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PHILIPPINE WATER REVOLVING FUND FOLLOW-ON PROGRAM

USING PERFORMANCE-BASED CONTRACTS TO REDUCE NON-REVENUE WATER IN PHILIPPINE WATER DISTRICTS

April 2013

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THE PHILIPPINE WATER REVOLVING FUND FOLLOW-ON PROGRAM

USING PERFORMANCE-BASED CONTRACTS TO REDUCE NON-REVENUE WATER IN PHILIPPINE WATER DISTRICTS

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ACRONYMS

BLT	Build Lease Transfer
BOO	Build Own Operate
BOT	Build Operate Transfer
BT	Build Transfer
CAO	Contractor Add and Operate
DBM	Department of Budget and Management
DMA	District Meter Area
DOF	Department of Finance
GCE	Government Corporate Entities
GFI	Government Financial Institution
GICP	Government Instrumentalities with Corporate Power
GOCC	Government Owned and Controlled Corporation
GPPB	Government Procurement Policy Board
GPRA	Government Procurement Reform Act
ICC	Investment Coordination Committee
IRR	Implementing Rules and Regulations
IWA	International Water Association
JV	Joint Venture
KMC	Kolkata Municipal Corporation (Kolkata, India)
LGU	Local Government Unit
LWUA	Local Water Utilities Authority
MWA	Metropolitan Water Authority (Bangkok, Thailand)
NEDA	National Economic Development Authority
NRW	Non-Revenue Water

NWRB	National Water Resources Board
ODA	Official Development Assistance
PD	Presidential Degree
PhP	Philippine Peso
ROO	Rehabilitate Own Operate
ROT	Rehabilitate Operate Transfer
SABESP	Companhia de Saneamento Básico do Estado de São Paulo S.A (San Paulo, Brazil)
SAWACO	Saigon Water Corporation
SEC	Securities and Exchange Commission
SUC	State Universities and Colleges
SWD	Selangor Water Department (Selangor State, Malaysia)
WD	Water District
WSC	Water & Sewerage Corporation (Commonwealth of the Bahamas)

INTRODUCTION

This report analyzes examples of performance-based contracts used or designed to reduce non-revenue water (NRW) and discusses performance-based contract structures that could be used by Water Districts to reduce NRW in the Philippines. The report, organized as set out in the table of contents:

1. Discusses the advantages of using performance-based contracting over traditional public-sector, input-based, contracting;
2. Provides a brief primer on reducing NRW;
3. Analyses performance-based contracts used to or designed to reduce NRW in six developing countries;
4. Includes lessons learned from the analysis, applicable to performance-based contracts to reduce NRW for Water Districts in the Philippines; and
5. Discusses the legal and regulatory issues impacting the use of performance-based contracts to reduce NRW by Philippine Water Districts.

This report is based on a desk review of information publicly available, including case studies and articles, contract templates and, to a limited degree from interviews with individuals who were involved in the design, implementation or evaluation of particular performance-based contracts. Actual contracts were not obtainable for any of the example performance-based contracts analyzed. As a result, the level of detailed information obtained for the performance-based contracts is not consistent. Occasionally, missing information was filled in by "reading between the lines," incorporating the author's past experience with procurements of similar contracts.

EXECUTIVE SUMMARY

Performance contracting provides a more effective means of incentivizing contractors to reduce NRW than traditional public sector, input-based, contracting can achieve. Water Districts in the Philippines can use the currently unrealized value of NRW from leakage and inaccurate metering to finance the specialized expertise and equipment needed to reduce water losses.

The BOT Law provides a reasonable mechanism to engage the private sector. The Rehabilitate Operate and Transfer model, authorized by the BOT Law, provides a reasonable mechanism for Water Districts to use performance-based contracts to reduce physical water losses.

Based on a review of example performance-based contracts used to reduce NRW in six countries, most of the NRW is caused by physical water losses, most the physical water losses are caused by leaks in the distribution network, and most of the leaks in the distribution network are on customer service connections. The use of District Meter Areas, which hydraulically isolate small sections of the distribution network usually consisting of between 500 and 3,000 connections, has proven to be an effective way of addressing the problems of leakage detection and pressure management, which are the really difficult aspects of a NRW reduction program.

Under the Rehabilitate Operate and Transfer model, the contractor would rehabilitate and operate the assets in the DMAs reducing water losses through leakage detection and repairs, pipe replacement and improved pressure management; transferring them back to the Water District upon completion of the contract.

For the Water Districts, performance-based contracts should focus on reducing leakage, improving meter accuracy and reducing illegal consumption. The contracts should include two phases or periods: 1) a Water Loss Reduction and Management Period, during which DMAs are established and water losses within the DMAs are reduced and 2) a Maintenance Period, during which the water loss reductions achieved during the Water Loss Reduction and Management Period are maintained for a period of time.

While, with one exception, the performance-based contracts reviewed during this study were financed by donors, such as the World Bank or the Inter-American Development Bank, most of the projects were "self-liquidating" meaning that projects paid for themselves. Thus, contractors should be willing to finance the projects recovering their investment from the value of the water saved.

PERFORMANCE BASED CONTRACTING

Performance-based contracting refers to contracts which link payments to outputs, such as the volume of water saved from reducing leakage in a water distribution network; rather than to inputs, such as the time and materials used to reduce leakage in a water distribution network.

Properly designed, a performance–based contract can achieve better results than are normally achieved using traditional public sector, input-based, contracting methods. The advantage comes from a better alignment of incentives with output objectives, coupled with more contractor flexibility in design and implementation to facilitate innovation and encourages efficiency.

The contractor's performance risk tends to increase when using performance-based contracting, compared with traditional input-based contracting, but this is mitigated to some extent by the flexibility that the contractor has in design and implementation.

Performance-based contracting may also increase the public entity's procurement and management risks as:

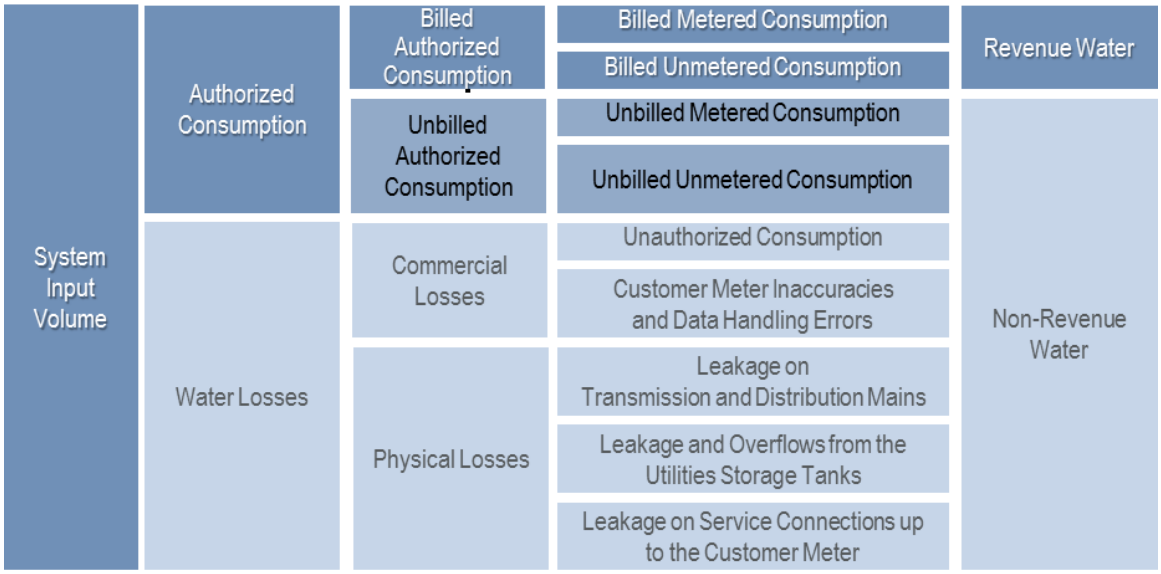
1. Competition for performance-based contracts is often weaker, as the pool of experienced contractors willing to accept the performance-based contracting risks is still quite small in most countries;
2. Performance-based contracts are usually more complex than traditional input-based contracts, often requiring special expertise to design and manage; and,
3. Effective performance incentives and means of monitoring performance are still being developed – by trial and error.

REDUCING NON-REVENUE WATER

WATER BALANCE

Non-Revenue Water refers to the difference between the water produced and authorized billed consumption. The following water balance diagram, developed by the International Water Association, defines the basic components of NRW.

Figure 1 – IWA Water Balance Diagram



NRW consist of authorized but unbilled consumption, commercial losses and physical losses. Commercial losses include unauthorized, or illegal, consumption and losses due to meter inaccuracies, meter reading errors and errors in calculating or reporting meter consumption information. Physical losses include leaks on the transmission or distribution network pipes, leaks or overflows from storage tanks and leaks on customer connections.

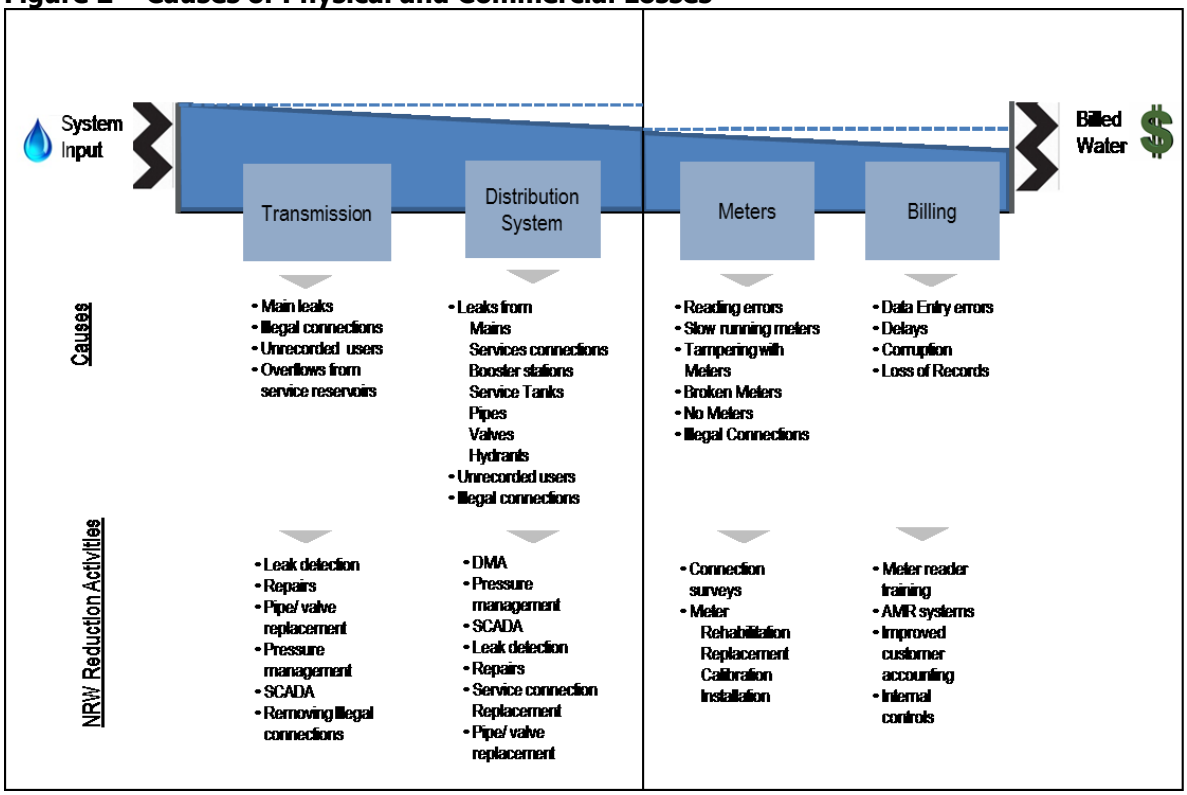
In developing countries it is not uncommon for NRW to represent 50% to 60% system input. In developing countries, physical losses accounts for 60% of NRW in developing countries.[1]

[1] Bill Kingdom, Roland Liemberger, Philippe Marin, *The Challenge of Reducing Non-Revenue Water in Developing Countries – How the Private Sector Can Help: A Look at Performance Based Service Contracting*, The World Bank, 2006, page 4.

