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of Transportation

Guide to P3-VALUE 2.3: Frequently Asked Questions (FAQs)

January 2021



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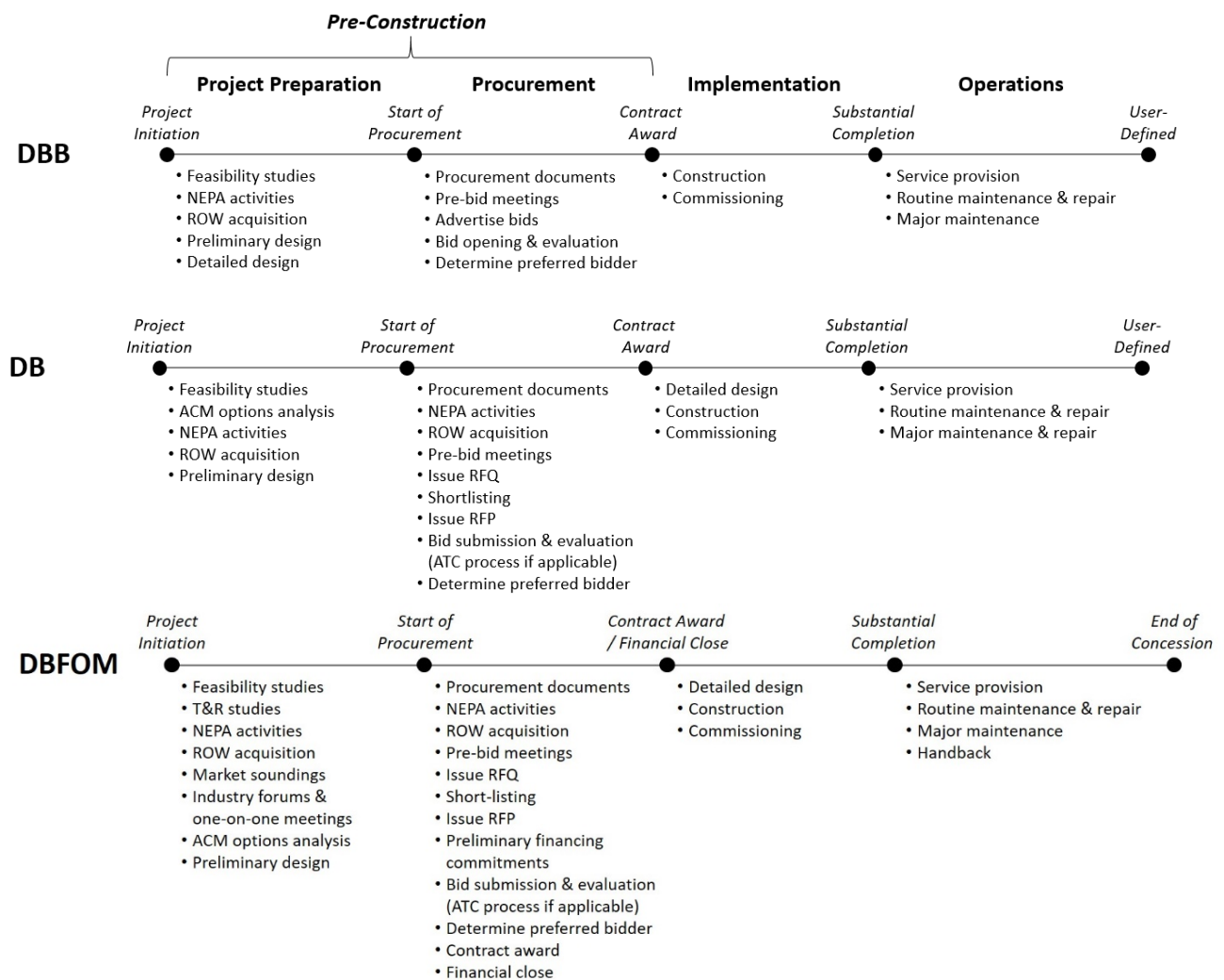


1 Timing and Cost Assumptions

1.1 How are the project preparation, procurement, implementation, and operations phases defined for the various delivery methods?

To compare the cost of the PSC to the P3 on an NPV basis, users need to allocate expenses to one of the following project phases in P3-VALUE 2.3: project preparation, procurement, implementation, and operations. As such, it is important for users to understand how these phases are defined within the context of P3-VALUE 2.3. As the exact activities may differ, depending on whether the project is implemented as a design-bid-build (DBB), design-build (DB), or design-build-finance-operate-maintain (DBFOM), the below illustration explains what activities may be conducted during each phase for the various delivery methods.

Overview of project preparation, procurement, implementation, and operations phases for DB, DBB, and DBFOM



Based on the above, users can determine the relevant cost for the various project phases under the considered delivery models. Note that P3-VALUE 2.3 combines the costs and duration inputs for the project preparation and procurement phases into a single pre-construction phase and thus spreads any inputted project preparation and procurement cost over this combined pre-construction period.



1.2 How do I use the timing outputs from the CASE webtool to populate P3-VALUE 2.3's timing inputs?

The CASE webtool can help the user generate P3-VALUE 2.3's timing inputs for the PSC and P3. However, as the timing outputs from the CASE webtool are expressed in months, these need to be rounded to the nearest year to be used in P3-VALUE 2.3.

As P3-VALUE 2.3 combines the project preparation and procurement phases into a single pre-construction phase, the effects of rounding can be somewhat mitigated. This can be best explained using an example. If the project preparation duration and procurement duration are both expected to be 17 months, the combined duration would be 34 months. Rounding each phase's duration to the closest year would lead to a total pre-construction duration of two years, which is quite different from 34 months. However, as the project preparation duration and procurement duration are combined into a single pre-construction duration in P3-VALUE 2.3, the user can approximate this by inputting two years for the project preparation duration and one year for the procurement duration (or vice versa), for a total pre-construction duration of three years. Similarly, if the project preparation period is 23 months and the procurement period is only three months, the user can input two years for the project preparation duration and zero year for the procurement duration (or alternatively one year for the project preparation duration and one year for the procurement duration).

By combining the project preparation and procurement phases into a single pre-construction phase and using the input approach outlined above, P3-VALUE 2.3 limits the overall combined difference of these two project phases to six months or less when comparing the rounded annual durations to the monthly durations.

1.3 What is the Delayed PSC and how do I estimate the difference in timing it?

In the Value for Money (VfM) analysis, the PSC is compared to the P3 in order to determine the fiscal impact on the Agency of P3 procurement. A key requirement for a VfM analysis to be valid is that the PSC and the P3 are implemented in a similar timeframe. For the Project Delivery Benefit Cost Analysis (PDBCA), there is no such requirement. Under PDBCA, a delayed project can be compared to an accelerated project without any conceptual challenges. The time delay in implementing the project would be estimated based on the budgetary limits and/or debt capacity of the Agency, and when sufficient funds might be available to begin and complete implementation of the project. The Delayed PSC has the exact same characteristics as the PSC, with only one exception: the start date of the project. If, for example, due to fiscal constraints an Agency can only afford to start building a project in 2025 instead of 2018, both the incurred costs as well as the benefits accruing to society will be delayed. Asset quality and value at handback therefore may be different as well. Depending on the exact profile of costs and benefits over time, accelerating a project may result in lower or higher net benefits to society.

1.4 How do I estimate private procurement costs? Are these the costs for all bidders, or just the winning bidder?

The field "private procurement costs (costs of winning bid)" should include an estimate of the costs incurred by the winning bidder in preparing a bid and negotiating an agreement. If losing bidders receive any form of compensation, the cost is borne by the public agency and included in the field of "public procurement costs".

