HIGH-LEVEL TECHNOLOGY

GUIDANCE NOTE ON PROCUREMENT

JUNE 2018

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ABOUT THIS PUBLICATION

In April 2017, the Asian Development Bank (ADB) approved its new procurement framework, the ADB Procurement Policy: Goods, Works, Nonconsulting and Consulting Services (2017, as amended from time to time); and the Procurement Regulations for ADB Borrowers: Goods, Works, Nonconsulting and Consulting Services (2017, as amended from time to time). These replace the former Guidelines on the Use of Consultants (2013, as amended from time to time) and Procurement Guidelines (2015, as amended from time to time). The procurement policy and the procurement regulations address the procurement activities of project executing agencies and implementing agencies on projects financed in whole or in part by a loan or grant from ADB, or by ADB-administered funds. ADB designed the 2017 procurement policy to deliver significant benefits and flexibility throughout the project procurement cycle, as well as to improve project delivery through a renewed focus on the concepts of quality, value for money (VFM), and fitness for purpose.

This note is part of a series of guidance notes published by ADB in 2018 to accompany the 2017 procurement policy and the procurement regulations. Each note discusses a topical issue for borrowers (including grant recipients), bidders, and civil society under the new framework (see list below). The guidance notes cross-reference each other frequently and should be read in conjunction. All references to “guidance notes” pertain to these notes. The notes may be updated, replaced, or withdrawn from time to time.

List of Guidance Notes for the 2017 ADB Procurement Policy and the Procurement Regulations

1. Value for Money
 2. Procurement Risk Framework
 3. Strategic Procurement Planning
 4. Procurement Review
 5. Alternative Procurement Arrangements
 6. Open Competitive Bidding
 7. Price Adjustment
 8. Abnormally Low Bids
 9. Domestic Preference
 10. Prequalification
 11. Subcontracting
 12. Consulting Services Administered by ADB Borrowers
 13. Nonconsulting Services Administered by ADB Borrowers
 14. High-Level Technology
 15. Quality
 16. Bidding-Related Complaints
 17. Noncompliance in Procurement
 18. Standstill Period
 19. State-Owned Enterprises
 20. E-Procurement
 21. Framework Agreements for Consulting Services
 22. Public-Private Partnerships
 23. Contract Management
 24. Fragile, Conflict-Affected, and Emergency Situations
-

ADB procurement reforms intend to ensure VFM by improving flexibility, quality, and efficiency throughout the procurement cycle (see illustration below and the *Guidance Note on Value for Money*). VFM is part of a holistic procurement structure with three support pillars: efficiency, quality, and flexibility. The two key principles of transparency and fairness weave across all elements of the structure.

Time

Time is an important element of VFM. When a project is delivered promptly or when a process is completed rapidly, greater value is created for all stakeholders. For example, a road project completed early provides economic benefit, security, or other value to the community it serves. It increases the return on investment to the executing agency and accelerates the project and payment cycle to the successful bidder. Likewise, a project delivered late loses significant value.

When considering VFM in the context of procurement, pay attention to anything that (i) shortens the procurement cycle time frame or (ii) accelerates delivery of the development project.

Objective

This guidance note is intended to assist readers by elaborating on and explaining ADB's 2017 procurement policy and procurement regulations for borrowers (including grant recipients).

This note identifies additional information for the reader to consider when applying ADB's procurement policy and procurement regulations to their circumstances.

Living Document

This guidance note is intended to be a living document and will be revised as required.

Be sure to check the ADB Business Center website for the latest version and updates, <https://www.adb.org/business/main>.

The Reader

In many circumstances, readers are expected to use this guidance note in a manner unique to their needs. For consistency throughout the suite of guidance notes, the following assumption is made about the reader:

The reader is a professional involved in activities financed in whole or in part by an ADB loan or grant, or by ADB-administered funds.

FAQs

Frequently asked questions, clarifications, examples, additional information, links to training, and other useful resources will be made available on the ADB website.

Be sure to check the ADB Business Center website for more information, <https://www.adb.org/business/main>.

Legal and Order of Priority

This guidance note explains and elaborates on the provisions of the Procurement Regulations for ADB Borrowers: Goods, Works, Nonconsulting and Consulting Services (2017, as amended from time to time) applicable to executing (and implementing) agencies under sovereign (including subsovereign) projects financed in whole or in part by an investment loan from ADB (i.e., excluding ADB results- or policy-based loans), ADB-financed grant (excluding ADB-administered technical assistance and staff consultancies), or by ADB-administered funds.

In the event of any discrepancy between this guidance note and the procurement regulations, the latter will prevail. The financing agreement governs the legal relationships between the borrower and ADB. The rights and obligations between the borrower and the provider of goods, works, or services are governed by the specific procurement document issued by the borrower and by the contract signed between the borrower and the provider, and not by this guidance note.

ABBREVIATIONS

ADB	—	Asian Development Bank
DBB	—	design–bid–build
DBF	—	design–build–finance
DBOFM	—	design–build–operate–finance–maintain
DMC	—	developing member country
HLT	—	high-level technology
NPV	—	net present value
PPP	—	public–private partnership
TCO	—	total cost of ownership
VFM	—	value for money

EXECUTIVE SUMMARY

ADB promotes attention to and support for high-level technology (HLT) and innovative solutions in its investment lending and technical assistance. The goal is to facilitate the adoption of HLT by ADB's developing member countries (DMCs).

Technology pervades the modern world and ADB's operations in one way or another, and HLT presents its own opportunities and risks. Innovation normally starts with a problem and involves the accumulation of scientific knowledge, research, or adaptation of existing technologies, amending and combining them in different ways and finding new applications. Diverse stakeholders are involved and resulting new technologies can either be demand-led or supply-driven.

In this process, DMCs are not left out of innovation. While much HLT has originated in high-income countries and has been adopted and adapted for lower-income countries, some innovations happened specifically to address the needs of lower-income countries. Ultimately, all ADB-financed or supported projects in all DMCs can incorporate HLT.

ADB's HLT Fund prioritizes HLT in four sectors—energy, transport, urban development, and water—and across its thematic areas of (i) climate change and adaptation, (ii) disaster risk management, (iii) renewable energy, (iv) energy systems planning, (v) emission reduction, (vi) road efficiency and safety, (vii) monitoring and data management, (viii) analytical tools, (ix) earth observation, (x) wastewater and waste treatment, (xi) drainage, and (xii) water quality. HLT can be incorporated into ADB operations in several ways:

- the acquisition of equipment and goods that employ HLT that is new globally, in ADB operations, or to an ADB DMC;
- construction or civil works based on specifications that require contractors to meet enhanced performance standards and/or employ HLT in the construction process, materials, and other inputs; and
- consulting services that require specific knowledge and expertise in the use of HLT in different phases of the innovation cycle, as well as different sectors and applications.

Exactly what is supported depends on the project goals, how well HLT meets user needs, the alternatives and options for meeting such needs, and whether HLT can be justified based on VFM analysis, including assessment of the best delivery and procurement option. ADB's core procurement principles and processes apply to HLT with emphasis on VFM.

Carrying out VFM analysis is essential to determine whether to adopt HLT and innovative solutions, based on costs and benefits. VFM can be a useful analytical tool in the following circumstances: (i) where there is little precedence for establishing the economic nature of the investment; (ii) where HLT is costly and complicated; or (iii) in determining whether HLT generates greater benefits than the status quo. VFM analysis enables decision makers to reach the best decisions possible, accounting for all relevant factors.

Contracting for HLT consulting services follows ADB's usual policies and practices. There is no substantive difference when dealing with HLT. However, contracting for services with HLT dimensions will require particular attention to specific needs and experience, to cost estimation, and to the selection criteria, including evaluating design-build options.

This guidance note is provided to assist country teams, executing agencies, and other ADB partners on how to integrate HLT and innovative solutions, and their related procurement dimensions, into ADB-supported operations. The focus is on capturing both costs and benefits in the analysis of options based on the overriding consideration of VFM, in accordance with ADB's principle-based procurement policy. The examples provided in this guidance note demonstrate a range of ways to do this. Readers are enjoined to reference other guidance notes, namely the *Guidance Notes on (i) Open Competitive Bidding, (ii) Value for Money, (iii) Consulting Services Administered by ADB Borrowers, and (iv) Public-Private Partnerships*. Such guidance will need to be complemented with grounded professional judgment. Specific information on information technology procurement can be found in the appendixes of the *Guidance Note on Strategic Procurement Planning*.

I. Introduction

A. Purpose

1.1 The Asian Development Bank (ADB) promotes attention to and support for high-level technology (HLT) and innovative solutions in its investment lending, grants, and technical assistance. The goal is to facilitate HLT adoption by ADB's developing member countries (DMCs), to accelerate the realization of their development objectives by improving quality and reliability, increasing efficiency, reducing costs, and/or promoting expansion of their public services. A donor-funded trust fund within ADB, the "High-Level Technology Fund," is facilitating these efforts.¹

1.2 The purpose of this guidance note is to provide ADB borrowers (including grant recipients), executing agencies, staff, consultants, and other interested parties with guidance on how to address the opportunities and challenges presented when procuring HLT. It cites several examples on how agencies have procured HLT through the analysis of value for money (VFM) and procurement approaches.² The use of HLT arrangements may apply across the ADB procurement cycle, described in the Figure. Specific information on information technology procurement in the context of HLT can be found in the appendixes of the *Guidance Note on Strategic Procurement Planning*.