CAUSES OF NRW AND REDUCTION ACTIVITIES

The typical causes of physical and commercial losses, where they occur in a water supply system and typical activities to reduce NRW are shown in the following diagram.

Figure 2 – Causes of Physical and Commercial Losses[2]



FINANCIAL IMPACT OF NRW REDUCTION

Reducing water losses can have an immediate impact on the financial condition of the utility. Reducing commercial or physical losses either increases water available for sale, increases revenues or reduces operational costs of producing water (e.g., electricity, chemicals). Reducing NRW is usually considered the most readily available and cheapest new source of water. Investments made to reduce NRW are usually quickly recovered by revenue increases or cost reduction.

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[2] Adapted from Figure 4.1, Chart to help staff understand NRW components, Malcolm Farley, Gary Wyeth, Zainuddin Bin Md. Ghazali, Arie Istandar, Sher Singh, The Manager's *Non-Revenue Water Handbook – A Guide to Understanding Water Loss*, Ranhill Utilities Berhad and the United States Agency for International Development (USAID), 2008, page 29.

USING PERFORMANCE-BASED CONTRACTS TO REDUCE NON-REVENUE WATER

COMPONENTS OF PERFORMANCE-BASED CONTRACTS TO REDUCE NRW

Performance-based contracts can be focused on reducing physical losses, commercial losses or both. Reducing commercial losses, principally involves improving the metering accuracy and water sales accounting. Contracts focused on reducing commercial losses, typically include the following components:

- Surveys to identify missing or unmetered connections;
- Installing, replacing, repairing or recalibrating meters;
- Improving meter reading and data transfer to customer accounting systems, using handheld meter reading devices or Automatic Metering Reading (AMR) methods, meter reader training, changing meter locations to reduce the frequency of unread meters and estimated sales;
- Improving customer accounting systems; and
- Institutional support for a period of time and training of utility staff.

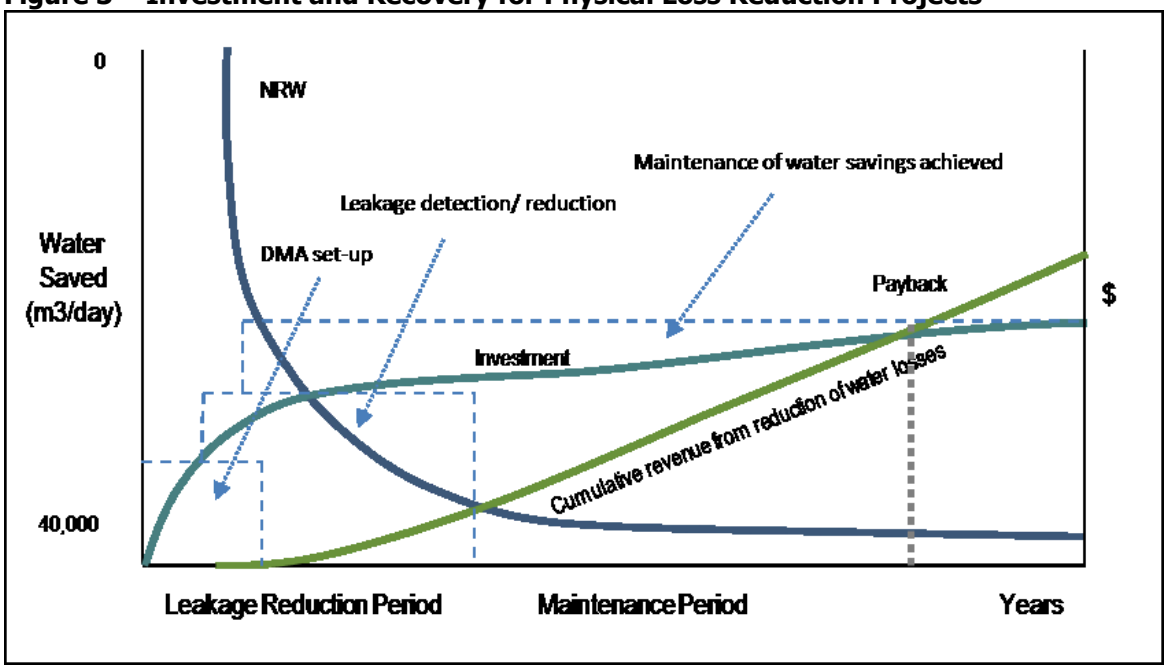
Contracts focused on reducing physical water losses, typically include the following components:

- Establishing District Metering Areas (DMAs), which isolates water supply to a small sub-set of the utility's customers, improving water inflow and pressure measurement and facilitating leakage detection (see **Annex A** for a detailed discussion on the establishments of DMAs);
- Leakage detection;
- Pressure management;
- Repairing leaks;
- Replacing service connections;
- Replacing leaking pipes, valves, hydrants, etc.;
- Maintenance of water savings achieved for a period of time; and
- Training of utility staff.

INVESTMENT AND RECOVERY FOR NRW REDUCTION CONTRACTS

The following diagram depicts the investment and recovery over a typical physical loss reduction project. The payback period depends on the project cost and the additional revenue or incremental cost savings generated by the reduction of water losses. Once improvements are made, it is critical that the NRW reductions be maintained. Historically this has been a significant problem in developing countries where management/ staff skills, financial resources and performance incentives are often inadequate or poorly aligned.

Figure 3 – Investment and Recovery for Physical Loss Reduction Projects



ANALYSIS OF PERFORMANCE-BASED CONTRACTS TO REDUCE NRW

This section includes the analysis of six performance-based contracts to reduce NRW in six countries. Each example includes: a discussion of the contract purpose, procurement, baseline NRW, performance targets, incentives, flexibility, financing, NRW improvement achieved or expect to be achieved, risk-sharing between the public entity and the contractor and the pros and cons of the contract.

The following six performance-based contracts to reduce NRW were selected for analysis, based on the availability of information and their perceived applicability in the Philippines.

Contracting Water Utility	Country	Start Date (Year)	Duration (Years)	Objective
Selangor Waterworks Department – Selangor State	Malaysia	1998	11.5	Reduce physical and commercial losses
Metropolitan Waterworks Authority - Bangkok	Thailand	2000	4	Reduce physical losses in distribution networks
SABESP – San Paulo	Brazil	2000	3	Reduce commercial losses
Saigon Water Corporation – Ho Chi Minh City	Vietnam	2008	5	Reduce physical losses in distribution network
Water and Sewerage Corporation – New Providence	Bahamas	2012	10	Comprehensive NRW reduction
Kolkata Municipal Corporation - Kolkata	India	TBD 2013	4	Reduce physical losses

SELANGOR WATERWORKS DEPARTMENT – SELANGOR STATE, MALAYSIA[3]

The scope of work for this performance-based contract was to reduce physical and commercial losses. The contract was not competitively bid. The Selangor State Government had requested proposals from the private sector for ways to resolve the water crisis in Kuala Lumpur in 1997 and while most respondents proposed new infrastructure to bring additional supplies to the city, one consortium proposed a performance-based NRW reduction contract. Due to the urgency of finding a quick

[3] Source: Bill Kingdom et al, pages 12-15

solution to the water crisis, the Selangor Water Department (SWD) decided to proceed with a negotiated contract in two phases.

The contract started in 1998 with an 18 month pilot (Phase 1), followed by a 9-year contract (Phase 2), which started in 2000. Control of the pilot area was initially transferred back to SWD at the end of Phase 1, however the public entity was not able to maintain the improvements and control of the area was returned to the contractor for the duration of Phase 2.

Baseline NRW

NRW was calculated at 40% in 1997 or approximately 800,000 cubic meters per day; physical leakage was estimated at 25% of system input, which translates into approximately 500,000 cubic meters per day or approximately 800 liters per connection per day at 30 meters average pressure. In 1997, there were approximately 625,000 connections in the Selangor water network.

Targets

The performance targets for this contract were primarily volumetric. The primary performance target for Phase 1 was to reduce NRW by 18,540 cubic meters per day. The Phase 1 contract included separate sub-targets for the reduction of physical losses and losses from metering errors.

Measurement	Performance Target (m3/d)	Percentage
Total NRW Reduction	18,540	
Physical Loss Reduction	10,450	57%
Meter Accuracy Improvement	6,400	35%

The sum of the NRW reduction sub-targets was less than the total to allow the contractor flexibility in meeting the total NRW reduction target.

The primary target for Phase 2 was to reduce NRW by 198,900 cubic meters per day by the end of the contract. Similar to Phase 1, there were two NRW reduction sub-targets for Phase 2:

Measurement	Performance Target (m3/d)	Percentage
Total NRW Reduction	198,900	
Physical Loss Reduction	97,500	49%
Meter Accuracy Improvement	81,450	41%

The contractor was also required to:

- Replace 150,000 customer meters,
- Install cross-border meters
- Install a telemetry system – using GSM data loggers
- Maintain NRW reduction improvements for the duration of the contract

Incentives

Both Phase 1 and Phase 2 contracts were fixed price contracts. Phase 1 did not have a contractual incentive. Phase 2 included a 5% penalty for not achieving the NRW performance targets.

The NRW penalty was calculated as follows:

$$Penalty = Base\ x\ [1 - \frac{PLA + MAA}{NPT}]$$

Where:

Base	=	5% of the contract value
NPT	=	NRW Reduction Performance Target (average cubic meters per day)
PLA	=	Physical Loss Reduction Achieved (average cubic meters per day)
MAA	=	Loss Reduction due to Metering Accuracy Achieved (average cubic meters per day)

It is unclear whether the contract included interim or annual NRW reduction targets or just the total for the contract. However, it appears the 5% penalty was funded by withholding 5% from fixed payments made to the contractor.

Flexibility

The contractor was given complete responsibility for design and implementation of the NRW reduction activities, including, for example, the freedom to select which zones to work in, where to establish DMAs, how big the DMAs should be and where to install pressure-reducing valves.

Finance

The Phase 1 contract cost the SWD, US$ 4.5 Million; the Phase 2 contract cost was US$ 105 Million. All of the financing was provided by the public entity.

NRW Improvement

NRW reductions for Phase 1 were:

Measurement	Target (m3/d)	Achieved (m3/d)
Total NRW Reduction	18,540	20,898
Physical Loss Reduction	10,450	11,429
Meter Accuracy Improvement	6,400	9,212

During the 18-month Phase 1, the contractor established 29 DMAs and replaced 15,000 meters.

