flows can come in various forms, such as lease revenues in the case of social infrastructure projects and toll revenue for toll roads. Project revenues partly or completely offset capital, operations, maintenance, and/or lifecycle costs.

If the asset generates revenue, the revenue streams must be included in the analysis. Market and other studies may be needed to evaluate the size and timing of project revenues.

3.4 Transaction Costs

Transaction costs are ancillary costs incurred by the public sector through the planning, development, structuring, and construction phases of the project. These costs may include land acquisition, preliminary studies, external advisor fees, internal project team and governance costs, and other costs such as financing, legal, etc.

Soft costs that can be capitalized are normally included in construction costs, therefore they are excluded from transaction costs.

3.5 Financing Costs

The capital payments should accurately reflect the payment structure expected for the project using the traditionally procured method. Governments often fund construction and lifecycle investments on a cash basis, also referred to as pay-as-you-go. They may allocate money from their general fund, or from special-purpose or enterprise funds.

In other cases, the government entity may issue bonds backed by those funds to finance the capital investments. Financing costs include placement and advisor fees, bond counsel, and interest.

3.6 Retained Risks

Any project is exposed risks, no matter the procurement method. The optimal procurement method for the public sector has attributes that cost-effectively mitigate public sector risks while engaging private sector interest to assume and manage risk.

Conducting a VfM analysis requires the valuation of project risk, and in particular the public sector's retained risks, associated with different procurement options. To quantify the risks associated with delivering the project through a traditional method requires conducting a full risk analysis.

Refer to the Project Risk Assessment Guidelines for a detailed discussion of the method of quantifying the risk impact that needs to be included in the PSC.

3.7 Competitive Neutrality

Including a competitive neutrality adjustment to the PSC takes account of differences in tax treatment and insurance coverage paid under the PBI procurement that flow back as a benefit to the public sector but are otherwise not valued in the VfM analysis. These are benefits and costs that are not equally available to proposers under different procurement methods.

This adjustment allows for a like-for-like comparison between the PSC and PBI Model.

3.7.1 Taxes

In the PBI Model, the Private Partner pays incremental taxes to the government such as income tax on its net earnings. To produce a fair comparison of the procurement options, in accordance with international best practice for evaluation of PBI procurement, an adjustment is made to the PSC that reflects the loss of tax

as an opportunity cost. Local, state, and federal taxes paid in the PBI Model may be treated differently, depending on the project's case.

The income tax paid by the designers, contactors, and service providers is typically not included in the competitive neutrality adjustments because they are involved in both delivery methods and are included in the capital cost estimates.

3.7.2 Insurance

Competitively neutrality adjustments also account for insurance differences under different procurement methods. In the PBI Model, the Private Partner will likely have to pay mandated insurance premiums, especially when there is private financing. In a PSC, the project is typically self-insured by the government.

To allow for a like-for-like comparison in the VfM analysis, when insurance is available and can be priced for a risk that is included in the PBI Model, its cost is also included in the PSC. This represents the actual cost of bearing the risk, rather than the expected value of the outcome of the risk if it were to occur.

4 PBI Model

There are various forms of PBI procurement methods, the most common being design-build-finance-operate-maintain and design-build-finance-maintain. The PBI Model should best reflect the characteristics and conditions of the expected PBI for comparison in the VfM analysis.

Because most project cost estimates are calculated with a traditional procurement method in mind, many components of the PBI Model are based on the PSC, and some elements may be similar.

Some key elements of the PBI Model in this context are as follows:

- Construction cost efficiency adjustment — may be applied as a reduction in capital cost to account for private sector cost savings and construction efficiencies due to incentives for innovation, ability to better control costs and schedule, faster decision making on and fast-tracking of design and construction, and tailoring of design to the contractor's construction means and methods.
- Transaction costs — may be higher in the PBI Model than the PSC due to the added complexity of structuring contracts and delivery. Key differences in costs include legal fees, proposal preparation, and managing the special-purpose entity responsible for PBI delivery.
- Financing costs — may also be higher than in the PBI Model than the PSC due to private financing. This may include short- and long-term bank loans and equity, and the nature of the risks assumed by the lenders. The financing

cost takes account of arrangement fees, commitment fees, reserve accounts, interest on debt, and dividend payments to equity.

- Operations and maintenance costs — may be lower in the PBI Model than the PSC, due to private sector efficiencies. This may be due to incentives for innovation, predictable year to year funding, economies of scale in the operation of similar facilities, and efficiencies resulting from coordination with the initial design. This adjustment is separated from the efficiency adjustments to the construction cost because they occur in different phases of the project.
- Lifecycle costs — may be lower in the PBI Model than the PSC, due to similar factors as for operations and maintenance. Chief among these are the use of industry standard asset management systems, predictable long-term budgeting for needed lifecycle investments, and optimization of routine and non-routine maintenance interventions. The spending profile in the PBI Model is typically be smoothed out due to the use of major maintenance reserve accounts (MMRAs).