1.3 Defining HLT is rather difficult and clearly relates to the context and the environment in which a given technology is considered. In establishing its HLT Fund, ADB decided that, to be supported by the fund, HLT and innovative solutions need to have at least one of the following characteristics:

- (i) improves efficiency, productivity, quality, functionality, and/or access to service delivery;
- (ii) addresses climate change mitigation and/or adaptation, including resilience to disaster risks;

¹ ADB. 2017. *High-Level Technology Fund Establishment*. Manila.

² The examples in this guidance note mostly cite experiences from Canada. While many other countries routinely carry out VFM assessments, especially those considering public-private partnerships, Canada requires that a VFM assessment, including the base public sector case, be carried out by an external, independent party. These assessments are made public. As a result, there is considerable information available on the overall approach, HLT choices, how qualitative factors are taken into account, the details of the cost-benefit analysis, and final recommendations.

Figure: The ADB Procurement Cycle

Source: Asian Development Bank.

- (iii) introduces innovation in processes, methods, techniques, and the use of new or improved equipment and materials in construction, operations, and maintenance;
- (iv) reduces environmental and social costs;
- (v) reduces total cost of ownership, increases durability, and improves long-term performance;
- (vi) enhances the scaling up of HLT and market opportunities for scale-up; and
- (vii) promotes synergies and increases scale and impact through cross-sector collaboration.

II. The Innovation Cycle

2.1 Innovation normally starts with a problem. It involves the accumulation of scientific knowledge, research, or adaptation of existing technologies, amending and combining them in different ways and finding new applications. Diverse stakeholders are involved. Technologies that result can be demand-led, i.e., they respond to an expressed desire from the general public or particular groups. There may be catalytic events, e.g., climate change, that alter the perception of what needs to be done. New technologies can also be supply-driven, meaning that someone creates a need through innovation, e.g., mobile telephones, that can be popularized and find new applications. The internet, and all it contains, is an excellent example of this. It started as a way for research institutions to share research data, and now pervades most aspects of modern life.

2.2 DMCs are not left out of innovation. While much HLT has originated in high-income countries, and has been adopted and adapted for lower-income countries, some innovations have come about specifically to address the needs of lower-income countries, such as drought resistant crops, microcredit and banking, or treatments for endemic diseases. In the notable case of mobile telephones, lower-income countries were able to “leapfrog” technologies by adopting mobile networks and skipping investment in conventional landlines. Renewable energy is another example of where DMCs can avoid investing in carbon-based energy.

2.3 Table 1 shows that getting innovations to market follows a cycle that begins with knowledge accumulation and development of prototypes. These are tested or piloted in real operating environments, followed by demonstration projects that build up evidence of what HLT can actually do and what it costs. Depending on the regulatory environment, the technology may need to pass safety, health, and other regulations before being widely accessible. HLT characteristics and functionality may also be protected from unauthorized users via intellectual property rights. Once launched, technologies become known, penetrate markets, and generate benefits for users and profits for suppliers. Like any other product, not all HLT will be a commercial success. Finally, as the technology matures, the cycle starts over, with users and inventors seeking solutions to solve new problems.

Table 1: Stages of Innovation

The Innovation Cycle					
Stakeholders	Generation			Commercialization	
	Research	Development	Pre-Commercialization	Introduction	Adoption
<ul style="list-style-type: none">• Universities• Research centers• In-house or corporate laboratories• HLT suppliers• Individual inventors or scientists• Specialized consultants or engineers• Users or executing agencies• Peer agencies• Regulatory bodies• Investors or financiers	<ul style="list-style-type: none">• Observation• Investigation• Discovery• Peer review• Failure analysis	<ul style="list-style-type: none">• Prototypes• Predictions• Laboratory testing and performance• Feasibility or cost-benefit assessments• Validation of data and predictions• Failure analysis	<ul style="list-style-type: none">• Pilots and trials in “live” operating environments, diverse conditions, differing severity• Analysis of results versus expectations• Fine-tuning or further development• Validation or empirical proof that the technology works• Copyright or intellectual property protection• Safety, licensing, regulation, and compliance	<ul style="list-style-type: none">• HLT launch• Documentation of quality, test results, performance• Identification of windows of opportunity• Engagement with early adopters• Demonstration projects• Compatibility or systems integration• Dissemination of results• Knowledge sharing	<ul style="list-style-type: none">• Marketing• Diffusion or opportunities for dialogue• User readiness• Migration strategy• Substitution of legacy technology• Overturning of dominant model or new technology becomes dominant• Markets adjust to dominant design• Internal user alignment and accommodation
<ul style="list-style-type: none">• User-driven or demand-led innovation• Modification to solve particular problems, adapt to local conditions or circumstances• Reconfiguration• Another round of organization and adaptation					

HLT = high-level technology.

Source: Asian Development Bank.

III. High-Level Technology in ADB Operations

3.1 All ADB-supported projects in all DMCs can incorporate HLT. Equally, HLT can be supported under all forms of ADB investment financing. Operations can involve a broad range of technologies and innovative solutions.

3.2 ADB's HLT Fund prioritizes HLT in four sectors—energy, transport, urban development, and water—and across its thematic areas of (i) climate change and adaptation, (ii) disaster risk management, (iii) renewable energy, (iv) energy systems planning, (v) emission reduction, (vi) road efficiency and safety, (vii) monitoring and data management, (viii) analytical tools, (ix) earth observation, (x) wastewater and waste treatment, (xi) drainage, and (xii) water quality. Other sectors, such as health, gender equality, and governance, are eligible, albeit not priorities for HLT as of 2018.³ To help plan and set priorities, a list of indicative projects and technical assistance with HLT component is prepared quarterly.⁴

3.3 HLT can be incorporated into ADB operations in several ways. The HLT dimension can be at the level of an outcome, output, or activity, depending on the project. Such component could include:

- (i) The acquisition of equipment and goods that employ HLT that is new globally, in ADB operations, or to an ADB DMC, and that can be introduced or scaled up. Such equipment may embed advanced automated systems and applications, or it may deliver greater VFM through advanced technology, materials, or engineering. Selection requires close collaboration with experts in design and systems, mechanical engineers, and other specialized consultants.
- (ii) Construction or civil works based on specifications that require contractors to meet enhanced performance standards and/or employ HLT in the construction process, materials, and other inputs. Contractors may find different ways to respond, for example, by using safer equipment, more resilient materials, processes that pollute less or consume less energy, and/or provide better quality. This serves as a demand pull for contractors to upgrade their use of HLT.

³ It is expected that priorities in other sectors will be identified and added over time.

⁴ This indicative list of investment projects and technical assistance is primarily for allocation of funding by ADB's HLT Fund, but it need not be exclusionary, meaning that operations not on that list may still be considered and processed without support from the HLT Fund.

- (iii) Consulting services that require specific knowledge and expertise in the use of HLT in different phases of the innovation cycle, as well as different sectors and applications. These experts and advisors can carry out feasibility studies, detailed design, knowledge transfer, and give policy advice and conduct pilot and demonstration activities. Among other things, specialized HLT consultants will often possess in-house capacity (hardware, software, skilled scientists, analysts, and engineers) to undertake design, data collection, testing, modeling, and analysis.

3.4 ADB's support for HLT and innovative solutions comes into effect once the technology has moved beyond the research and development phase (Table 1).⁵ In the pre-commercialization stage, operations can finance pilots to generate evidence on what HLT can do in different contexts. This is critical in DMCs where the operating environment and readiness to employ HLT may be vastly different from that of the country in which the HLT was developed and adopted. At times, its adoption will be contingent on an environment's ability to maintain and support it.

3.5 Once proven to be feasible, operations can support efforts to demonstrate, introduce, and encourage borrowers to adopt HLT. Operations can also help borrowers adapt HLT to meet specific needs. The intention to adopt HLT should be highlighted during the project concept stage in project concept papers and at the project approval stage in ADB's report and recommendation of the President. It should be emphasized that VFM will be used in the procurement process to evaluate the application of HLT or the selection of consultants.

3.6 Exactly what is supported depends on the project goals—how well HLT meets user needs, the alternatives and options for meeting those needs, and whether or not HLT can be justified based on VFM, including assessment of the best delivery and procurement option. A critical factor to the success of HLT implementation is the ownership and support of the HLT or project by the relevant government.

3.7 ADB's support can be in the form of investment lending, grants from ADB's HLT Fund, grants from other funds, or a combination of these. Resources from grant funds are useful for pilot and demonstration activities. Investment lending would likely be more prominent in the adoption and adaptation phase of the innovation cycle. These sources of financing are synergistic and can support integrated actions.

⁵ Lenders tend not to support research and development, as that debt may not be the best way to finance basic research and it is difficult to gauge the likely outcomes, establish contractual terms, and justify the investment. Lenders focus on pre-commercialization, adoption, and adaptation stages of the innovation cycle.

3.8 ADB engagement on HLT starts at an early stage of project selection and design, continuing through the project and procurement cycles. User needs and how to meet those needs—identified early in the project cycle—will set the direction and may even determine the HLT and innovative solutions to be adopted. These choices may be shaped by new performance standards and requirements, e.g., related to environmental stewardship.

3.9 Early engagement to scope out potential HLT is particularly relevant for projects that deal with piloting and demonstration. Identification of HLT opportunities requires upstream engagement and knowledge sharing with technology providers and DMCs. Consultation with technology providers at the early stages of a project is encouraged to become informed about the technology options and the nature of the supply market. These activities are candidates for the HLT Fund, which can finance preconcept, prefeasibility activities, master plans, and technology road maps.