Phase 2 NRW reductions through June 2005, the latest information available – 5 years into the 9-year contract, were:

Measurement	Target (m3/d)	Achieved (m3/d)
Total NRW Reduction	198,900	167,000
Physical Loss Reduction	97,500	117,000
Meter Accuracy Improvement	81,450	50,000

As of June 2005, the contractor had established 222 DMAs and replaced 119,000 customer meters, compared with a contract requirement of 150,000.

Risk Sharing

The SWD performance-based contract is interesting, because it appears to have achieved reasonable results using a standard fixed-fee contract, with a seemingly minor penalty for not reaching fixed targets. The pilot phase appears to have given the parties a "trust-building" period and to have educated the public entity to the point it felt comfortable entering into a long-term, considerably more expensive contract.

The SWD carried most of the financing risk as payments for both contracts were apparently made in advance to the contractor according to an agreed payment schedule.

The contractor's risks under this contract stem primarily from the fixed-price nature of this contract, the long duration of the contract and the penalty. SWD very likely retained the 5% penalty to the very end to ensure that the NRW reduction achievements, which were critical to resolving the water crisis in Kuala Lumpur, were maintained for a 9-year period.

It is difficult, without further information, to assess the incentive strength of the 5% penalty. But, it is obvious that the penalty mechanism would not have incentivized the contractor to do anything more once the NRW reduction targets were met.

Investment Recovery

Based on an average tariff of US$ 0.24[4] per cubic meter and assuming that the 167,000 cubic meters per day water savings achieved by year 5 were spread over the five-year period, that the remaining 31,900 cubic meters per day required to achieve the 198,900 cubic meters per day target were spread over the remaining four years of the contract, and that water savings in each year could be sustained, the payback period for the investment in the project would be approximately 8.9 years.

	SWD
Water savings (m3/d)	198,900
Revenue during contract	US$ 106.5 M
Subsequent annual revenue	US$ 17.4 M
Total contract cost	US$105 M
Payback period	8.9 Years

Stated on a cost per cubic-meter of water saved per day basis, Phase 1 cost US$ 215 per cubic meter and Phase 2 cost US$ 528 per cubic meter. The two costs are not really comparable however, as the Phase 2 contract also included:

- Maintenance of Phase 1 and Phase 2 improvements over the 9 year term of the contract,
- Installation of cross border meters, and
- Installation of a telemetry system.

Pros and Cons

The SWD performance-based contract was simple. It was fixed-fee contract with a target and a performance penalty to incentivize the contractor. The contract appears to have been quite effective. The 18-month pilot phase, it appears, provided both the contractor and public entity a learning, "trust-building" period, which was probably

[4] Selangor average tariff was .77RM/ m3 in 2006 - Ministry of Energy, Green Technology and Water, "Water Tariffs", http://www.kettha.gov.my/en/content/water-tariff, accessed February 2013

crucial for setting the performance target and for costing the Phase 2 contract. The 9-year maintenance period helped to ensure that the contract paid for itself.

The primary "con" for this contract was that the penalty did not provide an incentive to reduce NRW any more than the target. Since increasing water available for sale to help alleviate the water crisis in Kuala Lumpur was the primary purpose of this contract, it would have probably been even more successful had the contractor been given a bonus, such as a percentage of revenues from increased sales due to water savings in excess of the target.

METROPOLITAN WATERWORKS AUTHORITY – BANGKOK, THAILAND[5]

The Metropolitan Waterworks Authority (MWA) performance contracts were to reduce physical losses in 3 of the MWA's 14 district networks. MWA sought competitive bids; but only two firms prequalified. One bidder was awarded contracts to reduce water loss in two districts, the other bidder in one district. All three contracts were for four years and started in 2000.

Baseline NRW

In 1999, NRW for MWA's entire system was estimated at 33% of water produced or 1.5 Million cubic meters per day. Based on studies 1997 and 2000, 87% of NRW was due to leakage in the distribution network.[6] Physical loss baseline values and number of connections for the three district networks are shown below:

	District 1	District 2	District 3
NRW (m3/d)	146,205	130,750	156,218
Pressure (m)	5	8	8
Connections	99,131	238,591	142,478
Liters per connection per day	1,475	548	1,096

[5] Source: Bill Kingdom et al, pages 15 - 19
[6] Anand Chiplunkar, Kallidaikurichi Seetharam and Cheon Kheong Tan, Good Practices in Urban Water Management: Decoding good practices for a successful future (Mandaluyong City, Philippines: Asian Development Bank, 2012)

Targets

The MWA performance-based contracts did not have minimum water loss reduction targets.

Incentives

Contractors were paid a performance fee equal to 50% of the tariff value of the improvement in NRW. The following formula depicts the approximate calculation:

$$Performance\ Fee = (base\ NRW\% - actual\ NRW\%)\ x\ district\ input\ x\ avg.tariff\ x\ 50\%$$

Unfortunately, there were two different performance-fee formulas in the contract documents, which eventually led to a major dispute between the parties.

Flexibility

It appears that the contractors had adequate design and implementation flexibility, including determining the size of DMAs and which mains to replace. It also appears - from reading between lines of available information - that the contractors had the freedom to directly procure outsourced services.

Finance

The total value of the three contracts was $56.2 Million. Payments to the contractors consisted of:

1. The performance fee covering foreign experts, overheads and profits
2. A fixed fee covering the contractor's local staff costs, and
3. Reimbursement of materials and outsourced services and works, such as leakage detection, leakage repairs and pipe replacement — on a cost plus basis.

It is unclear from the information available exactly what the budgeted costs were for each payment component, but it appears that the bulk of the costs were covered by either reimbursement or fixed-fee payments, probably amounting to at least 70% to 80% of the contract.

NRW Improvement

The total improvement over the 4-year period was 165,207 cubic meters per day. NRW reductions by district are included below:

	District 1	District 2	District 3
NRW (m3/d) - Baseline	146,205	130,750	156,218
NRW (m3/d) - Result	106,300	97,353	64,313
Water savings (m3/d)	39,905	33,397	91,905
% Improvement	27%	26%	59%

Risk Sharing

MWA assumed most of the finance risk for these three contracts. The contractor's finance risk was limited to the costs of foreign experts, overheads and profit.

The short-term nature of these contracts, removed any substantive performance risk associated with the need to maintain the water loss reductions achieved.

The contractors appeared to have reasonable flexibility to achieve improved performance; but, without fixed targets and without penalties, the public entity retained some of the performance risks, as not all of the contractors may have achieved the minimum loss reduction that the public entity had hoped for.

Investment Recovery

Stated on a cost per cubic meter per day of water saved, the three contracts cost approximately: $409, $518 and $245 per cubic meter of water saved per day, respectively.

Assuming an average tariff of US$ 0.24 per cubic meter[7] and assuming that the water savings were averaged over the four-year duration of the contracts and that cumulative water savings at the end of the contract could be sustained, the payback period for three districts are as follows:

	District 1	District 2	District 3
Water savings (m3/d)	39,905	33,397	91,905
Revenue during 4-year contract	US$ 7.0 M	US$ 5.8 M	US$ 16.1 M
Annual subsequent revenue	US$ 3.5 M	US$ 2.9 M	US$ 8.0 M
Total contract cost	US$16.3 M	US$17.3 M	US$22.6 M
Payback period	6.6 Years	7.9 Years	4.4 Years

[7] "Thailand's Uncertain Future", *Global Water Intelligence,* Vol2 – Issue 3 (March 2001)

Pros and Cons

The MWA performance-based NRW reduction project's two best features were: 1) that two contractors were engaged, and 2) the tariff-based performance fee. Engaging two contractors probably encouraged some inter-contractor competition and the tariff-based performance fee appears to be an effective way to encourage the contractors to strive to reduce NRW until the very end of the contract.

The lack of minimum targets was probably at least partially responsible for the significant difference in the performance of the three contractors. It would have probably been better to also have minimum water loss reduction targets, with liquidated damages for not achieving them.

SABESP - San Paulo, Brazil[8]

The Companhia de Saneamento Básico do Estado de São Paulo S.A (SABESP) performance-based contract addressed the large amount of commercial losses related to metering inaccuracies and inadequate metering. SABESP analysis had revealed that 30% of their revenue was coming from just 1% of their customers. SABESP designed the project to replace meters for 27,000 of SABESP's largest customers, focusing on proper meter sizing and calibration to improve metering accuracy. Because of the desire to finance this "off-budget" and the State and federal approvals required, the bidding documents took 18 months to develop. There were 5 contract awards. All of contracts started in 2000, and had 3-year durations.

Baseline NRW

A total NRW baseline was not established; instead the flow for each meter was measured before and after replacement.

Targets

Each contract appears to have included a target number of meters to replace or rehabilitate.

[8] Sustainable Development Department Environment Division, *Performance Contracting in the Water Sector – The Case of SABESP*, Inter-American Development Bank, 2004

Incentives

A performance fee was paid to the contractors based on the increase in metered consumption for each new meter installed. Payments were made monthly beginning the month after installation and continued for 12 months. The payments were pro-rated to adjust metered consumption from SABESP's meter reading date, as necessary.

The performance fee was calculated using the following formula:

$$Performance\ Fee\ per\ meter = Net\ Tariff\ \ x\ Meter\ Depreciation\ x\ Metered\ Volume\ Gain\ \ x\ K$$

Where:

Net Tariff - SABESP water and wastewater tariff per cubic meter minus the SABESP overhead component included in the tariff

Meter depreciation (M) - The meter depreciation percentage for the first year after installation

Metered Volume Gain (G) - Weighted average increase in measured consumption for the first three months 3 months after changing the meters. The three month weighted-average period was used to remove seasonal impacts.

K - The factor or fee bid by the contractor. Winning bids included K factors between 0.68 and 0.70

The contractors also guaranteed the new meters for three years after installation.

Flexibility

The contractor was given complete freedom for the design and implementation of the meter replacement program, including, for example, determining which meters to replace.

Financing

All costs for the design, supply, and installation were financed upfront by the contractor. All payments to the contractor came solely from the performance fee paid monthly by SABESP, effectively paid from the increased revenues of the customers whose meters were replaced. Payments to the contractors totaled approximately US$18 Million. SABESP's revenues increased US$ 54 over the 3-year period.

The only costs incurred by the public entity were expenses related to the initial feasibility studies for the project.

NRW Improvements

NRW was reduced by approximately 41,208 cubic meters per day.[9] In addition, the targeted consumers reduced their water consumption by 18% during the course of the project. 28,000 meters were replaced, saving an average of 1,472 liters per connection per day.

Risk Sharing

The contractor carried all design, implementation, performance and finance risk under the contract. Contract technical specifications and the three-year performance guarantee protected the public entity against equipment failure.

The contractor financed all of the costs of its activities, with recovery coming from incremental revenues from increased water sales. The only risk mitigation provision for the contractor was that the increased water sold amount for the performance fee calculation was based on the average water consumption increase for the first three months after installation. This removed the impacts of seasonal consumption changes and customer conservation efforts due increasing bills. As the bidders were all meter suppliers, teamed with engineering firms, their procurement and implementation risks were only moderate. Their expertise and experience probably made this project relatively easy for them to implement.

Management risk for the public entity for this contract was quite low, as the means of monitoring performance — reading the old and new meters — was not complicated.

Investment Recovery

The contract cost per cubic meter of water saved per day (i.e., increase in cubic meter of water sold per day) was approximately $436.

