Street Smart. World Wise.

Altus Group

Infrastructure Ontario

Assessment of Innovation through AFP Project Delivery

September 22, 2015

Executive Summary

Infrastructure Ontario (IO) currently considers an Innovation Factor in its Value for Money analysis as an adjustment reflecting the savings associated with the increased level of competition, and opportunity for innovation and efficiencies that are afforded through the DBFM and DBF models.

The focus of this report is to review, assess and quantify the Innovation Factor applicable for IO's Social Infrastructure portfolio of projects. This assessment is based on our independent analysis of performance on a sample of IO projects delivered to date, and validated by our own experience and those of external participants and experts involved in large infrastructure project delivery.

Our analysis of IO's project portfolio was primarily focused on the difference between the successful winning bids, unsuccessful bids, and the initial project budget estimates. In our opinion, these differences highlight the impact of innovation, efficiencies, and competitive tension on AFP project delivery.

Through our analysis we demonstrate the following:

- The Pre-RFP Budget estimates are appropriate for establishing the initial base costs for traditional DBB and the AFP BF delivery models.
- For projects delivered through a DBF delivery model, the expected impact of innovation would be between **5 to 12%.**
- For projects delivered through a DBFM delivery model, the expected impact of innovation would be between **11 to 18%.**

This analysis is supported by an extensive market survey of industry participants that estimate the overall benefits of the AFP process on projects delivered by the DBF model at 13.5%, and 20.1% for the DBFM model.

Through both our extensive market survey and jurisdictional reviews, there is clearly a widely recognized view of both public and private sectors that the AFP/P3 delivery model does in fact encourage real innovation/efficiencies that translate into real costs savings of a project.

Assignment

Mandate

Altus Group Limited was retained by IO to perform the following:

- Review, assess, and quantify the differences between Alternative Financing and Procurement (AFP) project delivery in comparison to traditional project delivery methods for Social Infrastructure projects.
- Identify differences that are attributable to innovations or efficiencies that are a result of delivery and implementation using IO's AFP approach.
- Provide a quantified value range that can be incorporated into IO's established Value For Money methodology, in coordination with the associated risk matrix templates for each relevant delivery model and social infrastructure asset class.

Altus Group Limited Background

Altus Group Limited (Altus) is a multi-discipline advisory firm and the leading authority on infrastructure project finance, procurement, construction, operations, technical risk assessment, cost and schedule planning, control and management in the private and public sectors in

Canada. Altus has extensive experience in advising lenders, owners and investors in AFP/PPP and traditional project delivery.

Our ability to deliver independent professional services is enhanced by our ongoing relationships with leading lenders, owners, developers, contractors and other professionals throughout Canada, the U.S. and internationally. Altus has a proven track record, demonstrating our ability to provide reliable and impartial expert advice.

Our experience with traditional infrastructure delivery projects encompasses various aspects including: risk analysis, costing, and project monitoring services through the planning, construction, and operations phases. Through our past experience in AFP / PPP and traditional procurement, Altus has participated in and tracked data, including risks and their associated budget and schedule impacts, on a wide range of projects.

Background

Value for Money Methodology

Infrastructure Ontario's Value for Money (VFM) analysis consists of a comparison between the total costs of delivering an infrastructure project using the traditional public sector project procurement model and AFP[1].

This analysis is undertaken at three distinct milestones of the procurement process.

Stage 1 - Authorization to release the Request for Proposal (RFP)

In order to obtain approval from its Board of Directors to release the RFP, IO must demonstrate that the proposed AFP delivery model yields a positive VFM.

Stage 2 – Authorization to enter into the Project Agreement

Upon close of the RFP process, the preferred bid is then compared to the Public Sector Comparator (PSC) and presented to the IO Board of Directors. At this point the PSC is updated to reflect the most current cost information. The Board will not approve execution of the Project Agreement without demonstrating a positive VFM.

Stage 3 - Publication of the Value for Money analysis

After the Project Agreement has been finalized, IO releases a public report that contains the final VFM analysis, along with details on the project, the procurement process and the project agreement.

IO develops two cost scenarios for comparison in the VFM assessment:

Traditional Design Bid Build Project Delivery: Estimated costs to the public sector of delivering an infrastructure project using traditional procurement processes for that sector. This is referred to as the Public Sector Comparator (or PSC); and

Alternative Financing and Procurement (AFP): Estimated costs to the public sector of delivering the same project to the identical specifications using AFP.

These cost estimates include:

Base Costs

[1] Assessing Value For Money – An Updated Guide to Infrastructure Ontario's Methodology, March 2015

- Construction, Lifecycle, Operating, Maintenance, as applicable

Retained Risks by the Public Sector

- Risks best managed by the public sector that remain with the public sector

Financing Costs

- The financing cost premium incurred by the private sector (and ultimately passed on to the public sector) under a project delivered through alternative financing and procurement.

Ancillary Costs

- Includes costs for project management, legal services, architectural and engineering, advisory and other professional fees, transaction, capital markets and fairness advisors.

The difference between the PSC and the AFP is referred to as value for money. If the cost of delivery under AFP is less than the PSC, positive value for money is achieved.

Base Costs are developed by qualified external cost consultants, estimating the cost of the project if delivered under an AFP model.

The following adjustments are made to reflect the differences between AFP and the PSC:

Innovation Factor

- An adjustment reflecting the savings associated with the increased level of competition, and opportunity for innovation and efficiencies that are afforded through the DBFM and DBF models.