IV. Procurement Strategies for High-Level Technology

4.1 ADB's core procurement principles and processes apply to HLT with emphasis on VFM. VFM analysis is undertaken in the early stage of identifying HLT and its delivery and procurement options, and then again downstream in the actual procurement process.

4.2 The appropriate strategy to procure HLT and innovative solutions depends on (i) the project's goals, (ii) the stage of the innovation cycle, (iii) the extent to which there is more than one feasible HLT or innovative solution, (iv) whether or not that solution is protected by intellectual property rights, (v) the availability of reliable information, and (vi) market sounding and intelligence.

4.3 Table 2 lists a range of procurement strategies, and selection and contracting approaches applicable to HLT procurement at the various stages of the innovation life cycle. Opportunities for open competitive bidding are likely to be limited, with bidding geared toward identifying qualified suppliers that have access and experience to deal with HLT. It is possible that a market analysis or prequalification exercise reveals that the required technology is proprietary and/or only available from a single source. In this case, consideration could be given to developing an outcomes-based specification and conducting a two-stage procurement process to determine the existence of alternatives to the proprietary technology that would deliver the required outcomes.

4.4 Whether feasible or not, the approach to procuring HLT must ensure that it is nondiscriminatory, fair, and transparent. Given that quality considerations and the weight of improved benefits on procurement decisions tend to be subjective, HLT procurement must be well-documented, clearly demonstrate the increased VFM achieved, and be open to verification and scrutiny.

4.5 Consultation of HLT suppliers at the early stages of a project is good practice, regardless of the stage of the innovation cycle of the technology. Early consultation provides information on available technologies and the nature of the supply market which can inform project conceptualization and procurement planning.

Table 2: Procurement Strategies and Methods for High-Level Technology by Innovation Stage

Pre-Commercialization	Introduction	Adoption	Adaptation
<ul style="list-style-type: none"> • VFM analysis • Performance or block grants • Consulting services, based on quality • Requisition of key components from limited suppliers • Prequalification • Design and build of pilots • Minor civil works and standard equipment on open competitive basis 	<ul style="list-style-type: none"> • VFM analysis • Performance or block grants • Consulting services, both quality and cost, depending on scope or nature of assignment • Prequalification • Design and build of demonstration projects • Procurement of components from limited suppliers • Civil works largely on a competitive basis, some specialized facilities may have limited potential bidders 	<ul style="list-style-type: none"> • VFM analysis • TCO analysis with mix of qualitative and quantitative criteria • Interactive outreach, market sounding • Prequalification • Design and build • Progressive design and build • Performance incentives • Two-stage bidding • Direct contracting, with negotiations • Consulting services, primarily based on quality 	<ul style="list-style-type: none"> • VFM analysis • TCO analysis with mix of quantitative and qualitative criteria • Interactive outreach, market sounding • Prequalification • Design and build • Progressive design and build • Performance incentives • Two-stage bidding • Direct contracting, with negotiations • Consulting services, primarily based on quality

TCO = total cost of ownership, VFM = value for money.

Source: Asian Development Bank.

A. Pre-Commercialization Stage

4.6 Procurement for pre-commercialization activities such as pilots will likely be made under performance or block grants that devolve procurement to the sponsor (university, research center, private sector laboratory, consultant, executing agency, etc.), as that body is likely in the best place to determine what inputs are needed, where to procure them, and when they are needed.⁶ In particular, for screened HLT already broadly assessed on the basis of VFM, the pool of potential suppliers is likely to be very small, and little can be gained from following competitive bidding methods, except for standard, relatively minor works and goods.

⁶ Grants are commonly used to find innovative solutions that are hard to define up front and need to allow considerable discretion on the part of the implementing agency to carry out procurement, following its own policies and procedures.

4.7 Pilots can be (i) one component of a multistage bidding process (depending on the scale and cost to bidders of the pilot), wherein shortlisted bidders are required to conduct pilots for selection purposes; (ii) procured as a stand-alone contract followed by a separate procurement exercise to select a contractor for HLT implementation; or (iii) the first part of a contract comprising conduct of a pilot and then HLT implementation, conditional upon the success of the pilot. Consultant selection ought to aim for the best quality and focus on the skills needed to help design the pilots, carry out analysis, and monitor and evaluate results.

4.8 ADB's fiduciary requirements are met through the grant application and approval process, as well as post audits, to ensure funds are used for the purposes intended. Post audits can take the form of project completion reports produced by the project team, ADB's post review (sampling) process, and random project audits conducted by ADB's Office of the Auditor General.

B. Introduction Stage

4.9 Procurement strategies during the initial introduction stage will unlikely involve open competitive processes, except for those items that are standard components, routine civil works and equipment, and/or if the HLT is widely available (but not yet commonly used) and not protected by patents and intellectual property rights. If there are multiple, feasible HLT solutions, following prequalification, the bulk of the procurement will likely involve limited competition, and/or direct contracting and direct negotiation with the company (or companies) that have developed the HLT. Such activities could focus on the demonstration of one new technology (or its adaptation) to see if it meets requirements, or multiple technologies in the search for the best VFM.

4.10 As for pre-commercialization, the selection of consultants ought to emphasize quality and, in some cases, costs. Consultants include design engineers and architects who may be requested to provide analytical, modeling, and data collection or management services as part of the assignment.

C. Adoption and Adaptation Stages

4.11 During the adoption and adaptation stages—depending on the range of potential HLT solutions and the extent to which solutions are protected by intellectual property rights—competitive procurement processes based on VFM can be carried out. This would usually be among prequalified suppliers and contractors. Two-stage processes can accommodate the need for fine-tuning of specifications. However, care should be exercised in the use of two-stage processes for HLT so as not to reveal proprietary information and bidder intellectual property provided in the first stage of the process in the second stage.

4.12 The use of innovative HLT solutions can be encouraged by permitting bidders to offer alternative designs and/or configurations and solutions as part of the bidding process. Further, borrowers may want to consider procurement alternatives such as design and build or design–build–operate, and other forms of public–private partnerships (PPPs) to address risks and complexity.

4.13 Given the level of complexity, adequate time is needed for bid preparation and evaluation. Selection of specialized consultants to support the adoption and adaptation stages would similarly rely on quality criteria over price. Consultants, especially design engineers and architects, may be required to provide analytical and modeling capacities, and it may be more efficient for these services to be provided as part of a consortia that combines design, construction, engineering, information technology, and project management. There may be scope to include price in the selection of consultants for assignments that are more routine.

V. Value for Money

5.1 Carrying out VFM analysis is essential to determine whether to adopt HLT and innovative solutions based on costs and benefits (Box 1).⁷ See the *Guidance Note on Value for Money* for further details. VFM can be a useful analytical tool in the following circumstances:

- (i) where there is little precedence for establishing the economic nature of investment,
- (ii) where the HLT is costly and complicated, and/or
- (iii) to determine whether HLT generates greater benefits than the status quo.

This analysis enables decision makers to reach the best decisions possible, accounting for all relevant factors.

5.2 Moreover, VFM analysis may point to those areas where benefits can be enhanced and anticipated costs of adopting HLT can be reduced. Examples include demonstrations that can lower the resistance to technology and assistance to help the agency upgrade their legacy organization, systems, and processes to be better able to absorb the new technology.

A. Value for Money at the Project Concept Stage

5.3 VFM analysis is applicable and useful for projects of any value and risk. Large capital investment projects and projects of higher risk may warrant VFM analysis in two or more passes. The first pass is done pre-procurement, during project design, as the way of ensuring that costs and benefits are duly considered at an early stage, based on estimates derived from historical performance, peer experience, feasibility studies, and financial modeling.

5.4 VFM analysis at this stage provides a high-level view at the investment, including the screening of potential technology (Box 2). This helps to preempt poor design choices whereby (i) HLT may be rejected due to costs, without accounting for its benefits; or (ii) HLT is adopted because of perceived benefits without understanding all its costs. The analysis can also examine and identify the inherent risks and opportunities in these areas as well as the specific market situation and the operational context.

⁷ There is considerable literature available on VFM that can be referenced. One example is: Department of Treasury and Finance, Victoria State, Australia. 2013. *Economic Evaluation for Business Cases: Technical Guidelines*. Melbourne.

Box 1**Costs and Benefits of High-Level Technology**

High-level technology (HLT) has the potential to generate considerable benefits, enabling developing member countries (DMCs) to “leapfrog” and avoid investment in soon-to-be-obsolete technologies. HLT can expeditiously find solutions to pressing problems. While the exact benefits will vary depending on the project, HLT is expected to improve quality, predictability, and precision. It may increase speed, efficiency, and flexibility. HLT may add reliability and security, and its ability to generate, collect, and handle vast amounts of data can bring significant benefits. Importantly, limitations to space and time can be overcome with HLT such as remote sensing, virtual processes, and automation.

HLT brings with it challenges. One of them is an information gap: users may not even be aware of what technology is available. Hence, up-front actions are needed to familiarize borrowers and users with what is available. Another is that users may be fearful of change—adopting HLT should be made easy for users. High up-front costs can be another barrier. Importantly, the adoption of HLT may entail additional costs beyond the acquisition price, including the cost of addressing safety concerns; space or infrastructure requirements; supplemental water, electricity, or energy sources, and so on. The readiness of the organization to cope with HLT is another concern: personnel need to be trained, new staff recruited, and business processes and organizational structures reworked.