1.5 How do I determine the percentage of costs transferred in a P3?

The extent to which various costs are transferred to a P3 concessionaire depends on the presumed structure of the contract, project requirements, and risk sharing and allocation. For example, the public agency can be responsible for preliminary design, right-of-way, and project oversight, but shift all engineering and construction responsibilities to the P3 concessionaire. The percentage transferred cost reflects the cost allocation between the public agency and P3



concessionaire. Users should evaluate the aggregate amount of transferred and retained costs in order to calculate the percentage transferred cost.

1.6 How do I determine the P3 costs?

P3 projects may result in cost efficiencies by bundling different stages of project delivery under one contract and creating incentives to better manage the project's life cycle costs. However, there are no definitive studies regarding the cost efficiency of P3s in the United States. In studies where public agencies have compared P3 and conventional delivery options they have typically assumed cost efficiencies ranging from 0 to 15 percent. The CASE webtool provides additional guidance with regards to the P3 cost savings relative to the PSC. As the tool does not separately account for the cost impact of time efficiency in project delivery, P3 cost inputs should also include the impacts on cost reduction caused by reduced project delivery time.

1.7 What are handback costs? How do I calculate them?

A comprehensive VfM analysis or PDBCA should not only consider what happens to the facility under different delivery models during the operations period but also what may happen thereafter. Therefore, the analysis period should at least cover the proposed concession period but should also take into consideration the residual value of the facility at handback. If appropriate handback provisions are included in the P3 agreement, the remaining useful life of the facility under conventional procurement may be assumed to be the same as under a P3 delivery at the end of the concession period.

P3-VALUE 2.3 can accommodate a variation in residual value of the facility under various delivery models. In order to take this variation into consideration, the user must determine the cost associated with bringing the facility back to the specified standards for each delivery model. By including these costs in the VfM analysis and PDBCA, the user can make a fair comparison of the different delivery models while allowing for variations in residual value of the facility. Please note that under the simplified inputs option, handback costs are ignored.

1.8 What is the difference between major maintenance costs and operations and maintenance costs?

In P3-VALUE 2.3 major maintenance costs are differentiated from operations and maintenance costs in that major maintenance costs are costs that occur on a periodic basis of multiple years (e.g., every 10 years) whereas operations and maintenance costs are assumed to occur on an annual basis. Major maintenance covers preservation activities that typically increase strength and extend facility service life in addition to restoring serviceability. For example, structural overlay and rehabilitation can be performed every 10-12 years. Routine maintenance is performed primarily to ensure or restore the function of the existing system.

1.9 Should I enter implementation costs in year of expenditure dollars?

Preconstruction and implementation costs can be expressed in either in Year of Expenditure (YOE) or base year dollars. The tool applies "Indexation rate – Pre-construction & implementation" to adjust base year dollars to YOE dollars. If project preparation, procurement, and implementation costs are in YOE dollars, the field "Indexation rate – Project preparation, procurement and implementation" should be set to zero. Otherwise, a positive indexation rate should be used to reflect cost inflation during the pre-construction or implementation period.



1.10 What are the different indexation rates for? How does the indexation rate affect the availability payment?

The various indexation rates can be used to account for the inflation of costs or payments during different periods of project delivery. Generally, costs and payments are expressed in base year dollars, and indexation rates are used to estimate Year of Expenditure (YOE) costs and payments. The base year is defined in the field “Indexation and NPV base year”. The indexation rate for project preparation, procurement and implementation applies to costs incurred during the project preparation and implementation phase. The indexation rate for operations applies to any costs incurred after the implementation phase, including major maintenance and handback costs. For availability payment concessions, the maintenance charge of the availability payment is indexed using the indexation rate for O&M expenses whereas the capital charge is not indexed and stays constant over the life of the concession. The indexation rate for toll rates is used to calculate future toll rates. The indexation rate for CPI is used to translate nominal toll rates (which may escalate at a different rate from CPI) into real toll rates, which are used as part of the calculation of benefits for induced traffic in the PDBCA.

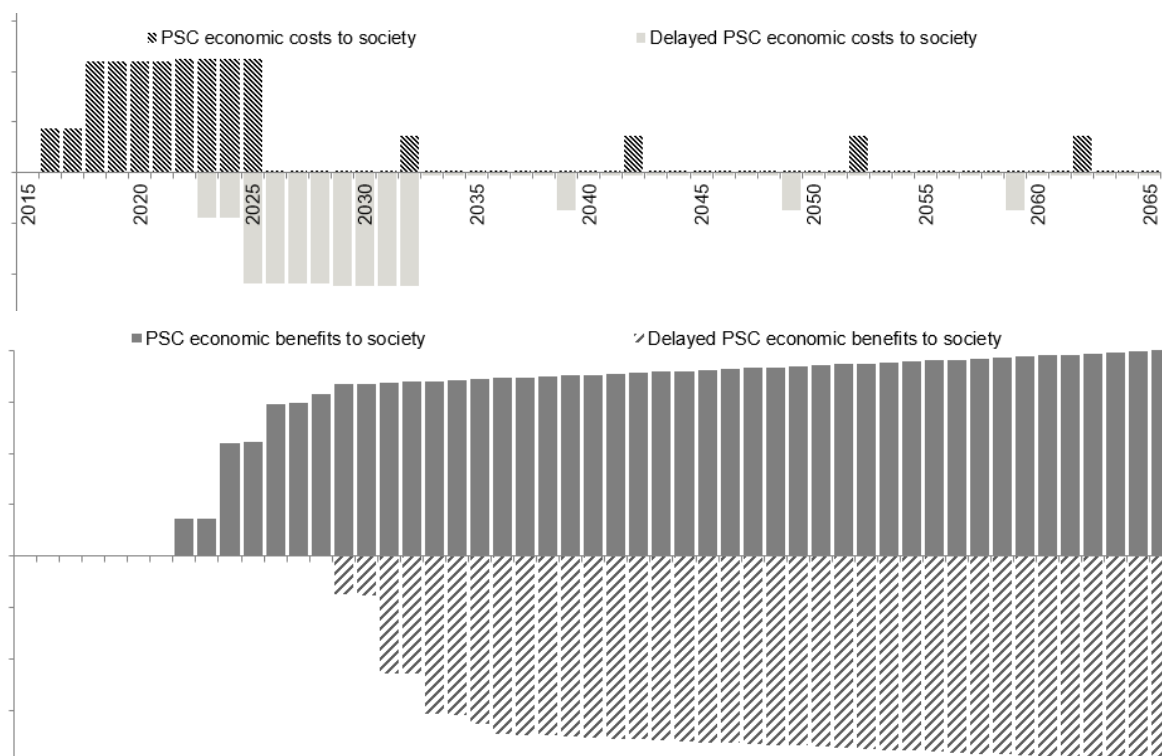
1.11 How are the major maintenance costs for the No Build scenario considered?

Users are expected to provide No Build annual O&M costs (in thousands of dollars per year), which are used to calculate the O&M cost savings achieved by doing the project. The No Build annual O&M amount should include all operational costs that will not have to be incurred if the project is undertaken, including any contributions towards major maintenance.

1.12 When should the inputs for the Delayed PSC differ from the inputs for the PSC?

The Delayed PSC has the exact same characteristics as the PSC, with only one exception: the start date of the project. If, for example, due to fiscal constraints an Agency can only afford to start building a project in 2025 instead of 2018, both the incurred costs as well as the benefits accruing to society will be delayed as can be seen in the figure below.

Comparison of economic costs & benefits between Delayed PSC and PSC



2 Traffic Assumptions

2.1 My project includes one lane in one direction and two lanes in the other direction; how do I enter the traffic and lane assumptions into the tool?