Lifecycle Adjustment Factor

- An adjustment to reflect the historically observed rates of investment in lifecycle and corresponding impact on asset residual value for traditionally delivered and maintained assets.

Competitive Neutrality

- An adjustment to reflect the differences in tax requirements between the public and private sectors

The focus of this report is to assess and quantify the Innovation Factor applicable for IO's Social Infrastructure portfolio of projects.

Assessment of Innovation in AFP

Overview

In order to assess the impact of innovation on the AFP project delivery model, it is important to understand the key differences between AFP delivery models and a traditional Design-Bid-Build (DBB) approach.

Under the traditional DBB model, the owner undertakes the procurement/delivery of each project component individually beginning with the design. Design is completed by the selected designer and forms the basis for the construction tendering process.

Under AFP, design is generally completed as part of collaborative project company team that competes with other short-listed pre-qualified teams to deliver and potentially operate and maintain the asset over a long term period (up to 30 years). Each team has the flexibility to

assess and achieve the solution which it believes achieves the greatest whole life value of the asset.

A comparison of the models are summarized as follows:

Design-Bid-Build (DBB)

This traditional approach involves a separate competitive tendering of each phase of the project development, with the public owner responsible for project financing, paying for costs as they are incurred by the Designer/Contractor/Service Provider.

While this approach does allow the Owner to select the specific Designer/Contractor/Service Provider it perceives to be most qualified/offers best value, it limits the opportunity to achieve innovation.

Some of the disadvantages of the model that limit innovation include:

- Design developed in isolation of construction, lifecycle, operations and maintenance requirements/impacts limiting opportunity to achieve optimal and most efficient solution over the full life of the project.
- Design developed from perspective and experiences of a single Designer
- Designer incentivized to develop its most profitable design solution that satisfies Owner's requirements, not necessarily one that achieves greatest value over whole life of project
- Highly prescriptive construction requirements based on the prescribed design.
- Limited competitive tension during design development subsequent to design contract tender.

While the designer under a traditional DBB delivery model may in fact be highly qualified and experienced, its interests under a traditional design contract is to achieve the vision, and satisfy the owner's requirements through the most efficient and profitable design solution. This would be most easily achieved by providing the simplest design that satisfies the owner, maximizing its revenue while minimizing the time and expenses consumed. This approach does not necessarily invite innovation or create significant efficiencies from a whole project life perspective, which is further limited through the development of just a single design solution.

Build-Finance (BF)

The BF approach is comparable to the traditional DBB model in many ways, with many of the same limitations on innovation as a result of the separation of design from the tendering of the construction contract.

The BF model does introduce AFP attributes that invite some level of innovation:

- Private financing creates incentives to accelerate construction schedule to minimize financing costs;
- Payment primarily upon successfully achieving Substantial Completion ensures Contractor responsiveness and the achievement of the defined project requirements; and
- Use of standardized project document templates and procurement process allows for greater certainty of outcomes and risk sharing.

Design-Build-Finance (DBF)

The DBF model builds on the AFP framework of the BF model by assigning design responsibilities to the private sector Project Company. As a result, the following additional innovation opportunities are introduced:

- Typically three distinct designs developed under a high level of competitive tension throughout bid phase, effectively tripling the odds of achieving an optimal solution at a lower cost;
- An interactive bidding process allows proponents to test potential design solutions and innovations to determine compliance with owner requirements and expectations;
- Design developed in coordination with construction requirements/impacts leading to a better more cost effective approach; and
- Project requirements can be less prescriptive, providing the private sector consortium (Project Co.) an opportunity to adjust the design to optimize construction approach and introduce efficiencies while still achieving final completion requirements.

Design-Build-Finance-Maintain (DBFM)

The DBFM model is considered the most innovative AFP delivery model where all aspects of the project performance are integrated and assigned to the designated private sector project company. Typically Project Co would be responsible for the design, construction, financing and maintenance/lifecycle investments over a period of 30 years, along with achieving appropriate end of term handback requirements.

The DBFM model includes all the benefits noted above, as well as the following:

- Design developed in coordination with construction, lifecycle, operations and maintenance requirements/impacts;
- Integrated team incentivized to develop solution that achieves greatest value over whole life of project, balancing efficiencies achieved over the useful life of the asset with initial capital investment;
- Private Sector responsibility for long term energy costs and consumption encourages solutions that achieve energy efficiencies and minimize overall project costs; and
- Long term responsibilities allow for significantly less prescriptive project specifications that are more performance/output based. This creates more flexibility across all activities/disciplines to apply innovation and develop cost effective solutions.

Data Review and Assessment

IO has delivered DBFM, DBF and BF projects through its AFP program. As of March 31, 2014, IO had reached Substantial Completion on 15 DBFM Social Infrastructure Projects, and 19 BF Social Infrastructure Projects. An additional 6 DBF Projects have progressed through the RFP transaction phase, successfully achieving Financial Close. These projects represent the reference sample used for this analysis.

In assessing the VFM for these previous projects, IO assumed that the Base Costs for both the Traditional and AFP delivery models were the same. For the Stage 1 assessment, these base costs would be consistent with those used for the Pre-RFP Budget estimates.

It is important to note that the Pre-RFP Budget estimate is developed by qualified cost consultants and estimators, based on the Reference Design. In many ways this is indicative of pricing of a project delivered traditionally where there is no deviation from the prescribed design.

A comparison of the Pre-RFP Budget estimates on these reference projects demonstrate there is a clear and consistent trend between the Pre-RFP Budget estimates, and the actual pricing under a competitive bid submission process.