There are risks that the benefits of technology are oversold or that reliable performance data are not available, especially at early stages. The rate at which HLT changes and becomes obsolete—or fails—is another concern, and so is the fear of incompatibility with other systems. Users may find themselves dependent on the supplier, as HLT often remains the intellectual property of the supplier and there is little ability for the user to troubleshoot and undertake diagnosis and repairs, let alone upgrade or customize the technology on its own. Finally, new technologies can involve extra costs for maintenance, spare parts, etc., and, given the reliance on technology, the costs of any downtime can be very high.

Source: Asian Development Bank.

5.5 VFM analysis at this stage can bring many benefits: (i) it can resolve differences between specifications and expectations, (ii) measure gaps in regulatory or legal requirements, (iii) determine affordability, (iv) gauge market interest and capacity, and (v) identify information gaps and reliability. The initial scoping and screening of HLT helps narrow the choice of which technology best meets user needs, at what cost, and the capacity to adopt and/or adapt the technology. Moreover, VFM analysis may point to the need to take intermediate steps—such as piloting and demonstration—before embarking on large-scale adoption or making a significant investment.

5.6 The use of VFM, in conjunction with total cost of ownership (TCO) analysis, can highlight the need for certain requirements in the specification, such as availability of spare parts and training of end users by the contractor or consultant at the time of commissioning of the HLT, as well as the benefits or disadvantages of incorporating operation and maintenance in the contract for supply of the HLT. TCO analysis is useful when evaluating proposals for long lifetime assets involving capital funds for construction or supply, and operating expenses for operation and maintenance.

Box 2**Early Screening of High-Level Technology Options**

Following a study that revealed that both surface water and groundwater supplies were not available to augment the supply to the rapidly growing town of Jaffna in northern Sri Lanka, a decision was made to build a 24,000 cubic meters per day desalination plant. Detailed technical studies were undertaken at the feasibility stage to determine both the preferred desalination process (several types of thermal processes as well as a pressure process are available) and the preferred location of the plant. Factors considered in the former were the available sources of reliable energy, the constructability in this relatively remote location, and the ongoing operation and maintenance requirements.

A reverse osmosis desalination process proved to provide the lowest total cost of ownership, to be the simplest to construct, and to be the simplest to operate and maintain. The plant had to be positioned within a reasonable distance of the town and at a location where its presence together with the seawater intake and brine waste stream outfall would have minimal social and environmental impact. Six sites were investigated, and detailed near-shore hydraulic modeling studies confirmed the final site selected. In addition, as part of the bidding process, bidders were asked to provide options for the reverse osmosis pretreatment system based on the quality of seawater. Several very different technologies were proposed and were technically and financially evaluated as part of bid evaluation.

Source: Asian Development Bank.

5.7 The costs of construction alone may not be indicative of the best VFM over the lifetime of the asset. For example, a higher capital cost power plant may be more efficient and have lower operational costs, resulting in an overall lower TCO than a lower capital cost plant. Differences may exist in the maintenance regime specified by plant manufacturers that can only be compared over the lifetime of the asset. Manufacturers, for example, may differ in their specification of overhaul frequency, with one specifying a 3-year frequency while another specifies 4 years. In this example, the present value of the overhaul costs over the life of the asset, plus the capital cost, could be used to determine the best value offer.

5.8 Procurement strategies and delivery options are part of the initial VFM analysis. First, how procurement is undertaken may make a difference. For example, it may be that different costs are incurred and different benefits generated between conventional implementation by the executing agency (i.e., design-bid-build, the public sector base case) and alternatives whereby the contractor takes on more responsibility and more risk under some form of PPP. One of the factors for the borrower to consider is to find the right mechanism for dealing with the scale and complexity of such large-scale projects.⁸ Another may be that the choice of technology determines the procurement process. For example, if only one technology is judged to be feasible and there is only one supplier of that technology, by default, direct contracting becomes the procurement process (Box 3). For this

⁸ There is considerable overlap with procurement approaches and VFM analysis for PPPs and HLT. Often the two are combined, as one of the reasons for opting for a PPP instead of public sector design and implementation is because of technological complexity, uncertainty, and the need for intensive integration between design and implementation.

Box 3**Metrolinx PRESTO Farecard: Value for Money Analysis**

Metrolinx, the regional transit authority of the Greater Toronto region in Ontario, Canada, engaged a consulting firm to carry out value for money (VFM) analysis of the early options in upgrading and improving its current farecard system. Staying with the status quo was rejected. The choices were to: (i) upgrade the current system—a closed proprietary system—via change orders and direct negotiations with the provider as per its ongoing contract; (ii) enhance the current system with patches that would progressively convert the closed system to a more open architecture; and (iii) acquire an entirely new system that had all the features Metrolinx wanted—an open architecture system based on commercially available off-the-shelf software that could be sourced from multiple bidders.

The VFM analysis identified the factors most important to Metrolinx. These factors—both qualitative and quantitative—were grouped into four categories: (i) the business case, namely, the ability of the option to meet business needs; (ii) technical criteria, such as the ability for the option to allow for progressive changes in the future, sustainability, and interface with legacy systems; (iii) operational functionality, including impacts on costs, time, and attention needed for implementation, ability to meet the required timetable, clarity of the ownership of the intellectual property, and alignment with in-house capacity and resources; and (iv) estimated costs, covering the full life cycle, as well as the possibility to maximize competition in future procurement.

These factors were assessed according to their alignment with the business goals and risks, with each rated low, medium, and high. These ratings were converted numerically and the alternative that received the highest score was selected. The greatest VFM was to be achieved by staying with the current provider and upgrading the system via change orders and direct negotiations. To validate this finding, the consultants carried out a benchmarking exercise, comparing the cost of this option with the costs incurred by the other mass transit operators in upgrading their systems. This showed that the recommended option was within the average costs that other operators incurred and was reasonable in terms of costs per capita.

Source: Grant Thornton LLP. 2011. *Metrolinx PRESTO Farecard Peer Review: Value for Money*. Toronto.

reason, involvement of procurement specialists upstream in the initial VFM analysis is highly desirable.

5.9 The example in Box 3 highlights the use of VFM as a way of screening HLT options before launching procurement. The case also demonstrates the risk of being locked into a particular technology, the risks of obsolescence, and issues of intellectual property rights. In terms of procurement, negotiations of changes to the contract ought to lead to agreement on exactly what is to be delivered, the performance criteria to be met, and the contractual terms to ensure successful outcomes. (Box 7 gives further detail on this example.)

B. Value for Money in Procurement

5.10 Assessment of VFM early in project design and the subsequent VFM assessment during procurement basically use the same approach. At the early stage, data may not be firm and the analysis is based on preliminary estimates. These are refined as project preparation proceeds. Depending on the extent to which estimated costs and benefits have been updated and new information becomes available, the VFM analysis may be refreshed in the interim.

5.11 The second pass VFM analysis is the tool for evaluating procurement and delivery options. This final analysis accounts for any changes in estimated benefits and replaces the estimated costs used in earlier analysis with the costs contained in the actual bids. As discussed in more detail in subsections D to J of this section, there are options as to how VFM considerations shape the bidding process and how cost–benefit analysis is carried out in bid evaluation.

5.12 Bid evaluation may be based on TCO analysis only, if the benefits have already been accounted for and/or they can be assumed to be equal.⁹ Alternately, bid evaluation can consider TCO analysis plus any enhancements or alternatives, in terms of benefits over the minimum performance standards stipulated in the bidding documents. When using TCO evaluation, a comprehensive cost–benefit analysis can be carried out on the competing bids with the highest-ranked bid selected.

C. Data Requirements

5.13 VFM analysis can be data-intensive. Most of the data required will have to be requested from bidders or suppliers. Some data may be available from the executing agency, peer agencies that use the same HLT, and open sources. Other data will have to be generated in other ways as part of the project design and preparation process. There may be need for specialized data collection, simulations, and modeling.

5.14 Even then, some information may still be lacking. In these instances, judgment must be made with respect to: (i) the criticality of that information—for example, if clean air is a determining factor, additional efforts would be needed to collect data on air pollution; (ii) the potential to substitute qualitative measures for the missing quantitative information; and (iii) the level of confidence that can be placed in subjective inputs that may be hard to verify and validate.

5.15 Another concern is the proprietary nature of HLT via copyrights and patents, which can leave much data as confidential and could prevent potential users from having access before making any commitment. This is a risk offset

⁹ Some VFM assessments assume that benefits are equal under all procurement options. The rationale for this is that bidders are required to achieve the same performance standards—if they do not, then the bid should be rejected.

by due diligence on the reputation and track record of the HLT supplier and agreement to nondisclosure. Nevertheless, proprietary information limits control that the executing agency has over the HLT application and can further impede it from making changes in the future.

D. Identifying Costs and Benefits

5.16 One of the first steps in carrying out a VFM analysis is to compile a comprehensive list of all costs and benefits. This list includes investment and operating costs and benefits, both direct and indirect.¹⁰ Direct costs and many indirect costs are almost always readily identifiable and available: an example of a direct operating cost is electricity consumption. An example of an indirect benefit (or cost) is the impact of HLT or the innovative solution on air or water quality. Another example of indirect costs would include abatement and mitigation measures, to comply with performance standards and relevant regulations.¹¹ Other aspects of sustainability are discussed in subsection F.

E. Quantification

5.17 Every effort should be made to quantify all costs and benefits in monetary terms so that they may be included in the cost-benefit analysis. Many costs are already stated in monetary terms, while others can be converted, e.g., the need to have 2 weeks of inputs or spare parts on hand can be restated in monetary value of that inventory. In cases where costs and benefits cannot be stated in monetary terms, such items will have to be excluded from the net present value (NPV) calculation and incorporated into the qualitative analysis.