The tool cannot easily model this scenario. The best approximation of this scenario may be a unidirectional three lanes alternative. The user needs to change the field “Number of directions in bidirectional traffic” to 1 in cell F111 in the Project Inputs sheet. All other inputs must be calibrated carefully to reflect the traffic pattern in this scenario. It may be possible to conduct two separate analyses, one for each direction of travel, and combine the results.

2.2 What is the traffic sensitivity factor?

Users are expected to provide a traffic sensitivity factor, which determines what share of the growth in P50 (or most likely) traffic will be considered in the PDBCA module. This factor is applied in order to capture the uncertainty in traffic projections. The factor is a percentage (less or more than 100%) of the P50 (or equivalent) traffic growth above the base year traffic and hence lowers or increases the traffic projections to be considered in the PDBCA sensitivity analysis. If, for example, daily traffic growth forecasted is 15,000 vehicles above base year traffic under P50 and the Agency believes that the traffic growth may possibly be about 20% above or below that forecast, the appropriate traffic sensitivity factors to be used would be 80% and 120%. In that case, the BCA module would be re-run with growth in traffic of 12,000 vehicles per day and 18,000 vehicles per day, in order to calculate the various societal costs and benefits and check whether the economic justification for the project and project delivery still holds. Note that the same factor is applied to both No Build and Build traffic growth forecasts.

2.3 Should the total number of unidirectional peak and off peak hours equal 24 hours?

In short, no, the total number of unidirectional peak and off-peak hours do not need to equal 24 hours. The model requires users to input only the number of hours with significant traffic in order to ensure that off-peak congested speed is representative of real world conditions. For example, the amount of traffic carried by a roadway between 12:00 AM and 6:00 AM may be insignificant and in that case would not need to be included.

2.4 How does the tool use the traffic assumptions to calculate delay?

The tool calculates speeds for each year in the analysis period for the various delivery models. These speeds are used to compute travel time costs, incident delays, O&M-related travel delays, construction-related travel delays, non-fuel costs, fuel costs, emissions costs, transit, and carpooling travel time costs. Capacities for peak, off-peak, and weekends are calculated using inputs from the Project Inputs and Other BCA Inputs sheets. Then vehicle volume/capacity for peak, off-peak, and weekends are calculated using traffic volumes from the Traffic sheet and capacities calculated in the above step. Speeds for peak, off-peak, and weekends are then calculated using volume delay function (VDF) parameters, free flow speeds from the Other BCA Inputs sheet, and the V/C ratios calculated above. Delays due to construction, O&M activities, and incidents are also calculated. The concept guide (Chapter 5 in Part II of the Guide to P3-VALUE) explains the procedures in detail.

2.5 Does the tool calculate induced traffic?

The users of P3-VALUE 2.3 must provide traffic projections for both the No Build and Build alternatives. Typically, these projections will be generated using a travel demand model. The difference between the No Build and Build traffic projections is induced traffic. These induced traffic projections are then used in the model to calculate the costs and benefits to society of induced traffic.

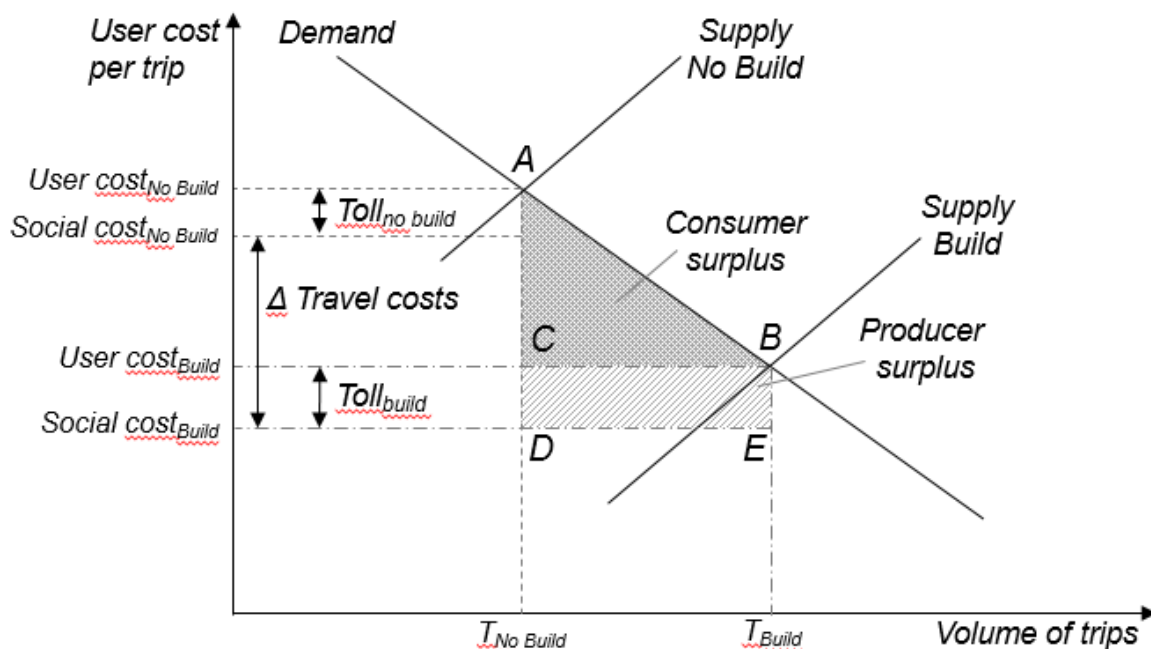


2.6 What type of facility is assumed in a No Build scenario – tolled or non-tolled? What if the existing facility already includes a managed lane?

First, the No Build scenario is only used for the benefit cost analysis and has not impact on the financial value for money analysis. P3-VALUE 2.3 has certain limitations with regard to the type of projects it can analyze for the BCA analysis. For example, there is only one lane type and associated traffic input for the No Build. If the No Build contains both high occupancy vehicle (HOV) lanes and general-purpose lanes (GPL), the user would need to combine both types of traffic into a single input. While the combined traffic volumes can be directly input, the vehicle occupancy for the No Build would need to be adjusted to represent both sets of lanes. In addition, HOV lanes and the GPLs may in reality have different congested speeds. Since a single Volume Delay Function (VDF) would be applied to the combined traffic, the estimated congested speeds will not reflect actual conditions. The VDF will overestimate the speed of GPL traffic and underestimate the speed of HOV traffic. Therefore, use of P3-VALUE 2.3 for this type of project will not provide an accurate representation of congestion delays in the No Build scenario.

Second, tolls are considered to be a transfer payment and should not be included in calculating the benefits to existing users. For existing traffic, the introduction of tolls or change in toll levels between the No Build and Build alternatives does not modify the calculation of societal benefits. To determine the societal benefits of a facility expansion for existing traffic, the social costs of travel (i.e., excluding tolls which are transfers) for each existing user before and after the expansion are evaluated. The difference in travel costs multiplied by the number of existing users is the net benefit to society of the facility enhancement. For induced traffic, the “rule of half” can be used to calculate the societal costs and benefits if both the No Build and Build alternatives are not tolled. However, if the road is tolled in the Build or even in the No Build alternative, the rule of half alone can no longer be applied as the shape under the demand curve that represents the net benefits to society now has both a triangular consumer surplus and a rectangular producer surplus, as can be seen in the figure below. The producer surplus is equal to the toll level under the Build alternative multiplied with the induced traffic (CBDE in the figure below), and the consumer surplus calculation includes the consideration of tolls borne by users under both the Build and the No Build cases.