Delivery Model	Number of	Average	Average Winning	Average of All	Average of Unsuccessful

	Projects	Pre-RFP Budget ($M)	Bid ($M)	Bids ($M)	Bids ($M)
DBFM	15	$1,013	$801	$916	$974
% Change from Pre-RFP Budget			-21%	-10%	-4%
DBF	6	$187	$172	$188	$196
% Change from Pre-RFP Budget			-8%	0.5%	5%
BF	19	$134	$128	$135	$139
% Change from Pre-RFP Budget			-4%	1%	3%

In comparing this data, the following trends emerge:

- For BF projects, the Pre-RFP Budget estimates reflect a very high level of accuracy to the bid data, ranging between -4% for the winning bid, and +3% for the average of the unsuccessful bids;
- For DBF projects, there is a greater difference of -8% between the Pre-RFP Budget estimates and the winning bids;
- For DBFM projects, there is a significant difference of -21% between the Pre-RFP Budget estimates and the winning bids; and
- For DBFM Projects, the Pre-RFP Budget estimates are much more reflective of the unsuccessful bid data, with a difference of -4% from the average.

The bid prices of the BF Projects are based on the sole Reference Design provided to the bid teams, which is similar to traditional delivery from a design innovation/efficiency perspective. The data confirms that there is a strong correlation between the Pre-RFP budget estimate based on the reference design and both successful and unsuccessful bid submissions under this model.

For the DBF and DBFM projects, the Reference Design is provided for guidance, and proof of concept only. As a result deviations from the Reference Design would be driven by achieving greater overall project value. Unsuccessful bids are generally those that have achieved limited innovation/efficiencies, and therefore more likely to remain comparable to the Reference Design.

These comparisons demonstrate that there remains a high level of accuracy for the Pre-RFP Budget estimates where the design solution remains consistent with the Reference Concept.

This result is important to establish that while the base costs used for the initial Pre-RFP budgeting process may be appropriate where there is limited ability to deviate or optimize the Reference Design, they do not appropriately reflect DBF and DBFM delivery models that allow for a higher level of innovation.

Winning Bid vs Unsuccessful Bids

Having established the relationship between the estimated Base Costs and the Unsuccessful Bid pricing, we can compare the Unsuccessful Bids pricing to those of the successful Winning Bids.

For each model, the AFP bid process has generally included at least three pre-qualified teams that have been deemed sufficiently experienced and capable of delivering the specific project, through an extensive Request for Qualifications (RFQ) evaluation. Through the AFP process, there is significant private sector engagement and interaction to ensure each bid is in compliance with the specified project requirements.

All successful and unsuccessful bids have generally been deemed compliant through the AFP evaluation and review process. These bids will all have included pricing for all aspects of these projects based on the selected delivery model, technical requirements, and project specific risk allocation.

In our view, the differences in costs between the winning bid and the unsuccessful bids can be attributed to the following:

	DBB	BF	DBF	DBFM
▶ Efficiencies in construction approach/schedule resulting from a competitive process	✓	✓	✓	✓
▶ Competitive advantage in pricing materials and labour	✓	✓	✓	✓
▶ Additional efficiencies in construction approach/schedule resulting from leverage of private financing solution		✓	✓	✓
▶ Difference in risk premium based on competitive tension		✓	✓	✓
▶ Innovations/efficiencies introduced through the design development process			✓	✓
▶ Development of a more efficient lifecycle/maintenance program				✓
▶ Difference in ability to reduce energy consumption through efficiencies over lifetime of asset.				✓

All of these differences fall within what can be considered innovation/efficiencies or competitive tension. As a result the variance between the Successful and Unsuccessful Bids can be used to measure their value and resulting savings to the project.

Delivery Model	Number of Projects	Average Winning Bid ($M)	Average of All Bids ($M)	Average of Unsuccessful Bids ($M)
DBFM	15	$801	$916	$974
% Change			-12.5%	-18%
DBF	6	$172	$188	$195
% Change			-8%	-12%
BF	19	$128	$135	$139
% Change			0.5%	-7%

In assessing the BF Projects, the following can be considered:

- The 7% difference between the winning and unsuccessful bids demonstrates limited opportunity for innovation, as a result of the model characteristics;
- Innovation in a BF project is likely attributable to the rigour associated with private lending and a standardized delivery model/document templates; and
- The BF model can be considered more reflective of a traditional approach with highly prescriptive requirements, where design is undertaken independently from the other core project delivery streams (construction, lifecycle, maintenance).

Given the limited opportunity for innovation, and overall model characteristics, the BF model can be considered the AFP model that is the closest comparison to the traditional Design-Bid-Build model. Therefore it is reasonable to project that the difference between winning and successful bids for DBB project delivery would be within a range of 0 to 7%.

As a result, there would be no recommended Innovation Factor applied to BF projects in their Value for Money Analysis. This is a conservative assumption that discounts the innovation contributions noted above.

In assessing DBF Projects, the following is noted:

- The 12% difference between the winning and unsuccessful bids clearly demonstrates the impact of innovation through the introduction of design integration in addition the benefits of private financing and the clearly defined procurement process and an enhanced level of competitive tension;
- This difference results in a net increase of 5% (from 7% to 12%) from the conservative benchmark based on the BF model; and
- This net increase can be primarily attributed to the less prescriptive, performance based standards, and a higher level of competitive tension through the integrated phases of the project.

Specifically, design development occurring as part of the competitive DBF process provides for the development of 3 separate design concepts actively seeking more cost effective solutions that meet the ultimate performance objectives of the owner.