Table 4 summarizes the key components in a PBI Model. Figure 5 illustrates a simple example of the cash flow as seen from the public sector perspective (i.e., in terms of payments to the private sector) to illustrate the smooth profile in a PBI Model. This example is based on a PBI project using a combination of construction substantial completion payment plus annual availability payments thereafter.

Table 4: Key components of the PBI Model

PBI Model	
Base Cost	
CapEx	Construction cost
OpEx	Operations and routine maintenance cost
Lifecycle Cost	Major rehabilitation cost
Financing Cost	
Private Financing	Bond/bank financing cost
Transaction Costs	
Ancillary Cost	Transaction, legal, proposal preparation, Private Partner cost
Risk Adjustment	
Risk Retained by Public Sector	Quantifies shared and nontransferable risk
Base Cost Adjustment (if applicable)	
Efficiency Adjustments	Quantifies cost savings from innovation and performance-based approaches

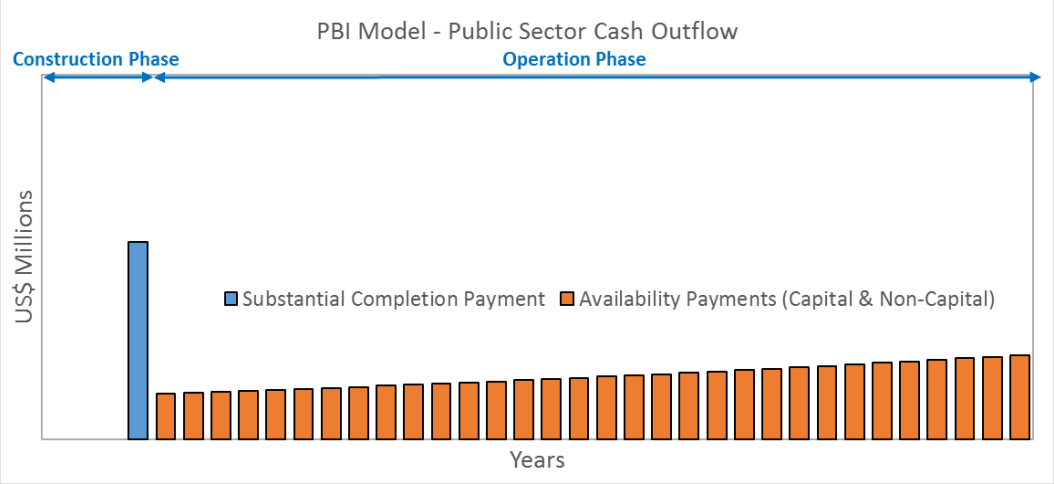

Figure 5: Sample cash flow profile for a PBI Model — for illustration only

4.1 Capital Costs

4.1.1 Construction Costs

The baseline construction cost estimate may be the same for the PSC and PBI Model, but typically certain efficiency adjustments are made when appropriate and if the adjustments better reflect the cost of a PBI procurement.

4.1.2 Public Sector Contributions

Rather than maximizing private financing under a PBI, the quantitative analysis seeks to optimize the levels of both public and private funds.

Public sector contributions can be paid to the private development partner in the form of a substantial completion payment or milestone payments, if they are considered in the PBI Model as follows:

- A substantial completion payment, if used, is a one-time payment at the end of construction, contingent on meeting all design and output specifications and the project being ready for start of operations.
- Milestone payments, if used, are made during construction when certain agreed-upon checkpoints are met. Even when the PBI includes substantial completion and/or milestone payments, the private development partner needs to use some of form construction phase, short-term financing.

The remaining initial investment that is not funded by public sector substantial completion and/or milestone payments, is typically financed by the private development partner with a combination of equity and long-term debt.

This financing is repaid during the operating term of the contract. Sources of repayment may include revenues generated by the project and/or annual availability payments. For more details on availability payments, refer to Section 4.3.

4.1.3 Private Sector Ancillary Costs

In a PBI, there are private sector ancillary costs associated with the private development partner. These are capitalized within the construction cost estimate because they must be financed and repaid through construction phase payments or annual availability payments during the operational phase.

Costs borne by the private sector include legal costs, proposal preparation, development fees, insurance, and surety or other bonding. Legal costs may have a significant role during the procurement process, depending on the extent of negotiations and/or development of contractual documents. The cost of preparing a PBI proposal is generally higher than that of a PSC because of the comprehensive, long-term nature of PBI contract.

4.1.4 Construction Cost Efficiency Adjustment

Construction cost efficiency adjustments should be carefully considered due to the factors explained above.