Effect of toll on consumer surplus and producer surplus



3 Finance Assumptions

3.1 My agency expects federal aid to reimburse a significant portion of the project capital costs. How should federal funding be included in my analysis?

Project delivery benefit cost analysis evaluates P3 delivery from the societal perspective. All project capital costs, regardless of funding sources, will be included in the PDBCA analysis. A public agency may produce an agency specific PDBCA by reducing costs reimbursed by the federal government, especially in the case of discretionary grants. For example, if an agency receives federal *discretionary* grant funding to cover 20% of project capital costs, project costs can be reduced by 20% accordingly. However, assuming that the same amount of federal subsidy is available under both P3 and conventional delivery, the treatment of federal subsidies in the analysis should have no impact on the results of the comparison between delivery methods.

3.2 My agency plans to make three milestone payments during construction; how do I enter those milestone payments into the tool?

The user should enter the total combined amount of the milestone payments in the appropriate cell in the Project Inputs sheet. The model assumes that all milestone payments are paid in the last year of construction.

3.3 How can I model a combined availability payment and toll-based payment P3?

The model does not contain this functionality.

3.4 What is the difference between sculpting and an annuity?

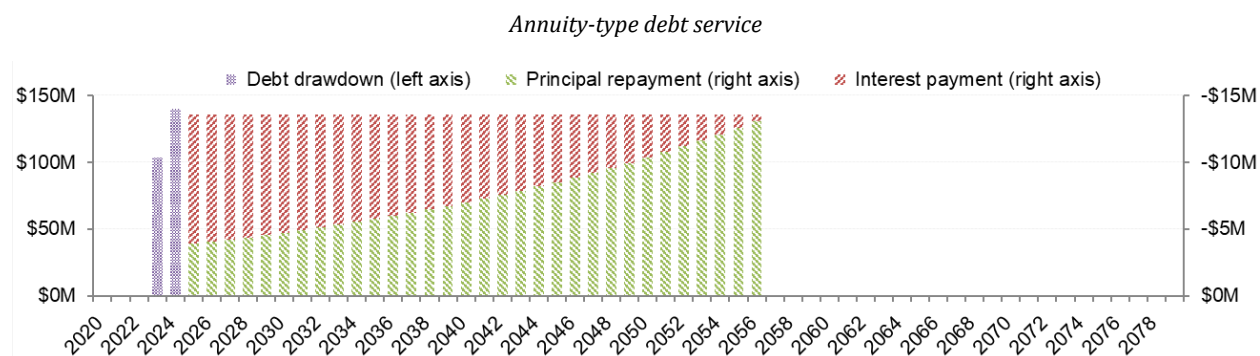
P3 projects typically have complex financing structures, potentially involving a large number of debt and equity instruments. The P3-VALUE 2.3 tool allows users to develop a variety of financing structures. On the P3 side, the financing/funding structure would typically include equity, debt, and public Agency subsidy payments. On the PSC side, the financing/funding structure can include debt and public Agency funding.

For both the PSC and P3, debt service can be structured in two ways:

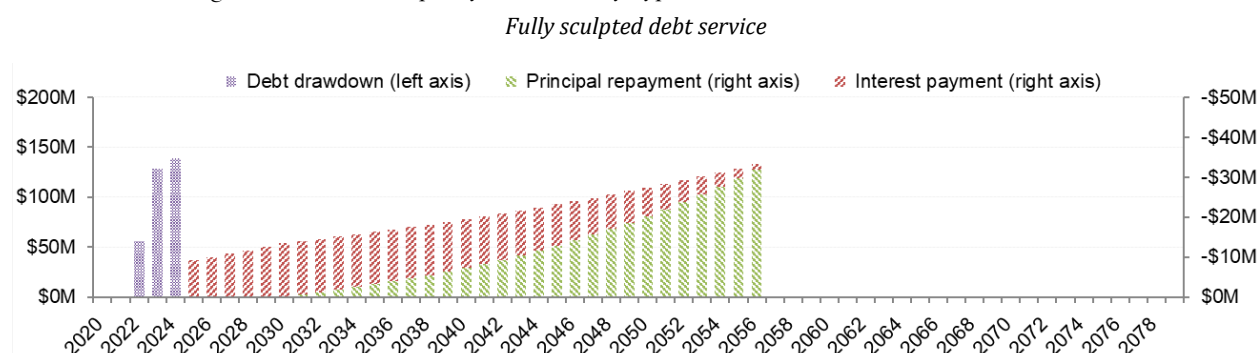
- Annuity-type (mortgage-style) debt service
- Fully sculpted debt service

Under annuity-type debt service, no interest capitalization beyond construction is considered. Furthermore, the model enables users to provide a grace period (number of years after substantial completion) during which only interest is due. The remainder of the tenor will be used to repay the principal. The total debt size under annuity-type debt service is determined by the minimum Debt Service Coverage Ratio (DSCR, an input) and the minimum cash flows available for debt service (CFADS), which typically occur in the early years. An example of an annuity-type debt service is shown below.





Under a fully sculpted debt service, the model uses the project's cash flows available for debt service (CFADS) in each year to create a perfectly sculpted repayment profile. This means that the DSCR will be constant throughout the debt service period. Under this approach, the total debt size is determined by the minimum DSCR and the CFADS over the entire debt service period. This may also lead to some interest capitalization during the early years of operation if CFADS in these early years is insufficient to make early interest payments. Although the CFADS under both debt service types are equal, a fully sculpted repayment makes more efficient use of these CFADS by “pushing back” debt service to future periods with higher revenues. As a result, the debt capacity of a fully sculpted debt solution will be larger than the debt capacity of an annuity-type debt solution.



In reality, P3 transactions will typically try to create a more or less sculpted debt profile using various debt instruments. The P3-VALUE 2.3 tool gives users the opportunity to analyze the impact of different financing structures.

3.5 My project finance plan anticipates multiple debt tranches with different interest rates and terms; how can I enter these financial assumptions into the tool?

The current model indeed includes a single long-term debt tranche whereas infrastructure projects typically use a number of debt instruments. However, a single sculpted debt tranche using a blended interest rate can be a good proxy for the debt financing of large US transportation infrastructure projects, even if these projects use a number of different debt instruments in reality. The reason for this is that typically the different debt tranches are combined in such a way as to create a more or less sculpted debt service profile.

Besides the long-term debt, the model also includes a short-term construction loan under a P3, which is paid off at substantial completion by the inputted subsidy/milestone payment (for both availability payment and toll concessions) and any additional required subsidy, as calculated by P3-VALUE 2.3 (for toll concessions only). The construction loan is assumed to pay current interest, which is funded through the other long-term sources of financing. If no subsidy or milestone payment is made, the model automatically excludes short-term construction financing.



3.6 My agency expects the project to be partially financed through a TIFIA loan. How should the use of federally subsidized financing be factored into my financial and risk assumptions?

Many financing structures for P3s in the US include TIFIA loans and/or tax exempt debt. These financing sources are effectively subsidized sources of financing. The financing conditions therefore do not accurately reflect the project's risk profile. The relevant consequences from a state perspective are that:

- P3 financial cash flows do not necessarily reflect the total value of the risks.
- P3 WACC (calculated from the P3 financial cash flows) does not reflect the total value of the risks, which means that the calculated lifecycle performance risk premium underestimates the total value of the risk (if the P3 WACC is used for the calculation of the lifecycle performance risk premium).
- Comparison between P3 and Conventional Delivery remains fair, however, as long as the same “subsidized” risk value (i.e., based on the P3 WACC) is used to estimate the lifecycle performance risk (which is added to the PSC cost). Indeed, the equalizing effect of the lifecycle performance risk calculation ensures that the risk is underestimated by the same amount in both P3 and PSC.