F. Sustainability

5.18 Cost-benefit analysis includes the possibility of adjusting costs and benefits by using shadow prices to take into account (i) market failures, whereby prices do not reflect true economic values of the goods or services in question; (ii) market distortions, e.g., where policies fix wages or subsidize electricity rates; or (iii) externalities, i.e., situations in which costs of producing a particular good or service are borne by the general public and not incorporated in the price that individuals pay.

¹⁰ Secondary (or second round) costs and benefits, welfare effects, and distributional impacts are usually not included in VFM analysis for procurement purposes, but may be important for the project as a whole. As well, the impacts on health and safety tend to be addressed using the value of work lost.

¹¹ For more information on direct and indirect costs and benefits, refer to the following: (i) ADB. 2005. *Financial Management and Analysis of Projects*. Manila. <https://www.adb.org/documents/financial-management-and-analysis-projects>; (ii) ADB. 2013. *Cost-Benefit Analysis for Development: A Practical Guide*. Manila. <https://www.adb.org/documents/cost-benefit-analysis-development-practical-guide>.

5.19 In performing cost–benefit analyses, analysts may choose to exclude shadow prices for costs such as labor if these are subject to policy variables that may not be easily changed. However, an economic analysis should include shadow costs and benefits of externalities.

5.20 Externalities are particularly important in the case of environmental impacts; among these is the price of carbon. It is widely accepted that the price of carbon does not fully incorporate the cost to society of climate change. Thus, it can be justified to add to the cost stream of a particular technology the imputed cost to society for its consumption of carbon products. Conversely, it can be justified to add benefits for HLT that reduces carbon emissions.

5.21 Another externality is air and water pollution. The best option is to have the project cover the costs for pollution avoidance and reduction. Alternatively, the VFM analysis could add benefits for HLT that exceeds performance standards.

5.22 The appropriate costing of fresh or potable water, which in most countries is free or carries a low price, is another area where shadow pricing may be justified. Many technologies rely on large quantities of fresh water for cooling, as part of the production process, or for the dissipation of residual materials. The cost of water is not necessarily fairly priced, nor is the cost of treatment of residual contaminated wastewater. Then, there are areas of negative impacts on human health and safety, biodiversity, and so on. Thus, the benefits of HLT that saves fresh water, enhances recycling, or reduces water contamination would not be properly valued unless shadow prices were used.

5.23 Appropriately pricing these externalities can be difficult. In the case of carbon emissions, if the DMC has a functioning cap and trade system or has imposed a tax on carbon, carbon prices have already been adjusted to reflect economic values. If there is no scheme for pricing carbon, then the pricing of neighbors that have such schemes could be used. Alternately, if there is a value that can be agreed upon by leading environmental and/or development organizations, then that could be used. Cost estimates vary considerably—up to \$1,500 per ton—although countries with carbon taxes currently tend to be in the range of \$30 or less per ton, with future costs expected to rise.

5.24 Given the range of potential externalities and the difficulty in accurately pricing them, and in the spirit of not overstating benefits, the recommended approach is to prioritize one or two externalities that are likely to play a major role in the HLT under consideration. Given ADB's current priority on climate change, transport, urban, water, and energy, carbon emissions will have continuing importance and justify the use of shadow prices.

5.25 As a precaution, the impact of using shadow prices, such as the cost of carbon emissions, should be tested via sensitivity analysis (see subsection H of this section). This entails repeating the VFM analysis using different shadow prices.

G. Net Present Value

5.26 The core of assessing VFM is calculating the NPV of the stream of costs and benefits in monetary terms over the life of the investment in civil works, equipment, goods, and services under the operation.¹² Depending on how HLT is integrated into the design of the operation, the stream of costs and benefits may be for the project as a whole, a specific HLT component, or a particular HLT procurement. When using NPV, a decision needs to be made whether an economic or a financial NPV calculation will be performed, and the appropriate costs and benefits used for each type of NPV analysis.

5.27 In the simplest of cases, a positive NPV could be sufficient—the benefits outweigh the costs. However, VFM analysis for choosing HLT can be more complicated. It can require repeating NPV calculations with and without the investment in HLT, and among different HLT procurement options. In particular,

- (i) if the program or component is ongoing, the choice of proceeding with the HLT is determined by the greater NPV of the costs and benefits of the status quo (base case) versus with HLT; and
- (ii) if there are multiple, feasible HLT options, as a result of prescreening, prequalification, or expression of interest, the selection of the HLT is based on the NPV of the base case versus the NPVs of the feasible HLTs, with the lowest NPV HLT being selected.

5.28 The following information is required to calculate the NPV (depending on whether an economic or a financial NPV analysis is to be performed):

- (i) life span or start and end dates;
- (ii) discount rate (a rate of 9% is suggested for economic analysis, while for financial analysis, the weighted average cost of capital is usually applied);
- (iii) construction or delivery period;
- (iv) purchase or investment costs, including inventories and scheduled upgrades and replacements, including contingencies;
- (v) ancillary costs to accommodate HLT (e.g., staff redundancy, upgrades to facility, power supply, water, information technology system upgrades, consulting, or technical support);
- (vi) salvage value;
- (vii) disposal and/or remediation costs;
- (viii) revenues or benefits (including positive externalities when performing economic analysis); and
- (ix) outflows or costs including operational costs, maintenance, repairs, training, additional staff wages, reorganization, systems reengineering, etc.

¹² There are other methods for assessing costs and benefits, such as internal rate of return, cost-benefit ratio, and cost-effectiveness. For purposes of simplicity in this guidance note, only NPV is presented. Many sources describe these other methods. For more information, refer to footnote 11 and to ADB. 2017. *Guidelines for the Economic Analysis of Projects*. Manila. <https://www.adb.org/documents/guidelines-economic-analysis-projects>.

5.29 Costs and benefits are usually presented in real terms, i.e., without the effects of inflation and relative price changes over time.¹³ If costs and benefits are presented in real terms, the discount rate used in the NPV calculation is also stated in real terms. If the costs and benefits are in nominal terms, so should the discount rate be.

5.30 When conducting cost-benefit analysis, the economic analysis ignores taxes while the financial analysis includes it. The same holds true for other financial transfers, such as subsidies and interest or debt servicing. Positive externalities should be included in economic analyses. It is the item which distinguishes economic analysis from financial analysis. Despite these guidelines, a decision may either be made to include or exclude certain costs to determine its effect on the project. Duties on imported HLT may be an important factor that deters the adoption of HLT. If the executing agency pays taxes, these have a real effect on their cash flow and operating results. Thus, a case can be made to include taxes in the VFM analysis, knowing that the executing agency's financial position may be affected. If so, the discount rate also ought to be the net of tax rate.

5.31 Another key variable is the life span of the investment. A standard economic life of around 20 to 30 years is often used; however, the rationality of estimating costs and benefits over a long period should be considered. This may be particularly important with regard to HLT if there is a chance of obsolescence and the need for periodic upgrading. Additionally, NPV analysis requires all options be analyzed on the same life span. Given these concerns about obsolescence, the ideal is to choose the option with the shortest life span as the common basis, and estimate the residual value (if any) of the options with longer life spans.

H. Sensitivity Analysis

5.32 As noted, it is wise to repeat the NPV analysis with different values of key variables that are high risk, uncertain, or less reliable, to test the sensitivity of the results to changes in those variables.¹⁴ Another way of testing the NPV calculation is to calculate the switching value of a key factor. If the resulting NPV does not vary significantly, or the switching value is not very likely to occur, then the risk to the viability of the HLT choice is not high. The variable(s) to test as part of the sensitivity analysis depends on professional judgment.

¹³ It is easier to deal in real terms as this avoids predicting future inflation. However, the cost of some items, such as petroleum, electricity, or water may change significantly over time in real terms. One option is to include future real price projections in the NPV calculation.

¹⁴ Various other methodologies exist for assessing risks. One example is the Monte Carlo risk analysis, which prepares probabilistic distributions of potential outcomes.

I. Qualitative Factors

5.33 There are different ways to deal with the qualitative factors not included in the NPV calculations. First, costs and benefits that cannot be converted into monetary terms can be presented in a measurable form that can be rated in numerical terms and ranked. Examples include (i) the number of people served, (ii) customer waiting time, (iii) speed of carrying out a transaction, (iv) level of pollution produced, (v) noise generated, and (vi) number of days that suppliers guarantee delivery of spare parts.

5.34 Second, factors that cannot be measured in numerical terms can be rated and ranked by canvassing the opinions of staff, management, users, and experts, using questionnaires and surveys, and documenting the results. It is important that the way in which such ratings are determined is structured, documented, transparent, and replicable to preserve the integrity of the VFM analysis and its results. The ranking of such costs and benefits can be converted to numerical ratings, an ordinal such as 1, 2, or 3, or category ratings, such as *high*, *medium*, or *low*. They can also be presented in terms of percentages, or “pass–fail.”

5.35 Examples of qualitative factors include (i) strategic importance—as ranked by senior management or users; (ii) technical support—online, 24/7, minimum elapsed time, the expected delay, and/or the reputation based on surveys of other users on the quality of technical support; (iii) responsiveness to user needs—based on priorities established by surveys or questionnaires; (iv) observations and reactions to site visits as rated by a panel; (v) opinions of external experts and/or the evaluation by an expert panel; (vi) references by those knowledgeable of the HLT, the supplier’s reputation, and past experience—using results of surveys and questionnaires; (vii) certain technical dimensions, such as worker or user safety; and (viii) impact on labor relations and staff morale—based on staff surveys.