The ability to generate and capture the value of efficiencies is dependent on the specifics of the project, its size and complexity, market conditions, and the ability of potential proposers to respond to the incentives in the proposed procurement method. They should be considered on a project by project basis, and should be based on the input from the project team, subject matter experts, advisors, and the feedback received through the market sounding process.

Care should be taken in the cost estimating and risk assessment process not to double-count efficiencies. Similarly, if there are network effects that may result in cost inefficiencies for the PBI option, they also need to be taken into account.

4.2 Operations, Maintenance, and Lifecycle Costs

The baseline operations, maintenance, and lifecycle cost estimates may be the same between the PSC and PBI Model, but typically certain efficiency adjustments are made when appropriate and if the adjustments better reflect the expected cost of a PBI. The driving factors are discussed above and similar comments regarding the process to evaluate, develop, and account for construction cost efficiencies apply for these items.

4.3 Project Revenues

The PBI Model typically results in generation of higher project revenue than the PSC, mainly due to the business mindset of the private sector. Examples of project revenue sources include, but are not limited to, tolls, other types of user fees, and/or rental income.

In the PBI option project revenues also help to partially or completely offset the initial capital costs and ongoing operating costs, and reduce availability payments, if any. The arrangement depends on the project's economics and specific contractual arrangement between the parties.

The PBI business case and Project Agreement may also contain revenue-sharing mechanisms between the public sector and the private development partner. If these provisions are expected, this must be appropriately included in the financial model.

If project revenues are not enough to offset financing needs, in terms of capital repayment and operating services, the public sector may provide public funding contributions that can take different forms (e.g., construction substantial completion payments, or service payments). This arrangement is evaluated in the PBI business case and must be outlined in the Project Agreement.

4.3.1 Availability Payments

Availability payments are typically considered to consist of two portions as follows:

- The capital portion of availability payments, if they are used, are to repay the financing for the initial investment. These may include debt service payments of principal and interest, equity dividends, and taxes associated with equity repayment.
- The non-capital portion of the availability payments, if they are used, are for costs incurred during the operational phase, which typically includes operations, maintenance, and lifecycle costs.

4.4 Transaction Costs

In this section, transaction costs refer to the costs borne by the public sector under a PBI. It is assumed that the transaction costs incurred by the private sector are included in the capital cost estimate as described above.

The transaction costs in the PBI Model are typically higher than that of the PSC, because PBI projects require much more planning, structuring, collaboration, and procurement document development and management.

Over time as the City develops a portfolio of PBI projects, these transaction costs should be reduced. Development of templates for procurement documents, business cases and structuring processes, etc. helps to reduce the costs. This standardization also helps to reduce private sector transaction costs and makes the future pipeline of PBI projects more attractive.

The PBI procurement process may also include an optional stipend — these are compensation fees to unsuccessful proposers to partially compensate the cost of preparing their proposals. Stipends are also common in the case of unsolicited proposals.

Stipends provide potential proposers additional incentive to pursue a PBI procurement. The need, size, and timing of stipends should be carefully evaluated by the procurement team, including feedback from the market sounding process.

4.5 Financing Costs

4.5.1 Financing Fees

There are a variety of costs associated with commercial financing, such as fees paid up front and/or at financial close. These fees may include arrangement fees and commitment fees, and amount to a significant sum. Therefore, they must be included in the analysis to reflect the appropriate market conditions and rates.

4.5.2 Reserve Accounts

Typically, the Private Partner is required by lenders to fund a debt service reserve account (DSRA). This helps to mitigate the risk of not meeting debt service obligations, depending on the nature of the variability of operating cash flow nature of the PBI project.

The DSRA serves as a cash buffer for periods when operating cash flow is lower than expected. Depending on the nature of the revenues and the cost profile of the project, it typically covers debt service of future obligations, principal, and interest, for 6 to 12 months. The reserve account may be funded, in full or partially, at the end of construction and then maintained through cash allocations during operations.

A major maintenance reserve account (MMRA) may also be required if there is significant capital work related to lifecycle costs associated with the asset. Because of the planned nature of major rehabilitation costs, MMRA funds typically accumulate only when there is a need 6 to 24 months prior to the planned or actual expenditures. Like the DSRA, an MMRA is funded through ongoing operational cash allocations.

The size and timing of these reserve accounts are determined by the lenders through negotiations of loan agreements. This can be estimated via experienced advisors and market sounding to be accurately included in the VfM analysis.

4.5.3 Cost of Private Financing

One of the major differences between the PSC and PBI Model lies in the frequent use in the latter of private sector financing. The cost of private financing is typically higher than traditional municipal financing. The trade-off is the greater transfer of risk to the private sector. One of the underlying questions of the VfM analysis is whether the risk transfer achieved outweighs the cost of private financing.

The following discussion of private financing covers the use of equity and debt, as well as the financing structure and costs of procuring the project through a PBI Model.