If the analysis is done from the federal perspective, there are two potential approaches:

- **Approach 1:** Adjust the VfM analysis by adding/subtracting the difference in value of the credit subsidy/tax benefit as a competitive neutrality adjustment to the P3. The value of the credit subsidy/tax benefit is effectively the NPV of the debt service at market interest rate minus the NPV of the debt service at the subsidized interest rate.
- **Approach 2:** Ignore the subsidy, because 1) it does not affect the comparison of delivery models to the extent that TIFIA and tax exempt debt are equally available under both delivery models, and 2) it makes no difference in the comparison, which is the key metric of interest in VfM.

To keep things as simple as possible, approach 2 is preferred. P3-VALUE 2.3 allows for both approaches by allowing users to enter the value of any credit subsidy under both Conventional Delivery and P3 delivery.

3.7 What is a competitive neutrality adjustment? Should I make a competitive neutrality adjustment for federal or state taxes? Why or why not?

To ensure a fair comparison between PSC and P3, the model enables users to apply a competitive neutrality adjustment for the following elements:

- State taxes
- Federal taxes
- Construction self-insurance
- O&M and major maintenance self-insurance
- Credit subsidies or tax benefits

The competitive neutrality adjustment is included to ensure an apples-to-apples comparison between the PSC and P3. For example, if the P3 is more expensive due to taxation that will flow back to the government, the increased cost due to taxation should logically not negatively impact the evaluation. To offset this effect, the same tax liability can either be added to the PSC as a cost or alternatively subtracted from the P3 cost. Depending on their perspective and preference, users can decide to ignore the competitive neutrality adjustment, or to include a partial adjustment for, for example, only state tax.

If the Agency self-insures under PSC while requiring insurance from the P3 concessionaire in case of a P3, this can lead to a similar issue. P3-VALUE 2.3 allows the user to estimate the value of self-insurance (as a percentage of the construction/O&M costs) in order to adjust the VfM results accordingly. Furthermore, the model allows users to incorporate the difference in credit subsidies under the PSC and P3 into the competitive neutrality adjustment.



3.8 For the PSC case, should I use interest rate assumptions reflecting project revenue bonds or should I use rates reflecting general obligation (GO) bonds?

P3-VALUE 2.3 allows the user to use either project revenue bonds or general obligation (GO) bonds for the PSC case. If GO bonds are used, the Agency continues to bear all toll revenue risk. If project revenue bonds are used, some of the toll revenue risk that would otherwise be retained by the Agency is now being transferred to the project revenue bond holders. However, the Agency will still be subject to potentially large revenue fluctuations.



4 Risk Assumptions

The user can decide whether to provide detailed pure risk and base variability inputs for the project in the Risk Matrix sheet. If the user decides not to fill out the Risk Matrix sheet, all costs in the Project Inputs sheet should be input risk- and uncertainty-adjusted costs. FAQ 4.1-4.5 and 4.8-4.9 below are only relevant for users using the Risk Matrix sheet.

4.1 My project budget includes a set-aside for contingencies. Should I include contingency costs as an input? How?

All specified project costs should be included in the analysis, including contingency. Contingency costs are an output of the risk assessment process, and should typically be reflected as a risk input in a financial analysis. In P3-VALUE 2.3, risk values are input as a most likely impact (expressed as millions of dollars) with a probability of occurrence. If the contingency value is already known, that value can be input as the “most likely” impact, with 100% probability of occurrence.

4.2 For pure risks, how do I quantify the probability or impact of a particular risk?

Pure risks are also known as event risk and refer to the individual risk events, such as an accident at the construction site. As a first input, the user must determine what probability level should be used for the pure risk analysis. The probability level is input as a percentage. Based on this percentage, the model determines the value of the pure risks at the given probability level.

Pure risks can be identified and their probabilities and consequences assessed through review of historical data on similar projects, discussions with appropriate subject matter experts, or through risk workshops with the project development team. The output of a risk workshop is typically a risk register, which may include a quantitative estimate of the potential financial cost or “risk premium” based on the consequence and likelihood of a risk being realized.

4.3 What is the difference between triangular and uniform distribution?

Triangular distribution is applied to risks where a three-point estimate of the impact is possible. Here, discrete values for the minimum, most likely, and maximum risk impacts are defined. Uniform distribution is used for two-point estimates. Any value between the low point estimate and the high point estimate will have an equally likely chance of occurring. It implies that the impact of the risk has an equal chance of being any value within the specified range.

4.4 Is there any input for political risks? For example, the possibility of a concession being reclaimed by a government agency for political reasons.

To the extent that political risk can be treated the same way as other pure risks, users can add political risks to the risk register and include it in the analysis.

4.5 Does P3-VALUE 2.3 use Monte Carlo techniques? Does P3-VALUE 2.3 allow any assumptions made about correlation of risks?

The risk module included in P3-VALUE 2.3 allows for a relatively basic risk analysis. The model does not include a Monte Carlo simulation and risks are assumed to be independent. For more advanced risk analysis, users should use specialized software packages.



4.6 What is the Weighted Average Cost of Capital (WACC) adjustment for revenue uncertainty? How do I estimate it? What impact does this assumption have on results?

Traffic and revenues are inherently difficult to predict. In their bids for toll concessions, bidders (and their financiers) take revenue uncertainty into consideration through the financing conditions. Public Agencies that take revenue risk (under a PSC or a P3 availability payment concession) also face the same revenue uncertainty. However, it may be difficult for Agencies to value these uncertainties. P3-VALUE 2.3 allows for three different approaches to capture revenue uncertainty. The first approach uses market-based information to determine the value of revenue uncertainty and will be discussed in more detail below (see below). Under the second approach, the user can provide a percentage reduction (an input) to toll revenues flowing to the Agency to account for uncertainty. For example, if the user inputs 20%, this means that the revenues flowing to the public Agency will be reduced by 20%. Under the third approach, the user can decide not to adjust the revenues flowing to the Agency for uncertainty.

Under the first approach, the model views the difference between an availability payment transaction WACC and the project risk-free discount rate as a reflection of the lifecycle performance risk. Furthermore, in a toll concession, the WACC reflects both lifecycle performance risk and revenue uncertainty. P3-VALUE 2.3 uses this logic to determine the magnitude by which revenues flowing to the Agency should be reduced to account for uncertainty if the Agency would use (project-risk free) general obligation (GO) bonds under the PSC. To do so, the model compares the NPV of all transferrable project costs and toll revenues under 1) a market-based WACC for a toll concession and 2) a project risk-free discount rate. The difference between the two NPVs is a measure of the combined value of the lifecycle performance risk and revenue uncertainty adjustment.

The difference between the NPV of lifecycle performance risk under an availability payment concession and the NPV of the lifecycle performance risk and revenue uncertainty under a toll concession is a measure for the revenue uncertainty adjustment. P3-VALUE 2.3 calculates the relative value of the revenue uncertainty adjustment compared to the overall revenues (in NPV terms) to determine the percentage-based reduction that should be applied to the revenues flowing to the Agency.

Furthermore, if the Agency uses public revenue bonds to finance the project under the PSC, the differential between the interest rate on public revenue bonds and the project risk-free discount rate is used to calculate the revenue risk transfer from the Agency to revenue bond holders.

4.7 What is the difference between the social real discount rate and the project risk free discount rate? How do I calculate these assumptions?

In the VfM analysis and the risk analysis, the model use a project risk free discount rate (with the exception of cash flows to the P3 concessionaire, which will be discounted by the Weighted Average Cost of Capital, or WACC) to calculate the NPV of costs and revenues to the Agency. The Agency's borrowing rate can potentially be used as a proxy for the project risk free discount rate.