[9] Calculated based on 45 Million cubic meters saved over 3-year contract period.

Using the tariff of R$ 3.49[10] in effect at the time, which translates into approximately US$ 1.76, and assuming that the meter replacement was spread evenly over the three year contract, the payback period for this contract was 1.5 years.

	SABESP
Water savings (m3/d)	41,208
Revenue during 3-year contract	US$ 52.9 M
Subsequent annual revenue	US$ 26.5 M
Total contract cost	US$18 M
Payback period	1.5 Years

Pros and Cons

The SAESP performance-based contracts appeared to have been very successful. Improving meter accuracy can have a significant impact on the public entities revenues and, if tariffs are high enough and meter inaccuracies deemed large enough, can attract contractors willing to fund meter replacements, recovering their investment from the additional revenues.

There are no real "cons" associated with this example, except that the performance fee calculation could have probably been simplified.

SAIGON WATER CORPORATION – HO CHI MINH CITY, VIETNAM[11]

The Saigon Water Corporation (SAWACO) performance-based contract was to reduce physical leakage in Zone 1 of Ho Chi Minh City. The scope of work, included:

Primary focus

- Establishment of DMAs
- Leakage reduction and management services

[10] Sustainable Development Department Environment Division, *Performance Contracting in the Water Sector – The Case of SABESP*, Inter-American Development Bank, 2004, page 7

[11] Sources: E. Largo, N. Catipon , "*The Leakage Reduction Strategy in Low Pressure Conditions: The Manila Water Company Experience in the Ho Chi Minh City NRW Reduction Project*", IWA Water Loss 2012, http://www.iwa-waterloss.org/2012/Final_Papers_2/65.pdf , accessed February 2013 and Saigon Water Corporation, *Performance-based Leakage Reduction and Management Bid Document (Sanitized)*, The World Bank, 2012

Secondary focus

- Installation of new supply connections for new customers inside the contract area
- Emergency and unforeseen work – e.g., repair of leaks on trunk mains outside the contract area

The contract was competitively bid, using a two envelope method with 10 pass/fail technical criteria to ensure a minimum technical competency of the firm and the team and to ensure that the bidder has a minimum financial capacity considered necessary. The total bid price was then used to select the lowest qualifying bid. Four bids were submitted; of those, two bidders were evaluated as being technically qualified.

The contact started in 2008.The duration of the contract was 5 years, 4 years to achieve leakage reduction and 1 year maintenance, to maintain the lower NRW performance and train SAWACO staff to take over DMA management. There were approximately 139,000 connections in Zone 1.

Baseline NRW

During the preliminary feasibility study, NRW for Zone 1 was estimated at 40% of Zone 1 input. For purposes of the performance-based contract, however, separate baselines were established for each DMA set up, prior to commencing any leakage reduction activities. Prior to establishing the NRW baseline for a given DMA, SAWACO had the opportunity to identify and replace any under-registering customer meters. The baseline was the difference between the DMA inflow meter reading and the sum of customer meter readings taken at the beginning and end of a 7- day period, stated in average cubic meters per day.

An average pressure baseline for each DMA was also established by electronically logging pressure at 5 minute intervals over the 7-day period. This was to be used to calculate the water saved in the quarter, if the average DMA pressure was more than 1 m higher than the baseline.

Targets

The primary target for the performance-based contract was to reduce leakage by 37,500 cubic meters per day by the end of year 4. The contract included the following annual targets:

End of Year	Leakage Reduction Target (m3/d)
Year 1	2,000
Year 2	10,000
Year 3	20,000
Year 4	37,500

A secondary target was to establish 119 DMAs by the end of year 4.

Incentives

As depicted in the following formula, the primary incentive for this performance–based contract was the payment of a performance fee, calculated by multiplying the bid performance fee per cubic meter of water times the water saved during the quarter. The water saved in each quarter was the difference between the total water saved at the end of the quarter minus the total water saved the previous quarter. The water saved each quarter was the sum of the water savings for all DMAs, calculated as the difference between the baseline leakage and the leakage at the end of the quarter for each DMA.

$$Performance\ Fee\ Payment = Performance\ fee\ per\ m3\ x\ water\ saved\ during\ the\ quater$$

$$Water\ Saved\ = \sum_{DMA} (water\ flow\ baseline - water\ flow\ end\ of\ Qtr)$$

$$Water\ Saved\ During\ Qtr = water\ saved\ previous\ Qtr - water\ save\ current\ Qtr)$$

Other incentives included:

- A fee for each illegal connection identified, which was equal to half of the performance fee for a cubic meter of water;
- Liquidated damages for not setting up the target number of DMAs;
- Liquidated damages for not achieving the interim water saving targets;
- The retention of a percentage of the quarterly performance-fee payments until the end of the maintenance period to ensure that water savings are maintained;
- Liquidated damages if corrective action is not taken, when the 7-day average minimum night flow for a DMA increased above the target minimum night flow for the DMA. An increase in the minimum night flow indicates a possible increase in leakage. Under the contract DMA inflows and pressures must be monitored continuously.

It is unclear exactly what the retention percentage was, however a template for performance-based leakage-reduction contracts developed by the World Bank based on the SAWACO contract, recommended that retention percentage be substantial, e.g., 20%, to incentivize the contractor to maintain the water savings achieved through year 4.

Flexibility

The contractor is required to set up DMAs generally according to a DMA Outline Plan that became part of the contract which designated the general locations for the 119 DMAs. However, the contractor had the flexibility to prioritize the works and to adjust DMA boundaries based on its detailed investigations. The contractor also has the flexibility to prioritize its leakage repair works.

Finance

Payments to the contractor included:

- General - a minimal fixed fee;
- Leakage reduction and management - a 30% fixed fee and a 70% performance fee based on achievement of minimum targets;
- Initial establishment of DMAs - a fee per DMA set up, plus unit prices for extra activities not in the basic DMA price; and,
- System expansion-– unit prices to add customers to the network within the contract area;
- Unforeseen activities - unit prices covering repairs, requested by SAWACO, outside the contract area.

The total contract cost was estimated at $15Million[12], with the contractor pre-financing the DMA set-up and 70% of leakage reduction investment, which together probably amounted to approximately 40% to 50% of the contract value. The contractor's investment recovery came from fixed fees per DMA after they were set-up and the performance fee for each additional cubic meter of water per day saved each quarter.

NRW Improvement

As depicted in the following table, by the end of contract year 3, the contractor had exceeded the water savings target for year 4, by 1,452 cubic meters per day.

[12] Manila Water clinches $15 Million Leak Reduction Contract in Vietnam, Asia Water Business, 2004, http://www.asiawater business.com/news_show.php?language=English&n_id=2188, accessed February 2013

Results as of August 2011 (End of Year 3)	
NRW (m3/d) – Reduction Achieved	38,452
NRW (m3/d) – Year 4 Target	37,500

The contractor achieved the water saving after establishing only 29 DMAs out of the 119 in the original DMA Outline Plan.

Risk Sharing

The contractor appears to have shared a reasonable portion of the finance risk associated with this project. As discussed above they probably pre-financed around 40% to 50% of the project cost. The performance targets appear to have been easier to achieve than SAWACO expected. And, the one-year maintenance period was short, minimizing the contractor's performance risk.

Investment Recovery

The contract value was $15 million, which translates into US$390 per cubic meter of water saved, assuming no further increase in water saved during the fourth year.

Assuming an average tariff of $0.28 per cubic meter and assuming that the total NRW reduction at the end of year 3 of 38,452 cubic meters per day represents the total water saved during the contract, the contract would have a payback of approximately 4.8 years.

	SAWACO
Water savings (m3/d)	38,451
Revenue during 5-year contract	US$ 11.8 M
Subsequent annual revenue	US$ 3.9 M
Total contract cost	US$15 M
Payback period	4.8 Years

Pros and Cons

It is apparent that the SAWACO performance-based contract reflects lessons learned from earlier contracts. It includes a substantial performance-based fee, liquidated damages for not achieving minimum performance targets and payment retention until the end of the contract to encourage the contractor to maintain NRW reductions through

the end of the contract. Charging liquidated damages if DMA night-flow increases too much, which indicates an increase in leakage, was also a good incentive to maintain NRW reduction savings during the maintenance period.

The performance fee calculation also encouraged the contractor to continue reducing NRW during the 4-year leakage reduction period, even after the targets were achieved.

The use of DMA-specific baselines also seems to be a good idea, as historic system-wide data is often unreliable. The requirement that GSM-telemetry systems be set up made monitoring DMA-specific data relatively easy.

The primary "con" of the SAWACO contract was the short, 1-year maintenance period considering the typical problems that public entities have maintaining NRW reductions. However, the penalty-only incentive during the maintenance period would probably not have worked effectively for much longer than a year.

WATER AND SEWERAGE CORPORATION – NEW PROVIDENCE, BAHAMAS[13]

The Water and Sewerage Corporation (WSC) signed a performance-based contract to reduce NRW in 2012, including both physical and commercial losses. The contract is for 10-years. The contract term is split into two phases: first a 5 to 7 year NRW reduction phase, then a 3 to 5-year maintenance phase, during which the contractor is required to maintain the water savings achieved during the NRW reduction phase. Initially, the NRW reduction phase was to be 5 years, however this was changed during negotiations when an additional NRW reduction target was added for year 7.

The scope of work includes the following sub-components:

- Conduct a NRW based line survey and develop a detailed NRW reduction strategy;
- Leakage detection and repairs;
- Construction works and provision of equipment, including mains and service lateral replacement, pressure control , data collection and monitoring;
- Provision and installation of a NRW management information system;
- Training for WSC staff and other consulting services, as required.

[13] Primary sources: Water and Sewerage Corporation, Request for Proposals – Reduction of Non-Revenue Water (New Providence), 2009 and Water and Sewerage Corporation, Draft Contract for Consulting Services, November 2011.

Approximately 9,000 new customers are to be connected to the network. Currently WSC has about 38,000 customers in New Providence.

Baseline NRW

NRW was estimated at around 50% of water system input or approximately 27,275 cubic meters per day. The NRW baseline is to be established during the first five months of the contract. A preliminary baseline is being used until the 12-month baseline can be established. The new NRW baseline, stated in gallons (imperial), will be adjusted:

1. If the number of new service connections installed in a year is less than was forecasted, or
2. If the total active connections exceed the forecast connections for the year, if the percentage of new service connections installed by the public entity found leaking exceeds the percentage of service connections installed, repaired or replaced by the consultant.

Targets

The ultimate objective is to reduce NRW by 3 Million imperial gallons or approximately 13,640 cubic meters per day, with NRW reduced to approximately 11,365 cubic meters per day by year 5 and to 13,640 by year 7. Unlike other contracts analyzed, the NRW reduction targets for this performance-based contract are stated in gallons (imperial) of water saved for the year, rather than cubic meters of water saved per day. As discussed below, the performance fee is based on a shadow-tariff-type base rate per cubic meter of water saved.