5.36 Qualitative criteria can be prioritized to keep the process more manageable. Different weights can be given to each criterion: in some cases, all qualitative criteria are given equal weight and in other cases they can be weighted by importance. Box 4 gives an example of weighting qualitative factors. Qualitative criteria can also be weighted by risk. This is an additional step that relies on securing the opinions of experts, users, staff, and managers as to their relative importance.

J. Multiple Criteria

5.37 There are also different ways to combine quantitative analysis (NPV including all monetized costs and benefits) and qualitative assessments (costs and benefits that cannot be converted into monetary terms) to inform the decisions to proceed with a specific operation, HLT component, a procurement strategy, and/or contract award.

Box 4**Using Weighted Qualitative Criteria**

The value for money (VFM) assessment of delivery models for a wastewater treatment plant in the City of Regina, Saskatchewan, Canada, applied different weights to the qualitative factors. Four categories were established: (i) the city's resource capacity, weighted at 25%; (ii) the economic impacts, including innovation in the design, weighted at 40%; (iii) alignment with managerial goals and strategy, weighted at 25%; and (iv) social–public support, weighted at 10%. Within these four categories, there were 21 criteria, whose importance was rated as high, medium, or low. Further information on these ratings and their impact on the overall VFM assessment is not available, as these details were kept confidential.

Source: Deloitte. 2013. *City of Regina Wastewater Treatment Plant Expansion and Upgrade Project—Delivery Model Assessment*. Regina.

5.38 One way is to use the results of the qualitative analysis as an initial filter. This is similar to carrying out a prequalification process and then requesting financial bids, or a two-stage/envelope bidding process that sets a minimum technical score for the selection of consultants, contractors, or suppliers, and then proceeds to rank bids according to least cost. Box 5 gives an example of using qualitative criteria as an initial filter, and Appendix 1 gives further detail.

5.39 Qualitative criteria can also be considered after the NPV calculation has been completed and the highest-ranking bid or option determined. This was done in the case of an investment in a 350-megawatt combined cycle gas turbine facility by SaskPower, a power utility in the Province of Saskatchewan, Canada (Box 6). In effect, the assessment of qualitative factors served to confirm the results of the quantitative assessment.

5.40 It is possible to incorporate multiple criteria explicitly into the VFM analysis. This methodology is akin to how consultants are selected using combined weights for quality and price. As typical with quality–price evaluation for consultants, the main issues are the appropriate weights to be applied and how to normalize ratings.

5.41 First, concerning the weights given to NPV and qualitative factors, the practice by agencies that apply VFM as part of their procurement decision making is to apply the greatest weight to NPV, especially for large investments and those for which some benefits have been incorporated in the NPV calculations. In these cases, the weight of qualitative factors (if at all) is typically much less than the weight to NPV, say, 15% for quality as compared to 85% for NPV or costs.¹⁵ This reflects the preference of analysts to avoid subjective inputs to the extent possible. However, some agencies allow 60–40 or 50–50 weights. Box 7 gives an example of 50–50 weighting.

¹⁵ For example, the World Bank, in its latest procurement regulations (dated July 2016), advocates for a weight of around 30% for nonmonetary values, but does allow up to 50%.

Box 5**Lions Gate Secondary Wastewater Treatment Facility**

The regional authority of Metro Vancouver, British Columbia, Canada, used value for money (VFM) analysis to decide how to contract the design and construction of a new wastewater treatment plant, estimated to cost about Can\$700 million. Consultants engaged by the authority used multiple criteria: (i) the net present value (NPV) of monetized costs and benefits, and (ii) the ratings of a mix of qualitative and quantitative criteria. In this case, the choice of high-level technology (HLT) was made early in the project selection and design process. Higher secondary treatment standards were mandated by public policy. Further, based on consultations with community members, experts and peers, authorities decided to incorporate state-of-the-art technology. These technologies were widely available and did not confront barriers in terms of patents and intellectual property rights.

With the technical parameters and choice of HLT largely laid out, the next step was to narrow the procurement options. This was done based on the evaluation of multiple criteria: (i) social–community impacts, (ii) facility development and operations, (iii) environmental considerations, and (iv) procurement and financing. Each was rated based on the degree to which the procurement option met the desired best case. The evaluation process included consultations with local communities, visits to other advanced facilities, industry reactions to the design, and scoping of market interest.

Five procurement options were tested, with variations of with or without financing, and with or without operation and maintenance. Based on the multiple criteria, the consultants determined that three of five possible procurement options ranked the highest. NPV calculations, based on costs only (since benefits were already covered in the first stage assessment), were then carried out for these three. That analysis determined that the option with the least cost in NPV terms was design and build with financing. That option was then put out to contract, bids evaluated on cost and quality, and the contract awarded to a design–build consortium.

Source: KPMG. 2014. *Metro Vancouver Lions Gate Secondary Wastewater Treatment Project: Procurement Options Analysis and Value for Money*. Vancouver.

5.42 Second, with respect to normalizing, this can be very important to account for the relative importance of the differences in NPV or cost and quality ratings. One way of doing this is to convert the ratings to relative or comparative scores, with the best rating receiving 100 points and the other ratings receiving scores proportional to the difference between their respective scores and the best score. The formula is: $(\text{lowest bid price} / \text{bid price being evaluated}) \times 100 \times (\text{points available})$. In that way, small differences, say in NPV or quality, are not magnified. Another way is to calculate the NPV or cost of producing each point in terms of quality. The highest-ranking bid would be that producing the least cost for each point of quality.

Box 6**Swift Current Combined Cycle Gas Turbine Power Project**

SaskPower engaged consultants to carry out value for money (VFM) analysis of its procurement options to expand electric power production with a new combined cycle gas turbine plant based near the City of Swift Current, Saskatchewan, Canada. The size and location of the new combined cycle gas turbine plant was one of the early decisions taken, incorporating factors such as environmental sensitivity, water and fuel availability, public opinion, and time or scheduling. The technology selected was a combination of two traditional technologies, which would substantially increase overall output and fuel efficiency via the use of a heat recovery steam generator.

The project design process then proceeded to assess the best option for procurement based on life cycle costs and quality. The choice was between design–bid–build by SaskPower and competing bids by independent power producers. One of the things that the evaluation committee did was to separate the team in SaskPower that would be responding to the bid and the team who would be helping to prepare the VFM analysis. The qualitative assessment rated each competing proposal based on its technology (commercial use, adoption, reliability), contractor experience, environmental impacts, and aboriginal involvement. The qualitative assessment was carried out first, but was not disclosed to the evaluation committee, to avoid biasing its assessment of costs, risks, and competitive neutrality.

The net present values (NPVs) of the bids were calculated, using the assumptions contained in SaskPower's standard forecasting tool, with sensitivity analysis done on key variables such as gas prices. Risks were assessed, and NPVs adjusted to reflect those risks. The bid with the lowest evaluated NPV cost was identified. Finally, the evaluation committee turned to the results of the qualitative assessment to which it had not previously had access. The evaluation committee found that the highest ranked proposal also had a favorable quality rating so that no re-ranking of the proposals was required. It is not clear, however, what the evaluation committee would have done in this case had the quality ratings contradicted the NPV ranking.

Source: Crown Investments Corporation of Saskatchewan. 2016. *Swift Current Combined Cycle Gas Turbine Power Project: Competitive Selection Including Value for Money Analysis*. Swift Current.

Box 7**Metrolinx Value for Money Analysis of Expansion to Other Urban Transit Systems**

Returning to the example presented in Box 3, after it had determined to proceed with an improved farecard system via change orders with the original supplier, Metrolinx examined the expansion of its PRESTO farecard system with other urban transport systems. The value for money (VFM) analysis was updated to examine the option of developing an integrated e-farecard system to be used by these other transit systems versus letting each transit agency develop its own system. The net present value (NPV) analysis of the two options showed that the integrated system was much less costly than each agency developing its own (thanks to the economies of scale of a centralized system and the time advantages of using an existing system). In doing this VFM analysis, the qualitative assessment was weighted at 50% and the NPV result weighted at 50%. This weighting did not change the quantitative advantage of the integrated e-farecard option.

This option was made more attractive by two developments. First, the original contractor was convinced that a more open architecture was in everyone's interest and accepted to move in that direction. Second, Metrolinx secured property rights for the use of the PRESTO system within Canada, while the contractor retained rights in other countries. Nevertheless, the choices made by Metrolinx were subject to review by the Auditor General of Ontario. In two of its annual audit reports, the auditor general cited flaws in Metrolinx's VFM analysis, the way in which the initial contract was let (for example, it did not correspond to the original specifications that had required an open systems architecture), and why the choice of buying the farecard system of another major transit system had not been considered in the original options. It also cited various weaknesses in managerial performance: e.g., Metrolinx's ability to monitor design contracts and detect design errors, enforce contractual performance, and manage change orders, among others.

Sources: (i) Grant Thornton LLP. 2012. *Metrolinx PRESTO Farecard Peer Review—Phase 2*. Toronto. (ii) Office of the Auditor General of Ontario. 2016. *2016 Annual Report*. Toronto. (iii) Office of the Auditor General of Ontario. 2012. *2012 Annual Report*. Toronto.

VI. Contracting Consulting Services

6.1 The way in which consulting services for HLT are contracted follows ADB's usual policies and practices. There is no substantive difference when dealing with HLT or not. While the general approach and policies are the same, contracting for services with HLT dimensions will demand attention to certain aspects explored below. This guidance note should be read in conjunction with the *Guidance Note on Consulting Services Administered by ADB Borrowers*.