Under a PBI, many different financing strategies can be adopted. In general terms, a common one is for the private development partner to finance construction costs with (a) a short-term construction loan amounting to the substantial completion payment (if any), and/or (b) long-term financing through equity and debt, to be repaid over the concession term from project revenues and/or availability or other public sector payments during operations.

If a short-term construction loan is used, the public sector typically pays the loan's principal and interest incurred with a single payment at substantial completion of construction. The remaining construction cost, or the totality if there are no milestone payments, is financed in the form of long-term debt and equity.

The debt and equity are repaid out of the project revenues, which may be supplemented in part or in whole by annual availability payments by the public sector over the concession term. Long-term debt may be in the form of a commercial loan, a bank credit facility, or a bond, in which case the rate corresponds to yield rates or long-term interest rates. Typically, long-term rates and bond yields are higher than short-term loan rates, because of the extended duration of ongoing obligations.

Under a PBI, the private development partner is expected to invest equity into the project, therefore they become financially responsible for the performance of the asset. The PBI project financial structure typically consists of the equity investor's dividend being paid last, after repayment of operations, maintenance, reserve accounts, and debt. In return, the equity investors expect a commensurate return due to the risk undertaken.

Although both equity and debt are from private sources, equity better represents the financial interest of the private sector because returns are linked to the performance and yield of the project. The post-tax rate of return required by the equity investors varies from project to project, but it is mainly driven by the

gearing ratio (debt-to-equity ratio), debt coverage ratio (amount of free cash flow over the required annual debt service), specific project risks transferred, and the nature of the project.

When developing the PBI Model, the financing costs must be based on the market conditions and risk profile to the project. Table 5 identifies some core financing variables of the PBI Model.

The core financing assumptions must be stress-tested through a sensitivity analysis, which clarifies the financial implications of changing certain key independent inputs, while holding all else equal.

Table 5: Typical key variables for PBI financing structure and costs

Financing Structure	Financing Costs
• Type of long-term debt (bond or bank financing) • Timing of debt draws • Debt-to-equity ratio (gearing ratio) • Timing of equity injections • Debt service coverage ratio	• Short- and long-term base interest rate and credit spread • Required return on equity • Requirements for reserve accounts (DSRA and MMRA) • Financing fees (arrangement and commitment fees)

4.6 Retained Risks

As outlined in Section 3.6, a different risk register is developed for the PBI Model with allocation of responsibilities, probability of occurrences, and cost and schedule impacts specifically developed to capture the risks associated with the PBI procurement option.

Refer to the Project Risk Assessment Guidelines for a detailed discussion of the method of quantifying the risk impact that needs to be included in the PBI Model.

5 Value for Money Analysis

5.1 Cash Flow Considerations

The cost estimates used to develop the PSC and PBI Model must account for inflation, a standard economic variable, for the cash flow analysis.

The construction costs are typically presented in real terms and escalated using industry-accepted inflation indexes based on specific regional factors, such as the Building Cost Index or the Construction Cost Index. The use of the Consumer Price Index may not best represent the cost escalation associated with construction. The Consumer Price Index or the Producer Price Index are typically more appropriate for operations and maintenance purposes.

The biggest difference between the PSC and PBI Model, from a public sector cash flow perspective, is that the PSC incurs most of its cost in earlier years, while the PBI Model incurs the majority of its cost over a longer period.

Another difference is that the lifecycle costs are paid as they are incurred under a PSC, rather than smoothed out through more uniform payments. This is due to the use of continuous funding of the MMRA in the PBI Model, as discussed above.

Figure 6 compares the sample two cash flow profiles from Sections 3 and 4 above to illustrate the relative costs incurred by the public sector through the life of the project for the two example procurement options.