Based on this data, an Innovation Factor adjustment between 5% and 12% would be recommended for projects using a DBF delivery model, with 5% representing a more conservative perspective.

In assessing DBFM Projects:

- The 18% difference between the winning and unsuccessful bids demonstrates a high level of innovation.
- This difference results in a net increase of 11% (from 7% to 18%) from the conservative benchmark based on the BF model.
- In addition to the factors noted for the DBF model, the integration of long-term maintenance provides a significantly broader opportunity to apply innovative approaches and methods.
- Given the long term responsibilities assigned to Project Co, there is further opportunity to make project requirements less prescriptive and more performance based.
- Requiring Project Co to share in energy costs during operation of the asset over the long term provides additional incentive to manage these costs and develop energy efficient solutions.

With Project Co assuming responsibility for the long term condition of the asset under the DBFM model, there is an opportunity to balance all costs to develop the most cost effective and efficient solution from a whole life perspective for the asset.

Based on this data, an Innovation Factor adjustment between 11% and 18% would be recommended for projects using a DBFM delivery model, with 11% representing a more conservative perspective.

Evidence of Innovation

In light of these clear data trends, we examined those DBFM projects with the highest level of quantified Innovation based on the approach used above.

A third of the DBFM projects (5 out of 15) yielded winning bid submissions with designs that resulted in an overall reduction in project area in comparison to the provided Reference Concept. The overall reduction in area is, on average, approximately 8% for these projects. This can be directly attributed to the ability to innovate through design refinement, providing a facility of reduced size that provided the same performance as defined in the output specifications. This reduced size would yield lower construction costs, shorter construction schedules, and lower operations and maintenance costs over the lifetime of the asset.

Similarly, 8 DBFM projects had winning bids with construction schedules of a shorter duration than what was initially planned for at the time of RFP release. The overall reduction in construction schedule is, on average, approximately 13% for these 8 projects. While it is more difficult to quantify the costs savings directly resulting from a reduced timeline, there would be anticipated savings relating to time-based general, indirect, and financing costs. Beyond these direct cost savings, there is a much more significant benefit to the public through earlier access to the new infrastructure and the associated services provided within. This is particularly important in locations where much needed services were not available or were previously outdated and inefficient.

For DBFM projects where the winning bid was more than 10% below the average unsuccessful bids, the following key factors have been identified in addition to the general attributes described in previous sections:

Project	Winning Bid ($M)	Savings From Unsuccessful Bids (Average)	Key Factors
OPP Modernization Project	550	-33%	▶ Bundled delivery of numerous sites led to economies of scale ▶ Used a template approach to ensure consistency from site to site. ▶ Design refinement through lessons learned on prototype sites
Bridgepoint Hospital	1,300	-29%	▶ Innovative approach to foundation design ▶ Minimized winter construction requirements through non-traditional sequencing approach ▶ 12 month reduction in Construction Schedule
Quinte Consolidated Courthouse	280	-27%	▶ 7 month reduction in Construction Schedule ▶ Energy efficient solution resulting in up to 30% savings in downstream energy costs ▶ Winning bid up to 16% smaller than competing bid.
St. Joseph's Health Care - West 5th Campus	1,210	-27%	▶ 3% reduction in project area ▶ Maintained natural site grading to develop smaller floor plate ▶ Re-organization of program space for more efficient building
Forensic Services & Coroner's Complex	1,120	-25%	▶ 2 month reduction in planned Construction Schedule ▶ Unique design based on international experience created more efficient use of space, minimizing operating and

			maintenance costs.
Guelph Data Centre (aka MGS New Data Centre)	650	-24%	▶ 30% reduction in project area ▶ 5 month reduction in Construction Schedule ▶ Use of 600V system resulting in removal of 12 transformers and associated switches
Centre for Addiction & Mental Health	550	-22%	▶ 9% reduction in project area ▶ 4 month reduction in Construction Schedule ▶ Included landscaped green roof to achieve required outdoor space and meet LEED standards ▶ Included vibration mitigation initiatives that reduced sound attenuation material costs
Thunder Bay Consolidated Courthouse	480	-21%	▶ 1.5% reduction in project area ▶ 3 month reduction in Construction Schedule
Toronto South Detention Centre	1,160	-18%	▶ Use of modern technologies to optimize energy consumption ▶ Construction scheduled reduced staging costs, and private financing costs through the achievement of interim milestones,
Waypoint Centre for Mental Health Care	620	-13%	▶ 2% reduction in project area ▶ Addition of a number of energy efficient solutions including use of geo-exchange heat pump.
South West Detention Centre	330	-13%	▶ 2 month reduction in Construction Schedule ▶ Relocated utility plant to roof, to create more efficient use of space

Case Studies

In order to confirm these findings we examined specific example projects to review and assess these factors that contributed to their overall level of innovation realized through AFP delivery.

Waypoint Mental Health Centre - Penetanguishene, Ontario

Waypoint Centre for Mental Health Care is a 312- bed psychiatric hospital that provides an extensive range of both acute and longer-term psychiatric inpatient and outpatient services. This facility is the province's first maximum secure forensic hospital for clients served by both the mental health and justice systems.

The successful proponent introduced a number of key innovations through its winning design solution, which significantly improved a number of design features contained in the illustrative design. These improvements reduced the cut/fill requirements, improved the site layout, access to amenities, and the overall building footprint resulting in enhanced security, and reduced walk distances for patients and staff.