In the PDBCA, the model uses the social real discount rate. However, determining the social real discount rate can be challenging. Theoretically, the social discount rate should represent the opportunity cost of what else the Agency or government could accomplish with those same funds. In practice, it may be difficult to determine what the right value is. As guidance, the user should use the state or Agency's social discount rate or follow the federal office of Management and Budget (OMB) Circular A-94.

4.8 What is the probability level for pure risk analysis? Should I adjust my risk or cost assumptions based on the probability level I use?

The probability level (or P level) input can be selected by the user. It reflects the level of confidence required in the risk costs estimated, i.e., confidence that the actual cost will be at or below the estimated cost X% of the time. Based



on the P level selected, the P3-VALUE 2.3 tool will calculate the cost of the risk – no further adjustment by the user is necessary.

4.9 What is the difference between base variability and other types of risk?

In line with the FHWA Guidebook for Risk Assessment in Public-Private Partnerships, P3-VALUE 2.3 recognizes the following risk categories:

- Pure risks, event risks, or non-systematic risks (“Pure risks”)

Example: Accident at construction site, causing cost overrun and/or delays.
- Base variability or non-systematic uncertainties (“Base variability”).

Example: Uncertainty in volume of asphalt.
- Systematic risks, long-term performance risks, and project coordination risks that cannot be transferred to subcontractors but are retained by the concessionaire (“Lifecycle Performance Risks”). Example: Conflicts between DB and O&M contractors, supervening events exceeding liability caps, inflation.

The exact magnitude of costs is typically uncertain because of lack of more precise information. In practice, these uncertainties are often covered in a base variability mark-up. This mark-up can be a function of the stage in design development. If the design development is more advanced, typically the mark-up can be reduced. Alternatively, non-systematic uncertainties can be analyzed using probabilistic analysis.

The P3-VALUE 2.3 tool requires the user to provide separate base variability mark ups for pre-construction costs, implementation costs and O&M. These mark ups apply to costs only; risks are assumed to already incorporate base variability.

4.10 What is lifecycle performance risk? How does it differ from pure risk?

Lifecycle performance risk refers to the risks that cannot be transferred to subcontractors but are retained by the concessionaire. The value of these risks is already accounted for in the concessionaire’s bid. However, on the PSC side, these risks are typically not considered. The PSC therefore needs to be adjusted for lifecycle performance risk to ensure a fair comparison between the PSC and P3. This adjustment is effectively an equalizer between the PSC and P3 to account for possible cost overruns, interface risk, systematic risks, etc. on the PSC side.

P3-VALUE 2.3 offers three approaches to value lifecycle performance risk:

1. If the Agency does not have specific information on lifecycle performance risk cash flows, the model can use market-based financing information to determine the value of lifecycle performance risk. To do so, the user must select “calculated risk premium” under the “Lifecycle performance risk calculation switch” in the model (see Project Inputs sheet).
2. If an Agency has specific data on lifecycle performance risk cash flows, it should use these cash flows in the VfM analysis and PDBCA. To do so, the user must provide the value of lifecycle performance risks, expressed as the NPV in the model’s base year by selecting the “user-specified risk premium” option under the “Lifecycle performance risk calculation switch” in the model (see Project Inputs sheet).
3. The Agency can also decide to ignore the value of lifecycle performance risk in its analysis by selecting the third option (“Do not consider”) under the “Lifecycle performance risk calculation switch” in the model (see Project Inputs sheet).



4.11 Why is the lifecycle performance risk different under a toll concession compared to an availability payment concession? What can I do about it?

When relying on market-based financing information to determine the value of lifecycle performance risk for an availability payment concession (approach 1 as described in FAQ 4.10), the model uses the weighted average cost of capital (WACC), as calculated by P3-VALUE 2.3, to assess the premium required by a P3 concessionaire to take on the long-term risks that cannot be passed on to subcontractors.

As the WACC of a toll concession not only captures the long-term risks that cannot be passed on to subcontractors but also revenue risk, this toll concession WACC needs to be adjusted to exclude revenue risk when calculating the lifecycle performance risk. To estimate the difference between an availability payment WACC and a toll concession WACC, the user can run P3-VALUE 2.3 twice, using the different financing conditions for an availability payment and toll concession. The user can then subtract the two (post-tax) WACCs to calculate the difference, which it should input into the model as the “Delta between availability payment & toll concession WACC.”

One complication in the above approach is that the required subsidy amount under the toll concession may not be equal to the proposed milestone payment under a toll concession, which impacts the amount of financing outstanding at substantial completion and will cause the calculated lifecycle performance risk to be different under a toll concession when compared to an availability payment concession. Furthermore, certain costs (financing fees, tax) may be different under the two models. To ensure an apples-to-apples comparison and ensure a consistent valuation of the lifecycle performance risk, users can undertake the following steps:

- Create two models with the exact same inputs, except for differentiated financing assumptions for the toll concession and availability payment concession;
- Set P3 and PSC financing fees to 0% in both models;
- Set federal and state tax rates to 0% in both models;
- Make sure that the availability payment escalation inputs are the same for both models;
- Run the toll concession model to calculate the required P3 subsidy and toll concession WACC;
- Input the total subsidy amount calculated for the toll concession (sum of N34 and N35 in the Financing Outputs sheet) as the milestone payment for both the P3 and PSC in the availability payment model;
- Run the availability payment model to calculate the availability payment WACC;
- Calculate the difference between the availability payment WACC and toll concession WACC and input it into the toll concession model and run the model again if error checks show.

If the inputting of the subsidy amount and calculated difference between the availability payment WACC and toll concession WACC is done without any rounding, the lifecycle performance risk should be the same under the toll concession and availability payment concession.



5 BCA Assumptions

5.1 How do I identify inputs for the BCA?

The tool includes default values for all BCA inputs, except for those directly related to the project. The user can start with the default values and then adjust the values to reflect the characteristics of the region, project, and context.

5.2 How do I calculate speed adjustments?

Construction and O&M activities cause delays and therefore affect social benefits. So do incidents. The user guide provides guidance on the selection decision on speed adjustment inputs.

5.3 What are the sources for the default values for the BCA assumptions?

The default values for the BCA assumptions reflect the latest transportation studies and FHWA or USDOT guidelines. The user guide provides detailed citations of the sources of those default values.

6 VFM Outputs

6.1 Why are there different lines for O&M costs and O&M cost savings? How are O&M cost savings calculated?

O&M costs savings are equal to the costs of maintaining the facility under the No Build scenario. The O&M costs line item reflects the costs of maintaining the facility under the Build scenarios. Build scenarios, i.e. PSC, delayed PSC, or P3 will eliminate the O&M cost under the No Build scenario. The net cost of the Build scenario is estimated by subtracting the costs that are “saved” (i.e., costs that will not be incurred to maintain the No Build scenario).

6.2 Why are the discounted costs and revenues to the developer equal to zero?

To calculate the subsidy required by the developer given the financial assumptions, the tool sets the discount rate equal to the project internal rate of return (i.e., WACC over the project life). By definition, when the cash flows are discounted by the project internal rate of return they equal zero.

6.3 How does the tool calculate the subsidy required?

The Model Optimizer calculates the optimal subsidy/concession fee (for a toll concession) or availability payment, subject to a given gearing (ratio of debt to overall long-term capital, including both debt and equity) using an iterative optimization approach for the P3. In this context, optimal means the lowest possible cost to the Agency while simultaneously satisfying the following two requirements:

1. Calculated minimum Debt Service Coverage Ratio (DSCR) is equal to or exceeds the required minimum DSCR.
2. Calculated equity internal rate of return is equal to or exceeds the required equity return.