Incentives

The contractor is to be paid a performance fee representing approximately 30% of the contract value.
The performance fee is calculated by multiplying a base rate per gallon times the actual NRW reduction for the year. The actual NRW reduction is the difference between the NRW baseline, as adjusted, and the actual NRW for the year, adjusted for increases in pressure. The base rate per gallon is essentially a shadow tariff, apparently representing the opportunity cost of the water saved.

$$Performance\ Fee = Base\ rate\ x\ Actual\ NRW\ Reduction\ for\ the\ Year$$

$$Actual\ NRW\ Reduction\ for\ the\ Year = NRW\ Baseline\ (adjusted) - Actual\ NRW\ for\ the\ Year\ (adjusted)$$

The contractor was also required to provide a performance bond equal to 3% of the total contract value. If the contractor does not achieve the annual NRW reduction targets for two consecutive years, the public entity is entitled to draw from the performance bond an amount equal to the performance fee rate per cubic meter times the difference between the NRW reduction target for the second year and the actual NRW reduction achieved during the two year period.

Flexibility

The contractor appears to have complete control of technical design and implementation. It also appears to have control over procurement for main and service lateral replacement and pressure control equipment.

Financing

The total budgeted contract value of US$50 Million was used for this report. The contract was to include the following components:

- NRW baseline survey and NRW reduction strategy – US$ 3 Million
- Leakage reduction and repairs – US$ 13.5 Million
- Construction works and equipment, including mains and lateral replacement, pressure control, data collection and monitoring – US$30 Million
- NRW asset management system - US$ 2 Million
- WSC staff training – US$ 0.5 Million
- Consulting services to assist implementation – US$1 Million

The contractor remuneration is split:

- 30% based on performance (equivalent to US$ 15 Million) , and
- 70% fixed, based on an agreed schedule (equivalent to US$35 Million).

The contractor is to be paid the performance fee in in monthly installments equal to the performance fee rate per cubic meter times 85% of the NRW reduction target for the year. At the end of each year the payment to the contractor will be "trued up" based on the actual NRW reduction during the year compared to the NRW target for the year.

NRW Improvement

This performance-based contract has just started. The expectation is that it will result in a decrease in NRW of at least 13,640 cubic meters per day.

Risk Sharing

The contractor carries the design, implementation and performance risks and some finance risk for the WSC performance-based project. The public entity carries most of the finance risk. While 30% of the contract value is paid based on performance (the equivalent of US$ 15 Million), 85% of the annual performance fee will be paid monthly and then "trued up" at the end of the year. The performance fee payments are based on the actual NRW reduction per year, which backloads payments to the contractor increasing its financial risk.

Investment Recovery

The cost per cubic meter per day of water saved is extraordinarily high for this contract. Using the total contract cost the cost per cubic meter per day is US$ 3,666.

The cost of water in the Bahamas is also high, reflecting the high cost of desalination. The average tariff is $1.43 per cubic meter. Using the average tariff and assuming that water savings of 11,365 cubic meters per day is average over the first 5 years and the remainder of 2,275 cubic meters per day is average over two years, years 6 and 7; and assuming that the NRW reductions are maintained afterwards, the contract would have a payback of approximately 9.4 years, using the budgeted value for the contract. .

	WSC
Water savings (m3/d)	13,641
Revenue during 9-year contract	US$ 46.6 M
Subsequent annual revenue	US$ 8.0 M
Total contract cost	US$ 50 M
Payback period	9.4 Years

Pros and Cons

WSC uses a fee per gallon of water saved to compensate the contractor for reducing NRW in the system. This provides a significant incentive for continuing to reduce NRW. This also provides the contractor with a reasonable incentive during the long maintenance period.

The performance bond mechanism also appears to be an effective way of ensuring that minimum targets are met and maintained.

As the NRW baseline and NRW reduction are stated in annual volumes per year, the baseline amount must be based on projections, incorporating additional water flows into the network and increasing connections. This complicates the calculation.

The contractor does not appear to completely control the work site, at least not to the same extent that the contractor controls the DMA under the SAWACO contract. This adds a further complication as both the contractor and the public entity will be adding connections in the work area during the contract, probably with differing levels of concern for workmanship. The contract incorporates a potential adjustment to the NRW baseline for this; however, it may be hard to on agree the leakage percentages for public entity installed connections versus contractor installed connections; which may cause disputes between the parties over time.

Also, while the actual NRW used in the performance fee calculation is adjusted for pressure changes, it does not appear to be calculated at the DMA or Zone level and rolled up. As pressures vary in different parts of the network and at different times during the day, it may also be hard to agree on the amount of the pressure adjustment during the implementation of the contract.

KOLKATA MUNICIPAL CORPORATION – KOLKATA, INDIA[14]

The Kolkata Municipal Corporation (KMC) is planning to procure a contractor to reduce NRW in Zone 1 of its service area, using a performance-based contract which is currently being developed by the Asian Development Bank. This analysis is based on a draft of that contract.

The project will focus primarily on physical losses. The contract will be for four years, with a 3-year NRW reduction phase and a 1-year maintenance phase, during which the contractor will be required to maintain the water savings achieved.
The scope of work will include the:

- Set up of DMAs, in 6 Wards, including construction of DMA feeder mains, as necessary, installation of inflow meters, pressure reducing valves, data loggers, etc.;
- Metering of all existing unmetered connections - currently only large industrial, commercial and institutional connections are metered;

[14] Sources: Asian Development Bank, Kolkata Environmental Improvement Project (KEIP), Phase II – *Performance-based Water Loss Reduction Project.(Draft Contract)*; and Miya Water Projects Netherlands B.V. *Preparation of Performance-based Water Loss Reduction Project*, October 2012

- Leakage reduction and management, including repairs and pressure management; and,
- Replacement of mains, pipes and service connections, as necessary - it is estimated that all existing service connections in the Zone need to be replaced.

There are approximately 251,000 people living in the zone, it is estimated that there are around 24,500 connections; including standpipes in slum areas and current illegal connections.

Baseline NRW

The baseline for this contract has yet to be established, however NRW was recently estimated at around 63,000 cubic meters per day, or 65% of system input.

Targets

The project goal is to reduce NRW by around 40,000 cubic meters per day. The contract will include annual minimum targets of 10,000 and 20,000 cubic meters per day for year 2 and year 3, respectively.

Incentives

While the project design is still being finalized, it is expected that the contract will include a performance payment for achieving and maintaining loss reduction targets. Bidders will bid a total cost of the Water Loss Reduction and Management Services component and then bid the percentage of the total component cost to be paid based on water loss reduction performance, subject to a minimum of 30% of the total component cost. The performance fee will then be stated on a cubic meter of water savings basis, dividing the performance fee by 40,000 cubic meters per day.

The performance fee payment will be calculated by multiplying performance fee per cubic meter times the actual NRW reduction for each quarter. The actual NRW reduction at the end of the quarter is sum of the difference between the NRW baseline for each DMA, stated in cubic meters per day and the actual NRW for the quarter, adjusted for increase in pressure. The NRW reduction for the quarter will be equal to the NRW reduction at the end of the current quarter minus the NRW reduction at the end of the previous quarter. To incentivize the contractor during the maintenance period a final NRW reduction value will be calculated at the end of maintenance period, resulting in a true-up, with payments either to or from the contractor.

$$Performance\ fee\ payment = fee\ x\ Actual\ NRW\ Reduction\ for\ each\ quarter$$

$$Actual\ NRW\ Reduction\ = NRW\ Baseline - Actual\ NRW\ at\ the\ end\ of\ the\ quarter$$

$$Actual\ NRW\ Reduction\ for\ the\ quarter$$
$$= Current\ Quarter\ Actual\ NRW\ Reduction - Pervious\ Quarter\ Actual\ NRW\ Reduction$$

The contract will include minimum water loss reduction targets for years 2 and 3, stated in cubic meters per day. If the minimum targets are not met, after a 30-day grace period, the contractor will be required to pay liquidated damages.

The contract will have annual DMA targets, indicating the minimum number of DMAs that must have been established each year. The contract will be required to pay liquidated damages for failure to achieve the minimum targets.

There will also be liquidated damages required if the 7-day average night flows in a DMA increase by more than the specified target value, if this cannot be corrected within a 14 day period. This provides an incentive to the contract to monitor leakage during the maintenance period.

To further incentivize the contractor during the 1-year maintenance period, the contract also requires that 5% be retained from water leakage reduction and maintenance payments, both from the fixed and the performance fee until the end of the maintenance period.

Flexibility

The contractor will have substantial design and implementation flexibility. For example, the contractor is free to subcontract for most of the construction-type activities, including:

- Main inspection
- Civil works
- Pipe laying works
- Meter installation
- Leak repair
- Road reinstatement

Financing

The estimated value of the Kolkata performance-based contract is US$20 Million. The leakage reduction and management component of the contract is estimated to be approximately US$ 9 Million.

NRW Improvement

This contract is expected to start some time in 2013. The objective is to reduce NRW by 40, 000 cubic meters of water per day.

Risk Sharing

The contractor carries the design and implementation risks under the contract, principally as poor design or implementation may not achieve the water savings expected. The public entity carries most of the financial risks as it must arrange and be liable for project financing. The contractor must pre-finance the DMA set-up and at least 30% of the water loss reduction and management component, representing the performance fee portion, approximately equivalent to US$ 2.7 Million or 13% of the total estimated contract value.

Investment Recovery

As designed with at an estimated cost of US$ 20 Million and if the 40,000 cubic meters of water per day is saved, this project will cost US$ 500 per cubic meter of water saved per day. As domestic customers, which represent 82% of water demand in the zone, are not charged for water, and the low reported cost of water (US$0.06) it is difficult to estimate a realistic payback period for this contract. Using the cost of water, the calculated payback period would be 46.7 years.

Pros and Cons

The KMC performance-based contract fee for water saved provides reasonable incentives to encourage the contractor to exceed the performance minimum loss reduction targets. The threat of liquidated damages for not achieving the minimum targets for DMAs established and for NRW reduction also provides strong incentives to perform.

The true-up of performance payments, the 5% retention of the water loss reduction and management component, plus the threat of liquidated damages for night flow excesses, will probably be adequate to maintain water loss reductions during the maintenance period.

The 3-year leakage reduction period, however, appears too short to realize substantial savings, as customer meters have to be installed before a realistic NRW baseline can be calculated.

LESSONS LEARNED

Based on analysis of the six example contracts, there are lessons learned that would be applicable to performance-based contracts to reduce NRW by Water Districts in the Philippines.

A GOOD BASELINE IS CRITICAL

Any agreement to pay based on performance requires a good baseline to measure improvement against. The baseline must be acceptable to both parties to the contract. It should ideally be stated in units that tie directly to the performance objective. Thus, if the objective is to reduce water leakage then the baseline should be defined in units of water, e.g., cubic meters per day. The baseline should just cover the network under the control of the contractor otherwise adjustments will have to be made to take into consideration the actions of the public entity.

TARGETS ARE IMPORTANT

Setting targets are important to achieving minimum performance. MWA was the only example found without specific targets for NRW reduction. Most contracts included minimum annual targets indicating their perceived usefulness. When projects are intended to reduce both physical and commercial losses, it makes sense to have targets for both, plus an overall target; but to allow the contractor some flexibility in achieving the overall goal.

REPLACING METERS CAN HAVE A QUICK PAYBACK

Based on the SABESP experience, it would appear that a project to improve meter accuracy can be a quick win for both the public entity and private contractor. By increasing revenues, meter replacement could generate the cash from the additional revenues needed to help pay for more costly physical loss reductions.

Meter accuracy is also important to reducing physical losses and thus should be a component of physical loss reduction contracts, unless current meter-readings are considered reliable.