A. Categories of Services

6.2 A variety of consulting services are needed to design, prepare, and implement operations that deal with HLT and innovative solutions. These are typical for large-scale infrastructure investments, but entail a high degree of expertise that is able to cope with HLT complexity and uncertainty. Table 3 summarizes the basic categories of services that may need to be contracted.

B. Identifying the Need for High-Level Technology Consultants

6.3 Within these broad categories of consultant services, operations with HLT components or activities are likely to require particular technological expertise and skill, depending on the nature of the operation and the stage of the innovation cycle, in the areas listed below:

- (i) data analysis, database optimization, and modeling;
- (ii) risk analysis;
- (iii) systems architecture (real time, critical systems, automation, instrumentation, testing);
- (iv) automation (controls, electrical engineering, monitoring systems, regulation and control, validation);
- (v) migration strategies from one technology to another, integration with legacy systems;
- (vi) performance and process engineering;
- (vii) mechanical engineering (design of components, parts, subsystems);
- (viii) simulations;
- (ix) validation processes (tests, quantification, integration);
- (x) safety analysis;
- (xi) material strength, tolerance, and resistance; and
- (xii) dependability and reliability.

Table 3: Categories of Consulting Services for High-Level Technology

Advisory Services	Design Development and Design		Procurement Services	Construction- or Acquisition-Related Services	Quality Assurance	Project Management
	Preliminary Design Services	Design				
<ul style="list-style-type: none"> • Engineering • Appraisal, valuations • Financial analysis • VFM analysis • Feasibility studies • Estimation of capital and operating costs • Value engineering • Technical studies • Industry-market capacity • Economic assessment • Surveys • Land studies • Data collection and analysis • Legal services • Intellectual property rights • User-public consultations 	<ul style="list-style-type: none"> • Definition and scoping • Probable costs • Design reports • Scheduling • Investigations • Permits • Environmental assessment • TCO estimates • Engineering surveys • Sustainability modeling • Quality assurance • User-public consultations 	<ul style="list-style-type: none"> • Detailed design • Working drawings • Specifications • Scheduling • Demolition • Site preparation • Detailed cost estimates • TCO estimates • VFM analysis • Peer review • Fairness review • User-public consultations 	<ul style="list-style-type: none"> • Bidding documents • Review of bids and evaluation • TCO analysis • VFM analysis • Peer review • Fairness review • User-public consultations 	<ul style="list-style-type: none"> • Contract preparation and negotiation • Progress review • Testing and monitoring • Change order costing • Document interpretation • Payment recommendation • Performance review • Warranty review 	<ul style="list-style-type: none"> • Conceptual studies • Monitoring and evaluation design • Testing • Monitoring • Contractor compliance • Regulatory compliance • User-public feedback 	<ul style="list-style-type: none"> • Planning, scheduling, monitoring, and control • Estimating, budgeting, and cost control • Claims processing • Procurement • Risk management • Commissioning • Quality assurance • Warranty • Legal dimensions • Labor relations • User-public consultations • Materials receiving and warehousing • Asset management • Liability management • Post construction services

TCO = total cost of ownership, VFM = value for money.

Source: Asian Development Bank.

6.4 It is likely that the qualified consultants will not only have personnel experienced and skilled in the above areas, but also possess in-house capacity in terms of hardware and software to carry out the work in their own laboratories, modeling, and testing facilities. In addition, consultants will have to possess the relevant technical or scientific backgrounds, depending on the sector and technology. Finally, legal and financial dimensions, especially with respect to intellectual property rights, patents, VFM, and financial engineering may be very important.

6.5 Executing agencies should anticipate devoting time and effort to defining expectations in terms of outcomes and to prepare terms of reference that reflect this higher level of complexity and uncertainty. At the same time, given the uncertainties, terms of reference should also allow for innovation in how consultants carry out their work, explore options, and come up with solutions, and should permit alternative technical concepts, especially those that enhance benefits, increase operational flexibility, reduce costs, or reduce time frames. Similarly, in responding to requests for proposals, consultants should feel free to incorporate narratives, tables, charts, plots, drawings, schematics, and sketches to explain their approaches. This is particularly important for contracting design and build operations. Special attention is needed to how different consulting teams interface and work together. Finally, it is incumbent on consultants to incorporate quality assurance processes in their approach and work plan.

C. Estimating Consulting Costs

6.6 There has to be a realistic appreciation of the extent of the services required and their costs—these costs may be substantial. First, projects utilizing HLT and innovative solutions are likely to require a large amount of consulting input, at the initial concept stage, during design and preparation, and during implementation, given that the HLT is likely new and innovative. Second, consultants experienced and specialized in HLT are high-value, relatively rare, reputable professionals, and in high demand, especially in the priority areas identified by ADB.

6.7 In terms of estimating the cost of consulting services, including engineering, some agencies expect these costs to be between 1% and 2% of TCO, with capital costs in the range of 6% to 18% and operation and maintenance, 80% to 93%.¹⁶ That means that consulting or the “soft” costs as a share of capital costs could be as much as 33%. They could be more depending on the sector: for example, consulting services for investment in wastewater treatment can be as much as about 50% of the value of the civil works and equipment costs.

¹⁶ For example, see: (i) Association of Consulting Engineering Companies—British Columbia. 2009. *Budget Guidelines for Consulting Engineering Services*. Vancouver; (ii) Seattle Public Utilities. 2016. *Cost Estimating Guide*. Seattle.

D. Consultant Selection Criteria

6.8 ADB's usual policies and practices for the selection of consultants apply. These give the option of combining costs with quality. However, in the case of HLT, quality takes precedence over price, considering risks and downstream impacts. Borrowers should want to encourage consulting firms to put their best people forward, innovate, and not to undervalue the assignment. That means selecting the best qualified, without regard to price.

6.9 In terms of rating quality, the criteria for selecting HLT consultants should emphasize experience over other factors. Weight should be given to relevant research activities of both the individuals and institutions involved. Conventional criteria for selecting consultants apply a weight of 20% to 50% for methodology, 30% to 60% for key personnel, and only 0% to 10% for experience (although it is noted that "experience" may be given a low weighting because it is duplicated to some degree in the "key personnel" criterion).

6.10 The selection of consultants for HLT would argue for much greater weight for experience for both individuals and the institutions that employ them. There are three reasons for this: (i) ratings of methodology and key personnel can be subjective and prone to "bait and switch" tactics, while experience can be documented and validated with references; (ii) especially in complex, large-scale investments, HLT requires high level of skills and experience and teams that have worked together; and (iii) best-in-class research entities in both public and private sectors employ rigorous standards to the research process and the conclusions that such research may describe. Appendix 2 gives some sample questions that borrowers could assess when selecting HLT consultants.

E. Evaluating Design-Build Options

6.11 Design-build options present challenges for evaluation.¹⁷ This approach usually combines elements of consulting services with civil works and equipment, and entails competition among consortia of architects, engineers, IT specialists, project managers, and construction firms, among other skills. As such, it is appropriate to use multiple criteria with weights between monetary and non-monetary factors, as described above.

6.12 Experience is an important factor for design and build (as well as for other procurement options that involve PPPs). Evaluation criteria should incorporate the following:

- (i) past performance of each major participant;
- (ii) joint experience in working together;
- (iii) specific design-build experience;

¹⁷ Other forms of PPPs are even more complicated to evaluate.

- (iv) experience with similar investments and varied challenges;
- (v) time delays and cost overruns in past projects;
- (vi) technical credentials and experience of key personnel to be assigned;
- (vii) safety record;
- (viii) environmental record;
- (ix) organizational structure, resources, location, and staffing of the consortium;
- (x) history of litigation and disputes;
- (xi) appropriateness of design criteria;
- (xii) quality assurance and management;
- (xiii) approach to construction activities—completeness, responsiveness to client needs, familiarity to location, norms, regulations, and socioeconomic context;
- (xiv) ability to meet performance standards and specifications;
- (xv) alternative technical concepts, change in proposed scope;
- (xvi) resources and ability to handle workload;
- (xvii) in-house equipment and systems;
- (xviii) managerial skills;
- (xix) integrity and business reputation due diligence;
- (xx) TCO and benefits; and
- (xxi) any other relevant criteria.

Appendix 1: Example of Value for Money Analysis—Lions Gate Secondary Wastewater Treatment Plant

A1.1 This example summarizes the process that the regional authority of Metro Vancouver, British Columbia, Canada, went through to decide how to contract the design and construction of a new wastewater treatment plant, estimated to cost about Can\$700 million. The value for money (VFM) analysis carried out by the consultants engaged by the authority used multiple criteria: the net present value (NPV) of quantified costs and benefits, and the ratings and ranking of a mix of qualitative and quantitative criteria.

A1.2 In this case, the choice of high-level technology (HLT) was made early in the project selection and design process, which began in 2012. Higher secondary treatment standards were mandated by new standards issued by the Ministry of Environment. Further, based on consultations with community members, experts, and peers, the regional authorities decided to incorporate state-of-the-art technology. This included an enclosed design; building to the latest seismic standards; recovering water and energy for other purposes; and using biological processes, lamella plates, deep tank activated sludge, and thermophilic digestion. Notably, the technology behind these processes is widely available and did not confront barriers in terms of patents and intellectual property rights.

A1.3 With the parameters of the project design laid out, the next step was to narrow the procurement options. This was done based on the evaluation of multiple criteria: social–community impacts, facility development and operations, environmental considerations, and procurement and financing. These criteria captured both benefits, especially social–community and environmental benefits, and costs, mixing both quantitative and qualitative aspects (Box A1).