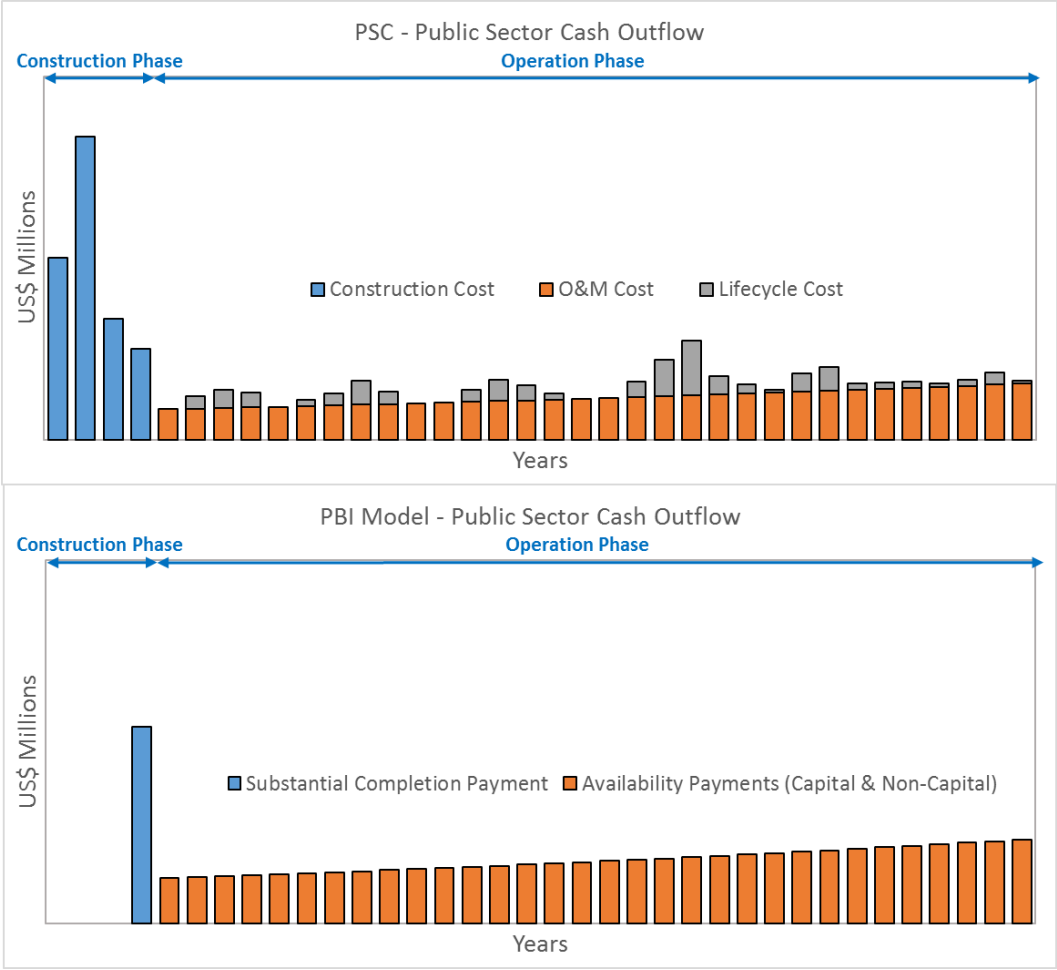

Figure 6: Comparison of sample cash flow profiles for the example PSC and PBI Model

5.2 Net Present Value Calculations

The two risk-adjusted cash flow profiles are very different in terms of timing and amount. Therefore, the cash flows need to be discounted to a common point in time to be able to compare the two options on a like-for-like basis.

The risk-adjusted cash flow is discounted to calculate the net present values (NPVs) of the different procurement methods, which is the foundation of quantifying the VfM. This is done using standard financial analysis methods.

5.3 Discount Rate

Discounting the risk-adjusted cash flows requires an appropriate discount rate. Because the NPV is a function of the cash flows and the discount rate, the selection of the right discount rate is paramount.

Given that there are different approaches used to establish an appropriate discount rate, it is recommended that after choosing the rate, a sensitivity analysis should also be conducted. The sensitivity analysis typically changes variables used to calculate the base case discount rate, or uses different rates based on different calculation methods. It tests the robustness of the model and the results for different assumptions.

The choice of a discount rate is a subject of debate in the industry, and there is no international or national consensus on a specific methodology. The following are widely used methodologies to calculate discount rates:

- **Social time preference rate** is the rate at which society is willing to pay for the project now rather than at a future point in time.
- **Weighted average cost of capital (WACC)** is the weighted cost of private financing proportioned to the amount of debt and equity, while considering the risks inherent to the project and the benefits of the tax shield arising from the interest payments. The WACC is also equivalent to the project's internal rate of return. The cost-of-equity portion of the WACC is calculated using the capital asset pricing model approach.
- **Capital asset pricing model (CAPM)** is the rate of capturing the systematic risk — the risk that affects the market as a whole — and expected returns for an investment on the project. This approach adds a risk premium to a risk-free rate to account for the volatility of equity distributions, while the risk-free rate is typically linked to the federal Treasury bills or bonds. The fundamental idea is that the public sector transfers systematic risk to the private sector through a higher rate of return.
- **Risk-free rate** is widely considered to be the public sector's long-term borrowing rate. It is typically linked to the federal Treasury bill or bond, because it is commonly viewed as risk-free. The risk-free rate feeds into calculating the CAPM and WACC, as mentioned above.

5.4 Analysis Period

It is important to determine the duration of the financial model and use the same model period for the PSC and PBI Model, to facilitate a like-for-like comparison of NPVs.

The analysis period is different from the concession period. The analysis period refers to the duration of the cash flow models, and the concession period refers to the duration of the private development partner's responsibility for the asset specified in the Project Agreement before handing back the asset to the public entity.

The analysis period is either the same as the concession period or longer to capture the conditions after the hand-back.