Given the remote location, harsh winters, and limited labour availability, the constructor emphasised the use of pre-cast steel elements and pre-fabricated exterior walls to advance installation on site resolving a number of costly logistical issues.

Specific benefits introduced included the achievement of LEED Gold certification over the Silver level specified at no additional cost, and significant energy efficiencies through the installation of a geo-thermal exchange heat pump and water conservation measures. The design solution also maximized the use of natural light through the use of extensive glazing.

This project was completed on-time and $80M below the established budget.

The St. Joseph's Health Care London's Specialized Mental Health Care and Forensic Mental Health Care

The St. Joseph's Health Care London's Specialized Mental Health Care and Forensic Mental Health Care projects include the construction of two new buildings in London and St. Thomas totalling 650,000 square feet of new space.

This project included two separate sites bundled together to leverage economies of scale, geographic proximity, and comparable scope requirements. The successful proponent developed a construction schedule where the sites were constructed consecutively, instead of concurrently. This approach better allowed the constructor to manage its labour resources, facilitated coordination of activities, and allowed for the application of lessons learned from the St. Thomas site to be incorporated into the London facility. This approach also allowed for Early Occupancy of the St. Thomas site, with the associated payment accelerating debt payment and reducing the overall project financing costs.

The proposed design solution was able to achieve LEED Gold certification as a Preferred Innovation. The successful proponent was able to implement a number of mechanical and electrical efficiencies that offset the costs associated with the additional LEED requirements. Overall, the London site was more compact and had a number of aesthetic and layout improvements, including the use of courtyards, to better allow the facility to integrate with its downtown location. This solution yielded a more efficient use of space that was considered programmatically and clinically

superior to the illustrative design provided.

This project was completed on-time and within the established budget.

Forensic Services & Coroner's Complex

This complex brings together the Office of the Chief Coroner, the Ontario Forensic Pathology Service and the Centre of Forensic Sciences on one site making collaboration between the units much easier. Housing the two operations on one site helped the government realise efficiencies during construction and through shared services during operations.

Given the unique nature of this facility, there was limited local expertise relating to the facility functionality and design requirements. The successful proponent included a design team with highly specialized global expertise relating to this type of facility. The resulting design solution significantly changed the internal layout and functionality. These changes allowed for significant improvements and efficiencies in the use of space, improved security and safety of the facility, and dramatically reduced the long-term operating and maintenance costs.

Specific benefits included a reduction in the size of mechanical and ventilation systems as a result of grouping like occupancies together into hubs, keeping all high hazard areas and specialized systems in isolated zones instead of spread out as considered in the reference design.

This project was completed 2 months ahead of the planned schedule and 27% below the established budget.

External Perspectives

There is significant external support for the concept of innovation through AFP/P3 project delivery resulting in direct cost savings.

Market Impressions

An anonymous survey of 22 key participants involved in both AFP and traditional project delivery of Social Infrastructure projects was undertaken to assess the extent of innovation encouraged and its impact on pricing and project costs. These participants included executive and senior members of companies actively involved in the following capacities:

- Developers
- Construction Contractors
- Asset Management and Maintenance Providers
- Cost Consultants, Commercial, Financial and Technical Advisors

The following questions were included as part of the survey:

1. How would you compare the bid process between AFP projects and comparable projects delivered through a traditional Design-Bid-Build approach?
    a. Bid Costs (significantly lower --- significantly higher)
    b. Time Commitment (significantly lower --- significantly higher)

c. Technical Design Development (significantly lower --- significantly higher)

2. Do you believe the additional involvement in the AFP delivery model allows for increased opportunity for optimizing the proposed solution through innovation/efficiencies?
3. Do you believe the AFP delivery model allows for an increased level of competitive tension as a result of the experience and expertise of the participants?
4. When you assess your involvement, and potential partners to pursue a specific project, which of the following key drivers influence your decision?
    a. Applicable global experience and expertise
    b. Applicable local experience and expertise
    c. Familiarity with public owner/project agreement
    d. Anticipated level of opportunity/flexibility to optimize design solution
5. On AFP projects that you have been involved with, to the best of your knowledge which of the following key drivers had the greatest impact on the development of the successful bid?
    a. Incorporation of new technologies
    b. Optimization/reduction of project size/material requirements
    c. Optimization/reduction of construction schedule
    d. Optimization/reduction of lifecycle program
    e. Optimization/reduction of Operations & Maintenance program
    f. Optimization/reduction of financing costs
6. To what extent would you estimate the anticipated savings on a project due to the enhanced level of competition associated with an AFP procurement process?
7. To what extent would you estimate the anticipated savings on a project due to innovation/efficiencies through a Design-Build-Finance-Maintain (DBFM) AFP delivery in comparison to a traditional Design-Bid-Build (DBB) delivery model?
8. To what extent would you estimate the anticipated savings on a project due to innovation/efficiencies through a Design-Build-Finance (DBF) AFP delivery in comparison to a traditional Design-Bid-Build (DBB) delivery model?