ESTABLISHING DMAS IS A BEST PRACTICE

If physical loss reduction is the objective, establishing DMAs is a best practice, as they facilitate more accurate baseline water loss measurement, leak detection and pressure management. Also, DMAs make performance measurement easier. DMAs also provide a limited site, i.e., the network between the inflow meter and the customer meters, which can be controlled by the contractor and handed back to the public entity at the end of the contract.

PERFORMANCE FEES SHOULD BE LINKED TO LEAKAGE REDUCTION

The bulk of the expenditures for projects to reduce physical losses are for the supply and installation of infrastructure, e.g., to replace pipes, valves, hydrants, etc. These activities are not technically difficult and should be priced at unit rates. However, special expertise is required for the leakage detection and pressure management component which directs the infrastructure supply and installation activities. The performance fee should therefore be linked to the leakage reduction costs, which typically includes leakage detection, pressure management and repairs; but not the replacement of assets.

Most of the contracts for physical losses calculated the performance fee by first splitting the contractor bid price for Leakage Reduction and Management component into fixed and performance components and then dividing the performance component by an amount of leakage reduction, stated in cubic meters of water saved per day. This produces a performance fee per cubic meter of water saved per day which links a percentage of the contractor's payment to performance.

The performance-based fee percentage has varied widely, from 70% in the SAWACO – Ho Chi Minh contract to 30% in the draft KMC-Kolkata contract.

Use Liquidated Damages, Retentions and True-Ups during the Maintenance Period

Requiring liquidated damages for not meeting minimum targets, or for not reducing night flows during the maintenance period seem to be an accepted way of incentivizing contractors. Retentions and true-ups, i.e., recalculating performance fee payments for NRW reduction at the end of the maintenance period, seem equally useful.

The World Bank template for performance-based leakage reduction contracts which was based on the SAWACO - Ho Chi Minh contract recommends using a high retention percentage - around of 20% - of the Performance Payment until the end of the maintenance period.

Maintaining NRW Reduction over the Long-Term

Most of the contracts analyzed were focused primarily on rapidly reducing physical losses. Maintenance periods were often quite short, designed to function like works contracts, with one-year warranty periods. However, maintaining loss reductions is often beyond the institutional capabilities of the public entity, as evidenced by SWDs decision to return Phase 1 assets to the contractor's control for Phase 2.

Most of the contracts used NRW reduction true-up at the end of the contract, liquated damages linked to night flows and/or retentions to maintain loss reductions during the maintenance period. These mechanisms would not seem appropriate if the contractor was to maintain the loss reductions for a longer period, for example until investment to reduce NRW had been recovered.

The WSC contract example indicates contractors may be willing help preserve NRW reductions for a longer period if compensated through a revenue sharing mechanism.

Trial Phases Can Help Both Parties

The SWD performance-based contract is interesting in that the contract design and negotiation and start-up of Phase 2, appears to have taken only six months from the end of Phase 1. This was actually a short period considering that parties were entering into a fixed-fee a US$ 100 Million contract and having begun discussions as the result of an unsolicited proposal. This indicates that the 18-month US$ 4.5 Million Phase 1 contract helped to educate both parties and built a level trust between parties which made the Phase 2 contract easier to design and negotiate. As performance-based

contracts are still new and evolving, a similar phased approach would probably be helpful.

STAFF TRAINING TO MAINTAIN LOSS REDUCTION

Reducing water losses involves specialized leakage detection and pressure management expertise. Maintaining water loss reductions requires a program of continuous leakage monitoring and repair, pressure management, and preventative maintenance. To maintain the water loss reductions achieved by contractor, the public entity must strengthen its technical expertise and must focus staff and financial resources and management attention on sustaining and adding to the reductions achieved by the contractor. Most of the performance-based contracts reviewed included a training component, which required the contractor to train public entity counterparts during the project. The contract could also require that the contractor transfer leakage detection equipment to the public entity at the end of the contract. However, the real challenge of ensuring that adequate management attention, expertise and resources are available and focused on maintaining the loss reductions over the long-term after the contractor leaves, must be solved by public entity alone.

USE OF NRW REDUCTION PERFORMANCE-BASED CONTRACTS BY PHILIPPINE WATER DISTRICTS

USING PERFORMANCE-BASED CONTRACTS TO REDUCE PHYSICAL LOSSES

Philippine Water Districts would probably realize significant benefits from using performance-based contracts to reduce physical losses. The table below values the physical water losses for a sample of Philippine Water Districts, assuming 60/40 split between physical and commercial losses.

Figure 4 - Sample Value of Water District Physical Losses[15]

Water District (WD)	System Input (m3/d)	NRW (%)	NRW (m3/d)	Physical Losses (m3/d)	Commercial Losses (m3/d)	Value of Physical Losses (PhP/year)
Macabebe WD	11,646	65%	7,570	4,542	2,725	29,460,255
Zamboanga City WD	62,613	50%	31,306	18,784	11,270	143,978,198
Isabela City WD	6,721	39%	2,621	1,573	944	8,426,875
Teresa WD	5,806	38%	2,206	1,324	794	10,629,011
Metro Naga WD	58,104	35%	20,336	12,202	7,321	70,991,433

Leakage detection and pressure management to reduce and maintain low leakage levels is an evolving expertise. Real expertise is highly valued and in short supply. Unlike for commercial losses, it is extremely unlikely that Philippine Water Districts have the in-house expertise, procurement flexibility or resources to reduce and sustain physical losses, without assistance.

[15] Based on data obtained by Philippine Association of Water Districts (PAWD)-Water Operators Partnership (WOP) Needs Assessment Survey in 2012 supported by PWRF-FP

RECOMMENDED MODEL CONTRACT FRAMEWORK FOR WATER DISTRICTS

Performance-based Contract Structure

A performance-based contract to reduce water losses in the Philippine Water Districts should include the following general structure:

1. It should cover only the DMAs, with control of the DMA network, from the inflow meter to the customer meter, transferring to the contractor when the DMA and the NRW baseline have been established

2. It should include two phases or periods:
    a. a Leakage Reduction and Management Period, and
    b. a Maintenance Period

3. Training for WD staff

The Leakage Reduction and Management period should be set based on the estimated length of time required to establish DMAs and to reduce physical losses within the contract area. This would generally be governed by the number of connections, age and condition of the assets, and geological conditions which impact the efficiency of leakage detection techniques. The Maintenance period should be set based on time necessary to recover the investment and required to build the capacity of the Water District to take over the loss reduction management operations.

During the Leakage Reduction and Management Period the contractor would provide the following services:

- Establishment of DMAs, including design, supply and installation of boundary valves, flow meters, pressure reducing values, and pressure loggers and construction of inflow chamber and the laying of water mains, as required, to isolate the DMA and with:
    a. Minimum annual targets for the number of DMAs to establish, and
    b. Liquidated damages for not achieving the minimum target in the respective year.

- Leakage Reduction and Management Services, which will include:
    a. Setting a physical leakage baseline for each DMA in cubic meters per day, as the difference between average water inflows to the DMA over a seven-day period and the average customer consumption over the same period;
    b. Establish a leakage model for each DMA to estimate average night flows
    c. Leakage detection , pressure management and repairs;
    d. Replacement of pipes, service connections, etc., as required;
    e. Quarterly physical leakage measurement to quantify water savings;

During the Maintenance Period, the contractor would maintain the leakage levels achieved during the Leakage Reduction and Management Period, monitoring night flows and taking corrective actions as necessary. However, if water flows are intermittent, the night-flows method of estimating physical losses may not be effective and a meter-reading method will have to be used.

As needed, the following additional activities would also be included in the contract:

- System expansion, to install new connections with a DMA, if requested by the Water District, with payments made based on unit prices per a Bill of Quantities. The Water District will be responsible for all costs.
- Meter Replacement, to replace customer meters, if requested by the Water District with payments made on unit prices per Bill of Quantities. The Water District will be responsible for costs.
- Emergency or Unanticipated asset repair or replacements, outside or inside the DMA, if requested by the Water District with payments based on unit prices per Bill of Quantities. The Water District will be responsible for all costs.

Under a performance-based contract, the contractor could be compensated by the Water District through a mixture of fixed fees and performance fees, or purely performance-based fees based on the volume of leakage reduction achieved and unit prices per a Bill of Quantities bid by the contract for the additional work.

Due to the shortage of funds available to the Water Districts it may be necessary for the contractor to provide funding for the DMA Establishment, Leakage Reduction and Management and Maintenance components of the project; if so, the contractor could be reimbursed from the Water District based on the value of the water saved. This will very likely require extending the maintenance period until the investment made by the contractor is paid back and a reasonable profit is recovered.

Recommended Legal Basis: BOT Law

Although a water district has sufficient authority to enter into contracts under the BOT Law and enter upon a joint venture agreement pursuant to the NEDA JV Guidelines, the requirements of a performance-based contract are best addressed under the legal framework and contractual modalities recognized under the BOT Law. Not only does the BOT Law provide a stable legal framework for undertaking performance-based contracting for non-revenue water reduction, the approvals process under the BOT Law provide safeguards to the water district in undertaking a non-revenue water reduction project under a performance-based arrangement.

As findings indicate that conduct of feasibility study will greatly enhance the viability of the project, taking the BOT Law route will permit the water district to tap the Project Development and Monitoring Facility ("PDMF") established under Executive Order No. 8 and administered by the Public-Private Partnership Center ("PPPC"). The PDMF provides funding to assist the implementing agencies, such as water districts, to undertake the following in projects approved for PDMF support pursuant to the PDMF Guidelines:

- Preparation of project pre-feasibility studies and feasibility studies;
- Project structuring;
- Preparation of bid documents and draft contracts;
- Transaction advisory;
- Assistance during bidding process through award

In addition, considering the constraint on tariffs (as source of revenue), income allocation, as well as limitation on borrowing,[16] investment in a JV would not appear to be the best solution. Indeed, in P.D. No. 198, the apparent preferred partner in cooperative activity is the Government or any of its agencies or political subdivisions, as Section 30 states "[s]pecifically, but without limiting said general power, a district may enter into the following contracts: (a) Cooperation Agreement with the Government of the Philippines or any of its agencies or political subdivisions for the cooperative or joint performance of any function of the district." Following the launch of the government's PPP program, there have been indications that further policy decision will be taken on whether the JV agreement is a BOT variant that should be implemented pursuant to the BOT Law. The uncertainty with regard to direction with regard JV agreements under the NEDA JV Guidelines cautions against its use in performance-based contracting for NRW reduction.

[16] Presidential Decree No. 198, Section 35, as amended by Section 16, Presidential Decree No 768 and Section 7, Presidential Decree No. 1479, states that "[w]here a water district has borrowed money from the Administration, the district shall not borrow money or incur further obligations from other sources without the prior written consent of the Administration.