All Project Agreements have clauses stipulating a standard of quality and condition of the asset throughout operations and also at the end of the concession term/ hand-back. Therefore, the length of the concession period and analysis period should be long enough to capture at least one cycle of major rehabilitation work to be completed by the Private Partner.

The concession term is approximately the same as the amortized period of the long-term debt, possibly providing a couple years of cushion at the tail end of the loan term.

5.5 Value for Money Comparison

In the PSC, all costs are borne by the public sector. Therefore, in the VfM comparison the use of funds can be easily broken down into CapEx, residual value, transaction costs, financing cost, OpEx (less revenues), lifecycle cost, retained risk, and competitive neutrality, assuming all are applicable.

For the PBI Model, there are two common methods of illustrating the costs to the public sector:

1. Payments from the public sector to the Private Partner through substantial completion payments and availability payments (capital and non-capital), with the addition of transaction costs and retained risks
2. Grouping costs borne by the public sector into the groups used in the PSC

Although Method 2 better illustrates the relative costs between the two procurement options, Method 1 is more intuitive from a government-payment standpoint.

The two methods of comparison consist of the same costs and are produced from the same financial models — they differ only in graphical outputs and perspective.

After discounting the two risk-adjusted cash flow models to the same point in time, the VfM between the PSC and PBI Model is clearly demonstrated.

Figure 7 illustrates Method 1, and Figure 8 depicts Method 2.