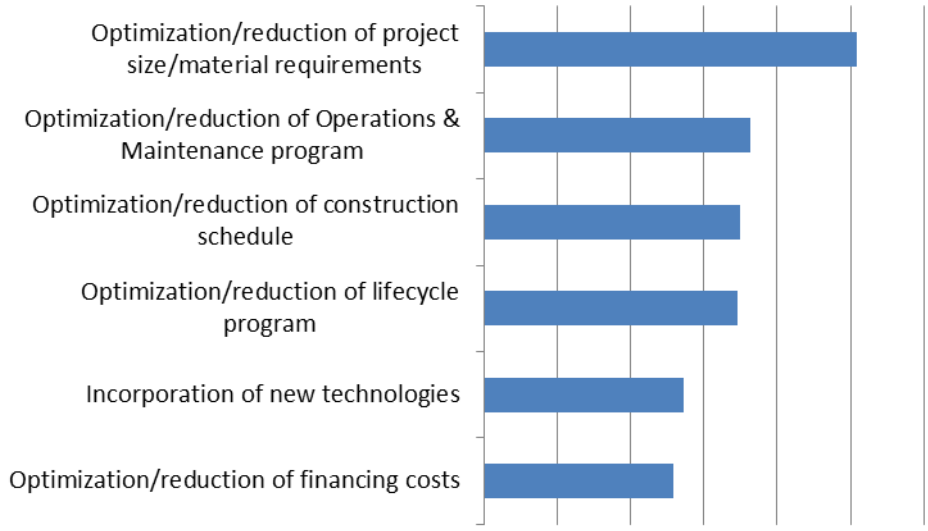
Overall, the responses to this survey were consistent with a number of points already noted, further validating our own analysis quantifying the level of innovation in each delivery model.

Based on the responses received, the following trends were established:

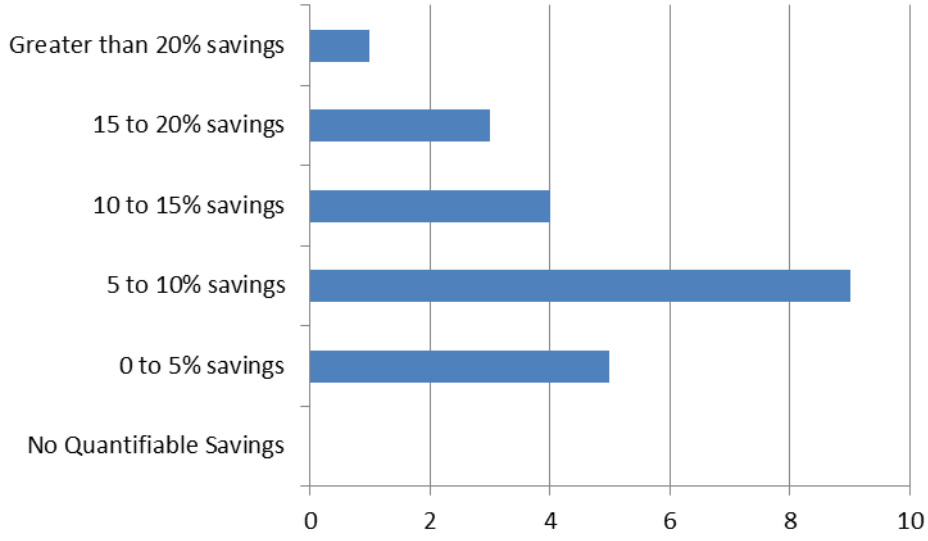
- **95%** of respondents considered AFP to allow for an increased level of competitive tension as a result of the experience and expertise of the participants.
- **91%** of respondents consider AFP to allow for increased opportunity for optimizing the project through innovation and efficiencies.

In considering their involvement in an AFP project, a balance of both global and local experience and expertise were frequently cited as key primary factors which influenced their partnering and pursuit decisions. Other factors given consideration included the anticipated opportunity to optimize the design solution, along with familiarity with the public owner and its project agreement/document templates.

On specific AFP projects that respondents had been involved with, the following key drivers were ranked by perceived impact on the development of the successful bid.

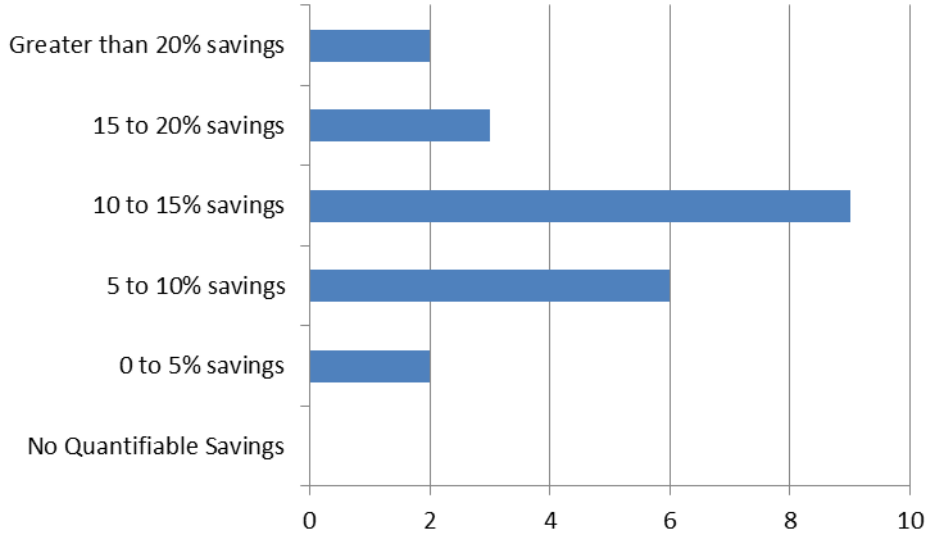


When asked to quantify the anticipated savings on a project due to the enhanced level of competition associated with AFP project delivery, **77.3**% of respondents estimated savings of at least 5% with a weighted average of **9%** from all responses**.**