Considering the main components and the challenges to designing the project to attract private sector while meeting the NRW reduction, performance-based contracting elements can be best accommodated under BOT Law using the **Rehabilitate-Operate-Transfer (ROT)** model:

Water District	Private Sector Participant
Provide the facility for rehabilitation	Rehabilitate existing facility, operate the same to provide expertise in leakage detection and pressure management
Provide contribution or support, including cost sharing, which means bearing a portion of capital expenses associated with the establishment of the facility, such as partial financing that shall not exceed fifty percent of Project Cost (in which case, bid parameter may include lowest government share); may share in revenue, whether on fixed fee or percentage basis	Permitted to receive repayment by way of remittance derived from reasonable tolls, fees, and charges for a fixed term (BOT Law IRR, 12.16.1[a]) and where applicable, the proponent may likewise be repaid in the form of a share in the revenue of the project or other non-monetary payments. Share in revenue for the agency may be in form of fixed fee or percentage of revenue or combination of both as indicated in bid documents and provided in contract.
	The private sector proponent shall within the contract term and warranty period undertake the necessary and appropriate repair and maintenance of the project, in accordance with the design and performance standards, and other terms provided in the approved contract, and in order to ensure that the facility operates at the desired level of services. For this purpose, and where applicable, a portion of the project's revenues equivalent to the cost of repair and maintenance shall be set aside and reserved exclusively for repair and maintenance costs (BOT Law IRR, Section 12.15)
May assess liquidated damages against the private sector, step-in, revoke or rescind	May be made liable for liquidated damages as indemnity (for both construction and operation phase), which may be taken from the performance security.

Regardless of contractual mode, contracts under the BOT Law must contain the following mandatory provisions:

- specific contractual arrangement, term, and scope of work;
- project technical specifications and system features;
- implementation milestones;
- cost recovery scheme via proposed tolls, fees, rentals and charges;
- liquidated damages;
- performance and warranty bonds;

- acceptance tests and procedures;
- warranty period and procedures (after transfer);
- grounds for and effects of contract termination including modes for settling disputes;
- the manner and procedures for the resolution of warranty against corruption; and
- compliance with all other applicable laws, rules, and regulations.

A more detailed review of applicable Philippine laws and regulations in included in **Annex B** of this report.

Risk Allocation under a ROT Arrangement

The risk allocation under a rehabilitate-transfer-operate arrangement is discussed in the risk matrix below:

Risk	Definition	Preferred Allocation	Rationale	Possible Mitigation Strategies	Allocation Instrument
Pre-contract risks					
Procurement	Risk that the procurement process will experience any of the following: (a) failure to attract sufficient qualified bidders and/or responsive offers; (b) prolonged and expensive negotiations; or (c) collapse of negotiations.	Water District	Government does not have a partner yet at this stage, so it has no option but to bear this risk.	Carefully prepare and manage the procurement process Ensure that the WD's procurement team is experienced and competent Establish a procurement schedule commensurate with project complexity	Since there is no agreement yet signed with any other party, there is no specific allocation instrument
DMA Establishment					
Plan and Number of DMAs	Risk that WD plan on establishment of DMAs is not in accordance with field conditions	Shared	The DMA establishment plan is done by the WD at FS preparation and contractor might have a different strategy after more in depth review of field conditions	WD and the contractor will discuss the revised plan, if at all there is such a suggestion by the contractor.	Cost of establishing DMAs shall be based on bill of quantities included in the bid documents.

Risk	Definition	Preferred Allocation	Rationale	Possible Mitigation Strategies	Allocation Instrument
Permits and approvals	Risk that necessary approvals (for example, management plan, construction permit) may be obtained or may be obtained only subject to unanticipated conditions which have adverse cost consequences or cause prolonged delay	Private proponent with the assistance of the WD	Private is better informed about the rationale for its request; and WD is better informed and positioned to influence the speed of the approval process, particularly in situations that are complex or sensitive	WD to inform in advance the LGU of the anticipated works Private proponent to secure all other permits.	Bid documents listing all permits and approvals required and Contact clause stipulating the schedule to obtain permits and approval
Required works at the DMAs to realize water savings	Risk that events occur during construction or repairs or replacement of pipes, which prevent operation of the system and realization of savings at budgeted cost and timeline	Private except when: The event is one for which relief as to time or cost or both is specifically grounded under the contract, such as force majeure or due to WD intervention	Private propo-nent has more experience, knowledge and control over the variables that influence construction cost and control over construction process (i.e., schedule, equipment, materials and technology, etc.)—this assumes that private propo-nent has enough information to estimate costs and start operations on schedule and as planned	Incorporate strict experience and competency requirements in the procurement process Ensure that feasibility study is available well in advance of the procurement process	Contract clause requiring performance bond Contract clause stipulating liquidated damages
Additional works required by the WD in the DMAs/outside of DMAs	Risk of unforeseen work to be done to effectively realize water savings in the DMAs	Water district as the additional works are at eh request of the WD	Water district is in control of the additional works required	Base price of the additional works on the bill of quantities included in the bid terms of reference	Bill of quantities specified in the bid TOR

Risk	Definition	Preferred Allocation	Rationale	Possible Mitigation Strategies	Allocation Instrument
Sponsor and Financial Risk					
Interest rates pre-completion	Risk that prior to completion local currency interest rates may move adversely	Private	Private proponent, as part of its due diligence, should get information regarding the factors influencing local currency interest rates and hedge if the interest rate regime is volatile	Get loans with hedging instrument such as interest rate caps. Currently private banks offer variable rates with one time option to fix	Contract clause allocating financing risk to the private proponent at construction stage
Interest rates post completion	Risk that after completion interest rates may move adversely	Private	Private proponent in control of selecting and arranging long-term financing	Interest rate hedging instruments (for example, interest rate caps Use local currency financing	Contract clause holding WD harmless
Inflation	Risk that value of payments received during the term is eroded by inflation	Shared: WD to assume part of it by allowing total or partial indexing of payments to inflation Private to assume remainder risk through the methodology adopted to maintain value	WD has more experience and information regarding the factors that influence inflation	WD to transfer part of it to users by allowing total or partial indexing of payments to inflation rate WD to ensure its payment do not overcompensate for inflation and to avoid any double payment for after costs adjustments (for example, changes in exchange rate)	Contract clause defining payment adjustment mechanisms
Financing unavailable	Risk that when debt and/or equity is required by the private firm for the project it is not available then and in the amounts	Private	Private proponent is responsible for arranging finance	WD requires all bids to have fully documented financial commitments with minimal and easily achievable conditionality	Contract clause requiring firm letters of credit from reputable financial institutions

Risk	Definition	Preferred Allocation	Rationale	Possible Mitigation Strategies	Allocation Instrument
	and on the conditions anticipated				
Sponsor risk	Risk that the private proponent is unable to provide the required services or becomes insolvent Risk that the private proponent is later found to be an improper person for involvement in the provision of these services Risk that financial demands on the private proponent exceed its financial capacity causing corporate failure	WD	If this risk materializes, there is no private proponent to transfer the risk to	Ensure project is financially remote from external financial liabilities Ensure adequacy of finances under loan facilities or sponsor commitments supported by performance bond Ensure adequacy of finances through the use of non-financial evaluation criteria and due diligence on private partner	Contract clause requiring a performance bond and letters of credit Contract clause requiring minimum liquidity and debt ratios
Operating Risk					
Maintenance and refurbishment	Risk that water savings are not realized	Private	Private proponent is in control of design and operation processes	Private firm to manage through capable staff	Contract clause imposing penalties (and possible termination) for not meeting water savings Contract clause requiring performance bond from private proponent
Demand risk					
Demand risk	Risk that water savings are not converted to revenues	Water district	WD has better information to manage risk	Private contractor is paid on the basis of water savings	Contract clause stipulating the payment to private contractor
Force majeure risk					
Force majeure	Risk that inability to meet contracted service	Private takes risk of loss or damage to the asset and	Private proponent can buy insurance from the	Private to purchase insurance for	Contract clause to expressly define

Risk	Definition	Preferred Allocation	Rationale	Possible Mitigation Strategies	Allocation Instrument
	delivery (pre or post completion) is caused by reason of force majeure events	loss of revenue when risk is insurable (for example, earthquake, floods, fire and drought) WD take some risk of service discontinuity both as to contracted service and core service when risks are uninsurable (i.e., terrorism acts, war, civil unrest, etc.)	marketplace—commercial WD is better positioned to manage uninsurable risks	insurable risks If uninsurable, private firm may self-insure by establishing reserve funding; If uninsurable, WD to establish contingency for alternate service delivery	events that will constitute acts of God and political force majeure events Contract clause to relieve private from conse-quences of service discontinuity; Contract clause to require that if insurable, private must ensure availability of insurance proceeds towards asset repair and service resump-tion and WD is to be given the benefit of insurance for service disruption costs
Asset ownership risk					
Default and termination	Risk of loss of the facility or other assets upon the premature termination of contract upon breach by the private firm and without adequate payment	Private firm will take the risk of loss of value on termination	Private firm has more knowledge of the underlying causes of default and can identify risk earlier than WD	Only serious breaches by the private firm to lead to termination Private proponent to be given time and opportunity to remedy defaults If termination occurs pre-completion WD may (but need not to) make payment for value in the project on a cost to complete basis;	Contract clause to define options for remediation of default If and when necessary, contract clause to define method to establish compensation to private in case of termination (pre and post completion)

Risk	Definition	Preferred Allocation	Rationale	Possible Mitigation Strategies	Allocation Instrument
				If termination occurs post completion the private proponent may receive fair market value less all amounts due to WD WD to require step in rights to ensure access and service continuity until ownership/ control issues are resolved	

*Outline adopted from the NEDA ICC PPP Risk Matrix

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Annex A - District Metered Areas (DMAs)

What is a DMA? What are pre-requisites in establishing DMAs?

District Metered Area (DMA) is defined as a discrete area of a distribution system usually created by the closure of valves or complete disconnection of pipe work in which the quantities of water entering and leaving the area are metered. The flow is analyzed to quantify the level of leakage. In this way the leakage practitioner can determine more precisely where and when it is most beneficial to undertake leak location activities.

In establishing a DMA, the following data, equipment and surveys are necessary:

1. Distribution network drawings
    - Select potential area/s for DMA selection
    - Establish DMA boundaries: find natural boundaries like rivers, railways, etc.
    - Update drawings: check pipeline routes and interconnection points (excavate if necessary), locate all service connections and check valves on the drawings
2. Customer Data (house-to-house survey)
    - Availability of water: have piped service connection? Have own well? Getting from neighbors? From standpipe?
    - Account name and number
    - Customer meter type, quality and installation
    - Number of households, persons
    - Tariff category (domestic, commercial, …)
    - Seasonal consumption changes (garden irrigation)
    - Ground and/or roof tank
    - Pumping
3. Consumption Analysis
    - Get billed consumption data from billing system
    - For each customer analyze:

    - Monthly billed volumes for the last 12 months
    - Maximum monthly deviation from average
    - Per capita consumption
    - Is the customer in the right tariff category?
  - Calculate average daily billed consumption in the DMA
  - Estimate potential unbilled consumption
  - Calculate expected total consumption for the selection of inflow meter
4. Equipment for inflow point
  - Flow meter
  - Strainer
  - Valves
  - Bypass (if necessary)
  - Pressure Reducing Valves (if necessary)
5. Pressure and Flow Loggers

<u>Factors that need to be considered in designing DMAs:</u>

1. Size of DMA (e.g., number of connections—generally between 1,000 and 2,500)
2. Number of valves that must be closed to isolate the DMA
3. Number of flow meters to measure inflows and outflows (the fewer meters required, the lower the establishment costs)
4. Ground-level variations and pressures within the DMA (the flatter the area the more stable the pressures and the easier to establish pressure controls)
5. Easily visible topographic features that can serve as boundaries for the DMA, such as rivers, drainage channels, railroads, highways, etc.

Establishing/Designing DMAs:

1. The system as a whole is divided into DMAs for which NRW can be calculated individually. These DMAs should be hydraulically isolated so the volume of water lost can be calculated within a particular DMA. Dividing the system into smaller, more manageable areas allows for better target NRW reduction activities, isolate water quality problems, and better management of overall system pressure to allow for 24/7 water supply throughout the network.