A1.4 Each of these criteria were rated by the consultant’s evaluation team, based on the degree to which the procurement option met the desired best case, with “✓✓✓” for the best, “✓✓” for average, and “✓” for the least. Nuances in the rating were allowed with “+” or “–” to each rating.

A1.5 The evaluation process included consultations with local communities, visits to similar advanced facilities, industry reactions to the design, and scoping out of market interest.

A1.6 Five procurement options were tested: design, bid, and build—the base case of public sector procurement—and variations of design and build with or without financing, and with or without operation and maintenance.

Box A1**Qualitative and Quantitative Evaluation Criteria****Community Impacts**

- Chances of meeting the project's objectives
- Risks to the general public in terms of health, odor, noise, and dust
- Integration of the project with other public infrastructure
- Opportunity to facilitate partnerships
- Public reactions and stakeholder acceptance

Facility Development and Operations

- Staff retention and labor relations
- Degree of operational flexibility in matters such as scheduling
- Control by the agency to manage and adapt the interface with existing systems
- Ability to achieve customer satisfaction and meet performance targets

Environmental Considerations

- Sustainability and the degree of innovation above baseline requirements
- Opportunity to recover water and other byproducts (e.g., biosolids)
- Compliance with existing regulations and ability to adapt to future needs
- Likelihood of obtaining local permits to proceed with construction on a timely basis

Procurement and Cost Implications

- Capital costs, including the certainty of estimates
- Operating costs, including the certainty of estimates
- Repair and replacement cost efficiency
- Risk management and how to best allocate risks
- Procurement and construction schedules or timelines, and their certainty
- Market interest with the goal of getting at least three bids
- Bidding complexity and the ability to attract bidders
- Operating efficiency
- Ability to enforce the contract

Source: KPMG. 2014. *Metro Vancouver Lions Gate Secondary Wastewater Treatment Project: Procurement Options Analysis and Value for Money*. Vancouver.

A1.7 Based on the multiple criteria ranking, the consultants determined that three of five possible procurement options ranked the highest. These were (i) design–bid–build (DBB), (ii) design–build–finance (DBF), and (iii) design–build–finance–operate–maintain (DBFOM).

A1.8 NPV calculations, based on costs only since benefits were already covered in the first stage assessment, were carried out for these three options (Table A1).

A1.9 The retained risk value in the table is the value assigned to risks that were retained by Metro Vancouver and not transferred to the contractor. More information is available in the VFM report on this project.¹

¹ KPMG. 2014. *Metro Vancouver Lions Gate Secondary Wastewater Treatment Project: Procurement Options Analysis and Value for Money*. Vancouver. <http://www.metrovancouver.org/services/liquid-waste/LiquidWastePublications/LGSWWTP-ValueForMoneyReport-Jan2014.pdf>.

Table A1: Net Present Value Analysis for the Three Procurement Options

	Design-Bid-Build	Design-Build-Finance	Design-Build-Finance-Operate-Maintain
NPV Categories	Amount (Can\$ million)		
Procurement and Contract Management	43.3	30.7	31.4
Capital Costs	460.4	445.5	471.8
Operations	100.9	100.9	98.6
Retained Risk	6.3	7.4	6.8
NPV Total	611.0	584.6	608.5

NPV = net present value.

Source: KPMG. 2014. *Metro Vancouver Lions Gate Secondary Wastewater Treatment Project: Procurement Options Analysis and Value for Money*. Vancouver.

A1.10 This analysis determined that the option with the least cost in NPV terms was DBF. That option was estimated to save Can\$26 million as compared to DBB and Can\$23 million compared to DBFOM.

A1.11 In justifying the final decision to proceed with DBF, the results of the qualitative factors were cited. Not only did the DBF option have the best NPV (based on costs only), it was also among the strongest in terms of environmental benefits, mainly because of performance incentives built into that option. It further avoided the risks associated with possible negative labor reactions to the DBFOM option. All options with financing included were rated highly, as the region needed financing for working capital during the construction period. DBB was also a strong contender, especially on community impacts and the control over operations, but was costliest. Note that operating costs were the same for DBB and DBF, as the facility is to be operated by the city agency, not the contractor.

A1.12 The procurement process that followed was competitive based on quality and costs. At the beginning of the process, five responses were received from consortia to the initial request for qualifications. Three consortia were shortlisted and bids received from all three. Data are not publicly available on the specific request for proposals, bids, or bid evaluations.

A1.13 The contract award to a design and build consortium was announced in early 2017. That consortium combined construction, design, project management, engineering, and information technology skills. Final design is under way and will take into account the factors listed above, as well as the impact of climate change on sea levels. The plant is expected to be operational in 2020, at a total estimated cost of Can\$700 million, of which the design and build contract is Can\$525 million.

Appendix 2: Sample Evaluation Questions for Selecting Consultants

A2.1 Table A2.1 provides a checklist of sample questions to use for evaluating consultants for high-level technology-related assignments. Table A2.2 describes a sample scoring guide for the questions in Table A2.1.

Table A2.1: Checklist of Sample Questions

RANKING OPTIONS	Option 1	Option 2	Option 3	Option 4
CATEGORY	SCORE			
Relevant Experience				
Have you worked on similar projects before?				
Have you worked successfully with similar clients?				
How diverse are your clients?				
How have you tested alternative technology in challenging environments?				
What innovative or alternative technologies have you employed successfully in the past in similar projects?				
How do you expect to deal with this particular client?				
What is your track record on bringing similar assignments in terms of costs, timeline, and ultimate user satisfaction?				
Technical Credentials and Expertise				
Who will be assigned to this project? What is their commitment in terms of time and availability?				
What are their levels of expertise? Experience in similar assignments?				
How will the team be organized? Who will be in the lead?				

continued on next page

Table A2.1 *continued*

RANKING OPTIONS	Option 1	Option 2	Option 3	Option 4
CATEGORY	SCORE			
Will you be using subcontractors? Which ones? Have you worked with them before successfully?				
Knowledge of Local Operating Environment				
How do you expect to work with local agencies?				
What experience do you have in working with regulatory bodies that will be involved in the project?				
Are you familiar with the local legal system? What expertise do you have access to?				
What constraints do you anticipate? How will you deal with them?				
Approach and Methodology				
What special facilities (e.g., testing, modeling, software) will you bring to the assignment?				
What are your in-house processes for quality control and assurance? Continuous learning?				
What are the critical decision points or milestones in your approach? How will you manage them?				
What is your method and track record on estimating costs?				
What is your track record on meeting deadlines in terms of costs and time?				
What systems do you use for controlling costs, personnel-hours, schedules, etc.?				
What is the management structure? Coordination mechanism?				
What are your ideas for saving money?				
How do you propose to work with the community during the project?				
How do you propose to provide status reports to the oversight, monitoring agencies? The community?				

continued on next page

Table A2.1 *continued*

RANKING OPTIONS	Option 1	Option 2	Option 3	Option 4
CATEGORY	SCORE			
What is your current workload and how does the project fit? Any constraints on the availability of resources?				
Business Reputation and Professional Conduct				
What is your experience in resolving and settling claims?				
Have you been involved in contractual disputes? How have these been settled?				
What professional or business organization do you belong to? How do you assure adherence to professional standards? Any disciplinary decisions on file? Any outstanding financial or professional claims?				
Ratings				
Overall Impression				
Experience				
Technical Competence				
Knowledge of Local Operating Environment				
Approach and Methodology				
Business Reputation and Professional Conduct				

Source: Asian Development Bank.

Table A2.2: Sample Scoring Guide

Rating	Points	Qualitative Appraisal	Weight	Score
Exceptional	90–100	Demonstrates responses that significantly exceed stated requirements and objectives. Offers consistent outstanding levels of quality. No weaknesses.		
Good	80–89	Responses exceed stated requirement and objectives and a generally better than acceptable level of quality. Weaknesses if any are minor.		
Acceptable	70–79	Meets requirements and objectives with acceptable quality. Likely to be successful. Weaknesses are minor and can be remedied.		
Poor	60–69	Fails to meet stated requirements and objectives, with significant weaknesses. Marginal in terms of content and information provided, but may be improved.		
Unacceptable	0–59	Significant weaknesses and deficiencies, unacceptable quality. Fails to meet stated requirements and objectives, lacks essential information, conflicting and unconvincing. Extensive revision would be necessary.		

Source: Asian Development Bank.

High-Level Technology

Guidance Note on Procurement

ADB promotes attention to and support for high-level technology (HLT) and innovative solutions in its investment lending and technical assistance. The goal is to facilitate the adoption of HLT by ADB's developing member countries. This guidance note is provided to assist country teams, executing agencies, and other ADB partners on how to integrate HLT and innovative solutions, and their related procurement dimensions, into ADB-supported operations. The focus is on capturing both costs and benefits in the analysis of options based on the overriding consideration of value for money, in accordance with ADB's principle-based procurement policy.

About the Asian Development Bank

ADB's vision is an Asia and Pacific region free of poverty. Its mission is to help its developing member countries reduce poverty and improve the quality of life of their people. Despite the region's many successes, it remains home to a large share of the world's poor. ADB is committed to reducing poverty through inclusive economic growth, environmentally sustainable growth, and regional integration.

Based in Manila, ADB is owned by 67 members, including 48 from the region. Its main instruments for helping its developing member countries are policy dialogue, loans, equity investments, guarantees, grants, and technical assistance.

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