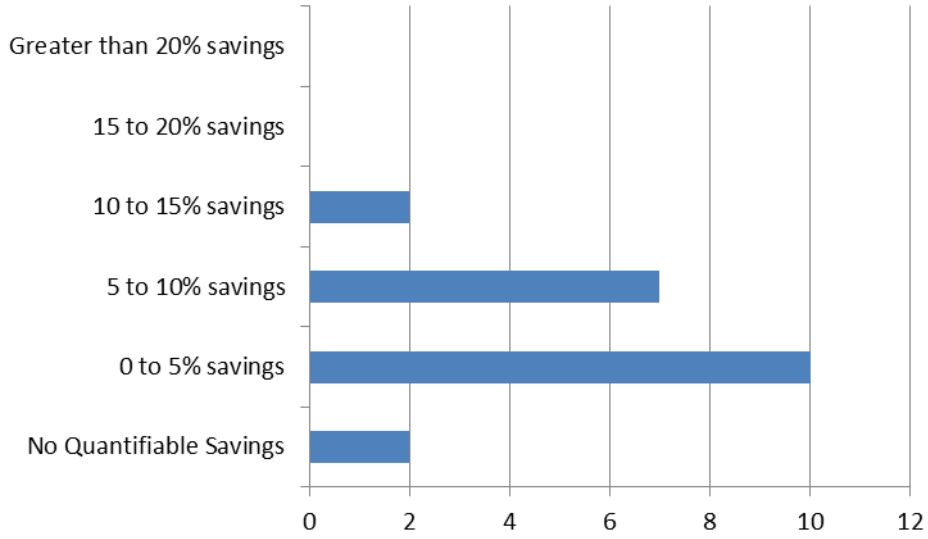


When asked to quantify the anticipated savings on a project due to innovations/efficiencies through a DBFM AFP project delivery in comparison to a traditional DBB model, 64% of

respondents estimated savings of at least 10%, with a weighted average of **11.1%** from all responses.



When asked to quantify the anticipated savings on a project due to innovations/efficiencies through a DBF AFP project delivery in comparison to a traditional DBB model, 48% of respondents estimated between 0 and 5% savings, with an additional 43% estimating savings of greater than 5%, with a weighted average of **4.5%** from all responses.



When the anticipated savings on a project due to the enhanced level of competition associated with AFP project delivery are combined with the anticipated savings on a project due to innovations/efficiencies for ach delivery model, the following ranges are projected:

Anticipated Savings Factor	DBF	DBFM
Enhanced level of competition through AFP	9.0%	9.0%

delivery		
Innovations/Efficiencies	4.5%	11.1%
Total	13.5%	20.1%

In order to ensure the benefits attributed to the enhanced level of competition and those attributed to Innovations/Efficiencies were not to some extent factored into both responses, we would consider the total benefits to be within the following ranges:

- **DBF – 4.5% to 13.5%**
- **DBFM – 11.1% to 20.1%**

These estimated savings are very closely aligned with the quantified differences between the winning and unsuccessful bid data for both the DBF model (5% to 12%) and the DBFM model (11% to 18%).

Literature Review

The majority of studies and reports focused on the performance of the AFP/PPP model have focused on the overall savings and benefits of the PPP model. While innovation and efficiency are often cited as key factors, from a quantification perspective they are typically combined with risk allocation and contractor performance as overall benefits and drivers of Value For Money.

The following studies have addressed the issue of innovation as it relates to the AFP/PPP model:

Evolutionary to Revolutionary: Understanding Innovation in Infrastructure Projects through Public Private Partnerships - Michael Himmel (2015)

Relevant Findings:

- "Overall, this research suggests that innovation does occur in IO's AFP process, and PPPs more generally. This innovation is fuelled by competition and incentives, and a structure that facilitates collaboration between the private-sector firms delivering projects."
- There is a 24% increase in average savings with the DBFM model compared to the BF model: "Therefore, it is likely that some of the 24% difference in average savings between Build-Finance and Design-Build-Finance-Maintain projects can be attributed to innovation."

Performance of PPPs and Traditional Procurement in Australia - The Allen Consulting Group (2007)

Relevant Findings:

- "the benefits of innovation from the PPP procurement model could conceivably also be applied to Traditional procurement models. However, there will be limits to this transfer of benefits, as it is the unique combination of incentives and constraints surrounding a PPP consortium that drives the full value contribution of the approach."
- PPPs demonstrate clearly superior cost efficiency over Traditional procurement, which can range from 30.8 percent when measured from project inception, to 11.4 percent when measured from contractual commitment to the final outcome.

Jurisidictional Comparisons

The AFP or PPP market in Canada has grown significantly in recent years, with a number of public sector owners/agencies undertaking delivery of significant infrastructure through a non-traditional approach.

Infrastructure Ontario has been at the forefront of this growth, with the largest portfolio of projects in Canada. Similarly a number of other provincial and federal agencies have participated in AFP/PPP projects in either a project delivery or advisory role, including;

- Partnerships BC
- Infrastructure Alberta
- Sask Builds

Each of these agencies undertakes or suggests the use of a Value for Money Assessment similar to the one developed by Infrastructure Ontario, through the comparison of a Shadow Bid to a Public Sector Comparator.

Similar to the revised approach followed by IO, all of the other P3 agencies in Canada allow for some sort of adjustment to recognize the qualitatively recognized innovations/efficiencies associated with the P3 model.

The following summarizes each agencies position on Innovation/efficiencies and its treatment in their VfM methodology.