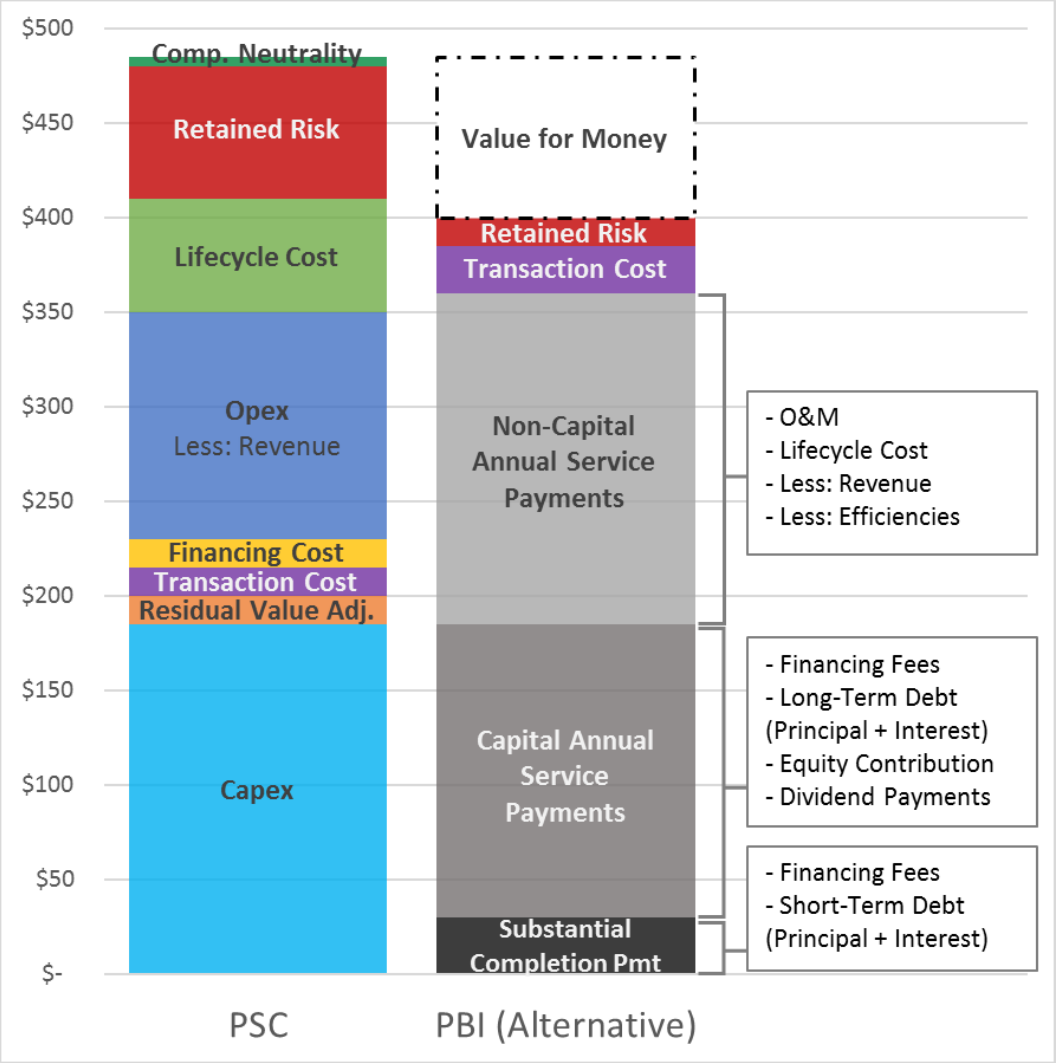

Figure 7: PSC and PBI Model comparison, Method 1 — for illustration only

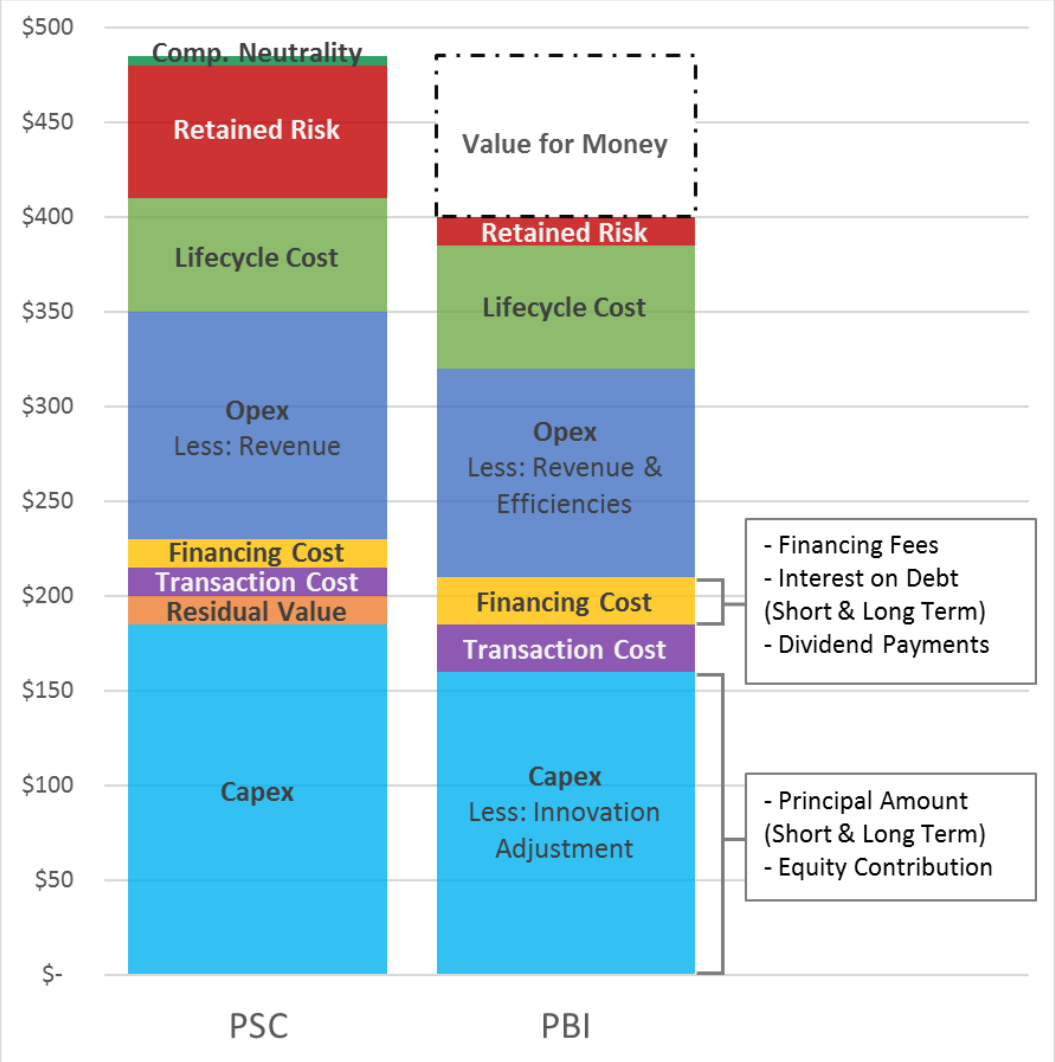

Figure 8: PSC and PBI Model comparison, Method 2 — for illustration only

5.6 Sensitivity Analysis

At this point in the VfM analysis, the procurement option that provides the best value should have been identified. However, the results are dependent on estimated inputs; therefore, the inputs need to be stress-tested for robustness through a sensitivity analysis.

The process of a sensitivity analysis is as follows:

- Identify key internal and external variables that affect the overall capital investment cost
- Determine the impact of these variables when stressed
- Reaffirm that the identified procurement option is indeed the optimal option when key variables are stressed

- Identify additional mitigation factors that may help reduce risk

In a sensitivity analysis, only one variable is varied in both directions, while holding all else constant. The impact to the VfM demonstrates the robustness of the procurement option.

At a minimum, the following inputs should be stressed: discount rate, cost estimate, cost of debt, revenue estimate, indexation assumptions, efficiency adjustments, risk valuation, debt-to-equity ratio, and internal rate of return.