The Model Optimizer iteratively adjusts the subsidy/concession fee or availability payment (depending on what P3 structure is selected) until both criteria are satisfied.

For Conventional Delivery, the Model Optimizer optimizes the minimum subsidy amount required using an iterative approach while ensuring that the public debt amount can be repaid and meets the minimum DSCR requirement. The optimized subsidy amount exactly meets the minimum DSCR requirement.

6.4 Why is the concession fee (or the public subsidy) in the Simplified Vfm Output less than the same line items in the Financial Output?

Although this may not be true in actual practice, the concession fee is assumed to be paid by the concessionaire to the public agency at the end of construction, as is the subsidy payment, if any. Because the Vfm Output shows present values, these values are discounted, and therefore will be lower than the year-of-expenditure values shown in the Financial Output.

6.5 What is the “value of revenue risk transferred to bond holders” in the Vfm Output Summary?

If the Agency uses public revenue bonds as opposed to general obligation (GO) bonds to finance the project under the PSC, some of the toll revenue risk that would otherwise be retained by the Agency is now being transferred to the project revenue bond holders. However, the Agency will still be subject to potentially large revenue fluctuations. P3-VALUE 2.3 uses the differential between the interest rate on public revenue bonds and the project risk-free discount



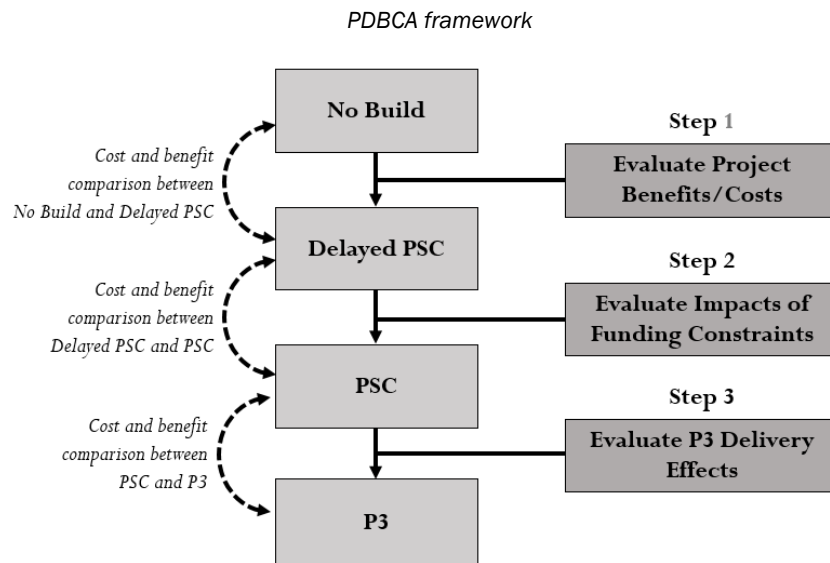
rate to calculate the revenue risk transfer from the Agency to revenue bond holders, which is captured under cost item 3 of the VFM Summary Output (long-term risks retained by revenue bond holders).



7 BCA Outputs

7.1 What is the difference between conventional delivery and delayed conventional delivery?

In the VfM analysis, the PSC (also called conventional delivery) is compared to the P3 in order to determine the fiscal impact on the Agency of P3 procurement. A key requirement for a VfM analysis to be valid is that the PSC and the P3 are implemented in a similar timeframe. For the PDBCA, there is no such requirement. Under PDBCA, a delayed project can be compared to an accelerated project without any conceptual challenges. This means that the PDBCA framework allows practitioners to evaluate the impact of funding constraints that could delay projects. As shown in the figure below, P3-VALUE 2.3 uses three steps to distinguish between the impacts of public funding constraints on the one hand, and impacts due to P3 cost and benefit efficiencies on the other.

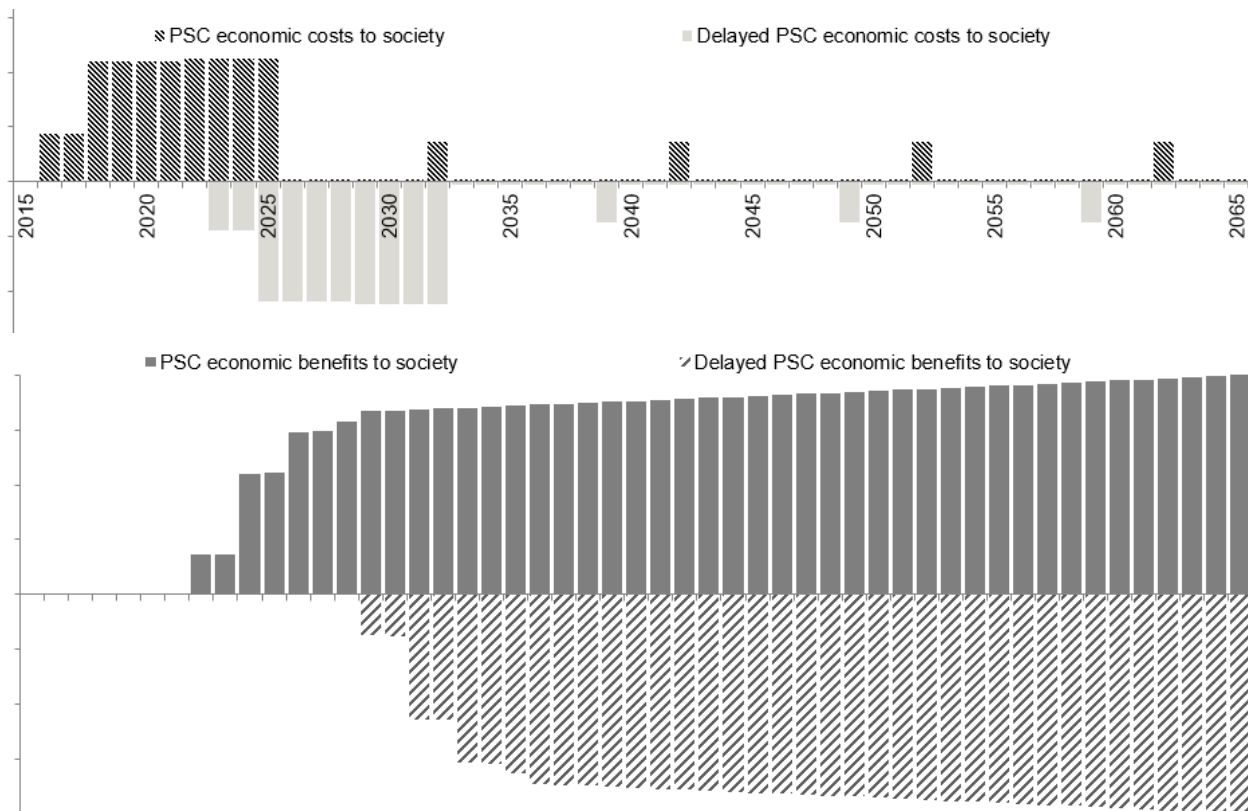


In order to evaluate the impacts of funding constraints (step 2 in the figure above), a third delivery model is therefore introduced: the Delayed Public Sector Comparator (Delayed PSC) or delayed conventional delivery.

The Delayed PSC has the exact same characteristics as the PSC, with only one exception: the start date of the project. If, for example, due to fiscal constraints an Agency can only afford to start building a project in 2025 instead of 2018, both the incurred costs as well as the benefits accruing to society will be delayed as can be seen in the figure below.



Comparison of economic costs & benefits between Delayed PSC and PSC



Depending on the exact profile of costs and benefits, accelerating a project may result in lower or higher net benefits to society.