Partnerships BC (PBC)

PBC states their views on innovation and efficiencies in P3s as follows[2]:

- PPP procurement encourages innovation through the development of performance-based output specifications drawn from the requirements of program service objectives, rather than being based on detailed, highly specified design. The added flexibility provided by this approach, in addition to the competitive nature of the bidding process and financial incentive, encourages PPP partners to develop innovative solutions in all aspects of a project, from design and engineering through to decommissioning.
- Efficiencies in the construction phase are the product of competitively bid design and construction approaches that can result in a lower cost than the estimated base cost.
- Efficiencies may be included to adjust the Shadow Bid as competition and innovation from the private sector can result in lower construction costs under PPP procurement;

PBC has provided the following guidelines on how to incorporate these innovations/efficiencies into its VfM assessment:

- Requires that estimated efficiencies are reasonably precise in order to have validity;
- Need to ensure that there is no double-counting of risk that would be addressed in the risk transfer analysis;
- Efficiency estimates should be expressed as a range rather than as a single point estimate;
- Estimated efficiencies should be determined based on specific capital components of a project, rather than being applied globally to the entire capital cost;

[2] Methodology for Quantitative Procurement Options Analysis Discussion Paper, Partnerships British Columbia – Updated April 2014

- Consideration of whether the particular PPP model chosen for the Shadow Bid would support such efficiencies;
- Potential efficiencies should be estimated at the same time and by the same people as a means of avoiding duplication; and
- Includes potential for 'negative efficiencies' of P3 model

Infrastructure Alberta

Infrastructure Alberta considers innovation/efficiencies in P3s as follows[3]:

- P3 projects benefit from an integrated design process to optimize lifecycle costs within a price-based competitive process. The efficiencies (construction and lifecycle) gained through this integrated process provide value for the P3 procurement. When significant value is assumed, sensitivity analysis around these inputs may be required.
- P3 projects can also benefit from integrated construction methods that shorten the construction period. When significant value is generated from a shortened construction period (e.g. through reduced construction escalation or user benefits) it may be appropriate to test the impact of changing these inputs

A part of its Shadow Bid development, it specifically identifies opportunities where the P3 model may result in achieving:

- cost savings
- improved efficiency
- improved quality of service
- impact on the timeline for implementation
- innovations

It suggests the following method of estimating these elements:

- Private Sector Efficiencies - Review of bids of similar past P3 projects, consultation with industry.
- Construction Period and Operating Period Timelines - Review of past similar projects procured traditionally or as P3s.

Infrastructure Alberta advocates the use of sensitivity testing for its VfM assessment:

- Provide an initial sensitivity analysis identifying the key assumptions that are significant enough to change the value for money estimate.
- Given that the business case is developed early in the project timeline, the accompanying sensitivity analysis should be revisited from time to time as the project evolves through the procurement process to determine if certain inputs and their related uncertainties have changed. Where changes are deemed material, the sensitivity analysis may require revisiting.
- A sensitivity analysis should be undertaken to separate those inputs where the uncertainty is critical to the VFM estimate (and therefore critical to the decision making process) from those where the uncertainty is less important.

SaskBuilds

SaskBuilds considers innovation/efficiencies in P3s as follows[4]:

[3] Alberta's Public-Private Partnership Framework and Guideline, Alberta Treasury Board – March 2011

[4] SaskBuilds Public-Private Partnership Project Assessment and Procurement Guideline, May 2014

- Innovation can often be generated through a competitive process and the integration of design, construction, finance and operation/maintenance in a P3 model, which translates into efficiencies and savings.
- Private companies that are responsible for overruns have a greater incentive to innovate at every stage: through design, financing, construction methodology, and in maintenance and operations if included. That innovation accounts for a good part of the overall savings and value to government and results in better products and services.

Its approach to including these efficiencies/innovations is consistent with both PBC and Infrastructure Alberta:

- A conservative approach should be taken to including efficiencies. If efficiencies cannot be demonstrated by reliable data or are otherwise uncertain, it is best practice to exclude them from the analysis.
- If efficiencies are included, sensitivity testing should be performed to ensure that VFM will not drop or become negative if the efficiencies are not realized.

The majority of other agencies, ministries, or municipalities that have delivered a project using a P3 model in Canada have also used a VFM assessment based on the methodologies described by one or more of those noted above, including IO.

Conclusions

Based on our extensive experience and involvement with both AFP/P3 and comparable traditionally delivered social infrastructure projects, Altus believes there is a significant tangible benefit achieved through the rigour, due diligence, competitive tension associated with the AFP delivery approach which leads to the ability to achieve innovative solutions.

Through our extensive market survey and jurisdictional reviews, there is clearly a widely recognized view of both public and private sectors that the AFP/P3 delivery model does in fact encourage real innovation/efficiencies that translate into real costs savings of a project.

With the continued maturity of the AFP/P3 market in Canada, there is also now sufficient data available to assess and quantify an expected range of cost savings attributable to the AFP model that should be considered in a Value for Money Assessment.

The analysis and assessment outlined above, further support these conclusions relating to the impact of innovation, efficiencies, and competitive tension on AFP project delivery. Based on our analysis we recommend the following:

- The Pre-RFP budget estimates are appropriate for establishing the initial base costs for traditional DBB and the AFP BF delivery models.
- An Innovation adjustment factor of at least 5%, and up to 12%, is suitable for a project delivered through a DBF delivery model.
- An Innovation adjustment factor of at least 11%, and up to 18%, is suitable for a project delivered through a DBFM delivery model.