Table 6 illustrates a sample range of changes to ensure the results are robust against uncertainties in the inputs.

Table 6: Sample ranges of a sensitivity analysis — for illustration only

Sample Inputs	Base Case (Example)	Sensitivity Range (Small Step)	Sensitivity Range (Large Step)
Discount Rate	5%	± 0.5%	± 1%
Cost Estimate	Base cost	± 5%	±10%
Cost of Debt (Spread)	225 bps*	± 50 bps	± 100 bps
Revenue Estimate	Base revenue	± 5%	± 10%
Indexation	3%	± 0.5%	± 1%
Efficiency	10%	± 2.5%	± 5%
Risk Valuation (Confidence Level)	70%	± 10%	± 20%
Debt-to-Equity Ratio	70%	± 5%	± 10%
Internal Rate of Return	12%	± 2.5%	± 5%

*bps: basis points

Appendix A

Glossary and Abbreviations

A1 Glossary

Term	Definition
City	City and County of Denver.
Co-development Solicitation Process	Solicitation process in which the Procurement Team plans to select a private partner with whom to co-develop the project based on the performance requirements of a Predevelopment Agreement or similar document. The selection can be done based on an RFQ and/or RFP. See Section 10 of the Procurement Guidelines for more details.
Firm-Bid Solicitation Process	A solicitation process in which the Procurement Team issues procurement documents; interested parties respond with a firm bid, generally including firm price and financing commitments; and, proposals are reviewed by the Procurement Team to select a private partner. See the Procurement Guidelines for more details.
Implementation Team	The staff and consultants assigned by the City to manage the implementation of a PBI project following execution of its Project Agreement.
Intent to Submit Form	Form that should be submitted by the Sponsoring Agency once the project passes Gateway 2, indicating their intention to prepare and submit a business case.
Notice of Intent to Procure PBI Services	Notification issued by the PIC to the Mayor / City Council once the PBI Office has reviewed the business case and considers the project suitable and ready for PBI procurement.
PBI Model	The financial model developed by the PBI Office to evaluate the risk-adjusted cash flows of a PBI procurement method during Stage 3: Structuring. It is used to develop the project's business case and the value for money analysis. At Stage 4: Procurement it is updated based on the proposals received and/or the Preferred Proposer's proposal. It may also be used to support evaluation of the financial models received from the proposers.
PBI Pipeline	The portfolio of projects approved by the PIC for evaluation as PBIs.
PBI Screening Application	Form submitted by Sponsoring Agencies along with the CIP Discretionary Funding Form, indicating whether the project passes PBI qualification criteria.
Preferred Proposer	The highest ranked proposer selected by the City after RFP responses are received and evaluated.
Private Partner	The private development partner after execution of the project agreement.
Procurement Team	The staff and consultants assigned by the City to manage the PBI procurement process.

Term	Definition
Project Agreement	The PBI contract signed by the City and the Preferred Proposer.
Project Liaison	The staff responsible for facilitating coordination between the different entities involved in the project development process such as, but not limited to, the PIC, CAO, and the PBI Office.
Public Sector Comparator	A hypothetical scenario representing the standard government procurement method that would be used to deliver a project in the absence of a PBI procurement option.
Term Sheet	The legal document that lays out the key terms of the project. Refer to the Procurement Guidelines for more information on the contents of the Term Sheet.
Sponsoring Agency	The applicable City entity that develops and identifies potential PBI projects during the screening stage. It coordinates with and supports the PBI Office during the project screening, structuring, and procurement stages. And it leads implementation of the PBI project after execution of the project agreement. During the implementation stage it may be referred to as Implementation Agency in instances when the agency in charge of implementing the project is different from the Sponsoring Agency in prior stages.

A2 Abbreviations

Abbreviation	Description
CAO	City Attorney's Office
CapEx	capital expenditure
CAPM	capital asset pricing model
CIP	Capital Improvement Plan
CORA	Colorado Open Records Act
CPP	Capital Planning and Programming
CPR	Capital Project Request Form
DoF	Department of Finance
DSRA	debt service reserve account

Abbreviation	Description
KPI	key performance indicator
MMRA	major maintenance reserve account
NPV	net present value
OpEx	operational expenditure
PBI	performance-based infrastructure
PDA	Predevelopment Agreement
PERT	Program Evaluation and Review Technique
PIC	Performance Infrastructure Committee
PSA	PBI Screening Application
PSC	Public Sector Comparator
PW	Public Works
RFAP	request for alternative proposals
RFAQ	request for alternative qualifications
RFDP	request for detailed proposal
RFI	request for information
RFP	request for proposals
RFQ	request for qualifications
USP	unsolicited proposal
VfM	value for money
WACC	weighted average cost of capital