7.2 Why is base variability included as a cost in the PDBCA outputs?

Base variability refers to the uncertainty in cost estimates. The exact magnitude of costs is typically uncertain because of lack of (more precise) information. In practice, these uncertainties are often covered in a base variability mark-up. This mark-up can be a function of the stage in design development. If the design development is more advanced, typically the mark-up can be reduced. Alternatively, non-systematic uncertainties can be analyzed using probabilistic analysis.

The base variability is calculated for each delivery model to create base variability cash flows. As an output field, base variability is calculated by importing the base variability inputs for each project phase (pre-construction, implementation, and operations) from the Risk Matrix sheet and the costs from the Project Inputs sheet. For P3, the base variability is divided into retained and transferred base variability, using the cost transfer percentages from the Project Input sheet.

Please note that no base variability is calculated if the Risk Matrix sheet is not used.

7.3 Why are financing costs not included in the PDBCA outputs?

Financing costs such as equity, debt, interest and principal payments and equity dividends, are typically considered to be an internal transfer and therefore excluded from the benefit cost calculation. However, financing fees *are* included because they are economic resource costs.



8 Other Functions

8.1 How do I know which cells I should alter and which cells I should not alter?

Cells that are highlighted in light yellow and contain a star (*) are designated as input cells. In addition to these, there are cells highlighted in light orange with a plus sign (+), which are non-project specific inputs. These inputs are assumptions made for all projects but can also be changed if the user makes a different assumption. For example, a Vehicle Lane Capacity volume of 2,000 cars per lane per hour is assumed for most roads. While this is a standard assumption, any other value can be used to be more specific for the project being analyzed. Values in grey shaded cells should not be altered. Furthermore, cells that are filled with a crosshatch pattern do not require inputs.

8.2 How do I use the checks and alerts?

At the top of each input and calculation sheet, the model indicates whether there are any errors or alerts. The user should navigate to the Checks & Alerts sheet to determine what the cause of the error check or alert may be. Please note that error checks and alerts will appear if the user makes changes to the inputs without optimizing the model. In that case, the user should click on the Model Optimizer button to initiate the optimization process. Upon completion of the optimization process, all error checks should disappear whereas, depending on the project's specifics, some alerts may remain. On the Checks & Alerts sheet, users can double click on the relevant error check or alert to be taken to the source of the error or alert. For this function to work, the user needs to enable the "detailed level view" in the Model Navigator.

8.3 What is the difference between error and alert checks?

Error checks are critical and require immediate attention. Alerts are not critical and are used to inform the user of the occurrence of non-critical events.

8.4 When should I use the Model Optimizer? How long does the optimizer typically take?

The Model Optimizer calculates the required subsidy/availability payment while simultaneously optimizing the project's financing. Use the Model Optimizer once you have entered all of the necessary inputs into the model. To initiate the Model Optimizer, the user can click on the blue Optimizer button or use the following shortcut key combination: Control + O. The speed of the model optimizer depends on the processing speed of the computer on which the tool is operating and the complexity of the model inputs.

8.5 What is the difference between the detailed and the high-level view?

In the high-level view, the user has access only to the inputs, landing sheets and outputs. Detailed calculation sheets are hidden to provide the user with overall understanding of the model flow and logic. The landing sheets provide an overview of each module's components (elements used as inputs to the calculations in the module, calculations carried out within the module, and a list of outputs and modules that are affected by this module's calculations) in a flow chart format and can also be used to navigate the model. By clicking on any of the buttons in the high-level view, the Model Navigator will either list the input and output sheets or take the user to the relevant landing sheet.

In the detailed level view, all sheets are visible and accessible to the user. By clicking on any of the buttons in the detailed level view, the Model Navigator will list all relevant worksheets. Click on any of the listed worksheets to navigate to a particular worksheet. While the high level view enables the user to navigate the model through landing sheets, the detailed level view enables the user to navigate to each individual calculation sheet in the model. Chapters



3 and 5 of the user guide describe the inputs and outputs of the model (visible in both high level and detailed level view), whereas Chapter 4 discusses the model's calculations (visible in detailed level view only).

8.6 Can the model outputs be exported into an external Word or Excel document?

Currently, there is no feature that allows the export of tables or graphs into other document formats including Excel. Alternatively, output tables and graphs can be copied and pasted into another document.

8.7 How long should it take me to create a workable model in the tool?

The time it takes to develop a model in the tool can vary widely. Depending on the complexity of the inputs used, the availability of data, and user familiarity with the tool, developing a model may take anywhere from a couple of hours to a few days.

8.8 What data should I have on hand to develop a workable model?

Useful sources of inputs include a variety of project studies including:

- Cost estimates
- Risk register (detailed inputs option only)
- Finance plan
- Traffic and revenue study
- Project benefit cost analysis
- Existing facility traffic data
- Existing facility safety data

8.9 How can I evaluate a design-build-finance (DBF) using P3-VALUE 2.3?

Whereas P3-VALUE 2.3 was developed to compare design-build-finance-operate-maintain (DBFOM) to conventional delivery using either a design-bid-build (DBB) or design-build (DB) delivery, it may also be used to compare a DBF delivery to conventional delivery. Under DBF delivery, the developer designs and builds the project and also provides private capital, typically in the form of debt. However, repayment of the debt is not linked to the project's operational performance and also tends to be shorter-term when compared to DBFOM delivery. Furthermore, operations and maintenance are not transferred to the developer.

When using P3-VALUE 2.3 to evaluate DBF, DBF is considered to be the P3 option, whereas DBB or DB delivery is considered to be the PSC. To compare DBF to DBB or DB, the following modifications to the P3-VALUE 2.3 inputs are required:

- **Tolling:** Whether or not the facility is actually tolled, the user's input should indicate that the facility is not tolled as toll revenues will not be directly pledged to the repayment of debt and can therefore be ignored.
- **P3 delivery method:** The user should set the P3 delivery method to "Availability payment." Whereas DBF is not an availability payment P3, the calculations used by P3-VALUE 2.3 to determine debt service for a DBF structure are similar to those used for an availability payment P3.
- **Implementation duration, operations duration, and long-term debt maturity:** To ensure that the private capital raised by the developer can be repaid, the implementation duration combined with the operations duration should be equal to the desired long-term debt maturity for both the P3 and PSC. For example, if the implementation duration is 5 years and the desired long-term debt maturity is 15 years, the operations durations should be set to 10 years.



- **Annual routine O&M, major maintenance, and handback costs:** As operations and maintenance are not part of the scope under a DBF structure, O&M, major maintenance, and handback costs should be set to zero for both the P3 and PSC.
- **P3 cost of equity, long-term debt interest rate, gearing, minimum DSCR, DSRA:** P3-VALUE 2.3's optimization process requires private capital to be a mix of private debt and equity. In order to mirror a debt-only solution under a DBF, the user should set the gearing to 99.99% and set both the cost of equity and long-term debt interest rate to the expected interest rate to be paid on the private debt. Furthermore, as debt repayment is not tied to revenue and performance, the DSCR should be set to 1.00x whereas the DSRA should be sized at 0 months debt service for both PSC and P3. Under these conditions, the model may show an equity return that exceeds the target return, but as this only relates to a very small equity investment, the overall impact on the results will be limited.
- **Public debt financing type:** The user should select "GO bonds" for the public debt financing type.
- **Lifecycle performance risk calculation method:** The user should select option 3 ("Lifecycle performance risks are ignored in the analysis") as the lifecycle performance risk calculation method. As no long-term lifecycle risks are transferred to the private party, their valuation should be ignored when comparing DBF to DBB or DB delivery.