2. Establish DMAs in network areas that can be easily isolated, i.e., areas with a separate supply zone.

3. If available, use a calibrated hydraulic network model of the supply system to simulate possible DMA designs. This enables analyses of system pressures and flows without affecting supply to customers. Network modeling is the process of constructing a computer simulation of a pipe network using specialized computer software. Simulations can be verified by comparing the simulated flows and pressures with real flow and pressure data recorded onsite. Adjustments are made to the model to ensure that the simulated and the real data correlate, thus creating a calibrated hydraulic network model.

4. In establishing a DMA, limit the number of inflows, which will help to reduce the cost of flow meter installation. To achieve this, it is necessary to close one or more boundary valves, which must remain shut permanently to ensure that any flow data accurately represents the total inflow for the DMA.

5. Ensure that all pipes into and out of the DMA are either closed or metered by performing an isolation test as follows: (a) Close all metered inlets. (b) Check whether the water pressure within the DMA drops to zero, since no water should now be able to enter the area. If the pressure does not drop to zero, then it is likely that another pipe is allowing water into the area and therefore needs to be addressed.

6. Initially, establish larger zones of 5,000 or more connections subsequently subdividing them into DMAs and sub-DMAs of 1,000 or fewer connections for those DMAs with high NRW and long lengths of pipework, as detailed in the Figure below:

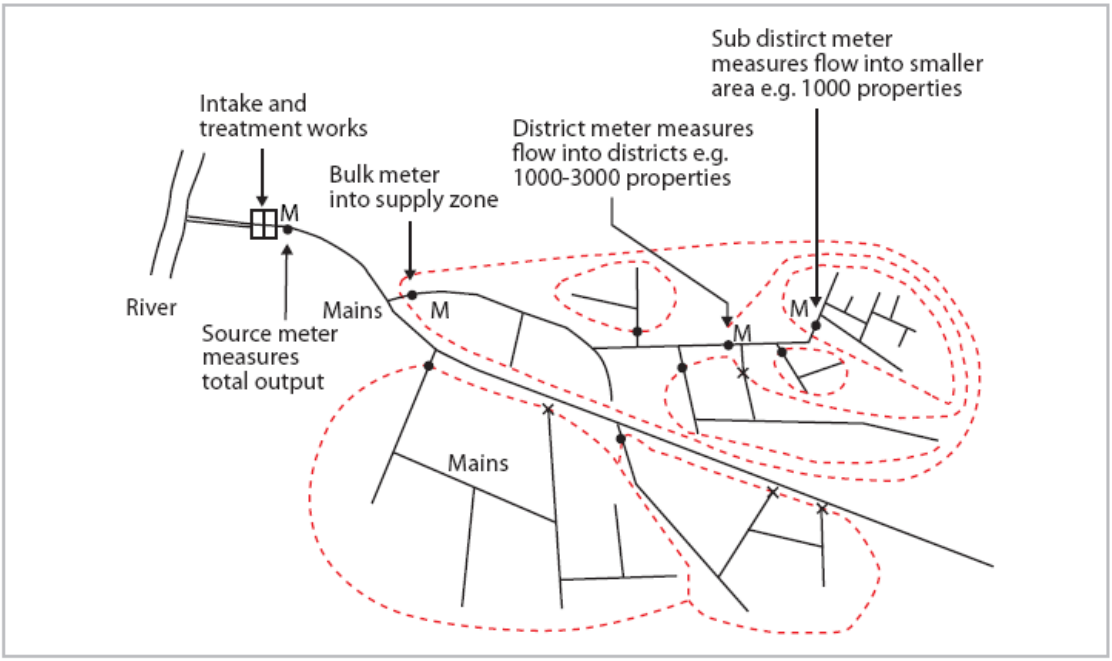

Figure A1. A Typical DMA Layout

Managing DMAs:

For each DMA, a detailed operations manual should be developed to assist future teams in managing the water supply. The operations manual includes a schematic of the pipe network; location drawings of the flow meters, pressure control valves, and boundary valves; and a copy of the billing database for the DMA. The manual is a working document and operational data should be continually updated, including information on the following:

a. Flow and pressure graphs

b. Leakage step tests data

c. Leak locations

d. Illegal connection locations

e. Legitimate night flow (LNF) test data

f. Pressure T Factor test data

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Annex B - Review of Applicable Laws and Regulations

WATER DISTRICTS AND THE LOCAL WATER UTILITY ADMINISTRATION

Presidential Decree 198

Water districts ("WDs") were formed under P.D. 198 for the purpose of (a) acquiring, installing, improving, maintaining and operating water supply and distribution systems for domestic, industrial, municipal and agricultural uses for residents and lands within the boundaries of such districts, (b) providing, maintaining and operating wastewater collection, treatment and disposal facilities, and (c) conducting such other functions and operations incidental to water resources development, utilization and disposal.[17] WDs are considered as public utilities, and, in 1991, it was settled in a Supreme Court decision that WDs are government owned and controlled corporations.[18] WDs are authorized to exercise all the powers which are expressly granted under P.D. 198 (Title I), or which are necessary, implied from, or incidental to the powers or purposes under the law.[19] Specifically, in Section 27, the WD has the power to sell water to any person within the district, pursuant to the generally applicable rules and regulations. It also has the power to safeguard and protect the use of its waters,[20] and for which purpose criminal liability for meter tampering and water pilferage, among others, is imposed. A district is expressly granted the power to enter into contracts with any person for the purpose of performing any function of the district, provided that its Board of Directors may not by contract delegate any of the discretionary powers vested in the Board. Provisions of this nature have been interpreted by the Supreme Court to permit the public utility to exercise its discretion to determine whether it shall perform the function or delegate specific functions and activities, thereby allowing another party to do so on the strength of the authority that is granted to the government entity.[21]

WDs, as far as practicable, shall fix (subject to the approval of the Local Water Utilities Authority) such rates and charges for water as will result in revenue which will:

a. Provide for reimbursement from all new water customers for the cost of installation of new services and meters,
b. Provide for revenue from all water deliveries and services performed by the district,
c. Pay the operating expenses of the district,

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[17] Presidential Decree No. 198, as amended, Section 5.
[18] *Davao City Water District v. Civil Service Commission*, G.R. N. 95237-38, 13 September 1991.
[19] Presidential Decree No. 198, as amended, Section 25.
[20] Presidential Decree No. 198, as amended, Section 31.
[21] See *Albano v. Reyes*, G.R. No. 83551, 11 July 1989.

d. Provide for the maintenance and repairs of the works,
e. Provide reasonable surplus for replacement, extension and improvements, and
f. Pay the interest and principal and provide a sinking fund for the payment of debts of the district as they become due and establish a fund for reserves.[22]

It is also important to underscore that P.D. No. 198, as amended, provides for the manner by which a WD may dispose of its income, as follows:

a. First, to pay its contractual and statutory obligations and to meet its essential current operating expenses;
b. Second, to allocate at least fifty percent of the balance exclusively as a reserve for debt services and operating and maintenance, to be used for such purposes only during periods of calamities, force majeure or unforeseen events; and
c. Third, to allocate the residue as a reserve for expansion and improvement of its physical facilities.

The Local Waterworks and Utilities Administration ("LWUA") was authorized by Presidential Decree No. 198, or the Provincial Water Utilities Act, in 1973. LWUA was created as a national agency for purposes of regulating, assisting in the development and financing of local water utilities. Specifically, it has the following powers:

- Establish minimum standards and regulations in order to assure acceptable standards of construction, maintenance, operation, accounting and fiscal practices of local water utilities;
- Furnish technical assistance and training programs for local water utilities;
- Monitor and evaluate local water standards;
- Effect systems integration, joint investment and operations, district annexation and de-annexation whenever economically warranted; and
- Provide specialized lending institution with peculiar expertise in the financing of local water utilities.

LWUA's primary responsibility is to serve as a special lending agency for water service providers and to perform economic regulation over water districts.

In 1995, the LWUA was reorganized, pursuant to the National Water Crisis Act.[23] Among the salient provisions of the National Water Crisis Act was the grant of authority in the President to:

[22] Presidential Decree No. 198, as amended by Section 17, Presidential Decree No. 768 and Section 7, Presidential Decree No. 1479.
[23] Republic Act No. 8041, or An Act to Address the National Water Crisis and for Other Purposes.

- Reorganize LWUA by revamping any or all segments of the agency, operations or facilities, if necessary, to make it more effective and innovative to address the water crisis[24] and
-
- Enter into negotiated contracts for the financing, construction, repair, rehabilitation, improvement and operation of water facilities, and projects related to increasing water supply, its treatment and its distribution, for projects to be implemented under the BOT and/or related schemes.[25]

In 2010, Executive Order No. 860 returned water tariff regulation to LWUA. Consequently, LWUA now has the authority to approve the tariffs for water districts, regardless of whether these water districts have financial exposure with LWUA. However, decisions by the LWUA on water rates may be further appealed to the NWRB.

PROCUREMENT LAWS AND REGULATIONS RELEVANT TO WATER DISTRICTS

Executive Order 423

Executive Order No. 423[26] delineates the governing laws for various government contracts as follows:

- Contracts for the procurement of infrastructure projects, goods, and consulting services shall be governed by Republic Act No. 9184 or the Government Procurement Reform Act ("GPRA"), and its Implementing Rules and Regulations;
- Contracts for the lease of goods and real estate shall be governed by the GPRA;
- Contracts for the acquisition of real property needed as right-of-way, site or location for national government infrastructure projects shall be governed by Republic Act No. 8974;
- Contracts undertaken through Build-Operate and Transfer ("BOT") schemes and other variations shall be governed by Republic Act No. 6957, as amended by Republic Act No. 7718 or the BOT Law, and its Implementing Rules and Regulations; and
- Government Contracts financed wholly or partly with Official Development Assistance ("ODA") funds shall be governed by Republic Act No. 4860, as

[24] Republic Act No. 8041, Sec. 7.

[25] Republic Act No. 8041, Sec. 6.

[26] Repealing Executive Order No. 109-A dated September 18, 2003 Prescribing the Rules and Procedures on the Review and Approval of all Government Contracts to Conform to Republic Act No. 9184, otherwise known as "The Government Procurement Reform Act," (2005).

amended, Republic Act No. 8182, as amended by Republic Act No. 8555, and the GPRA.

Joint venture agreements are recognized as contractual modes but are segregated from the foregoing classification of government contracts and are instead treated under a separate provision, which required the National Economic Development Authority ("NEDA"), in consultation with the Government Procurement Policy Board ("GPPB"), to issue guidelines regarding joint venture agreements with private entities with the objective of promoting transparency, competitiveness, and accountability in government transactions, and, where applicable, complying with the requirements of an open and competitive public bidding. The NEDA Guidelines for Joint Venture ("NEDA JV Guidelines") are discussed below.

BOT Law

Under the BOT Law, the term private sector infrastructure and development projects is defined as the general description of infrastructure or development projects normally financed and operated by the public sector but which will now be wholly or partly implemented by the private sector, including but not limited to, power plants, highways, ports, airports, canals, dams, hydropower projects, water supply, sewerage, drainage, dredging.

The BOT Law provides for well- defined contractual arrangements under which infrastructure and development projects are required to be pursued. These are:

- build-and-transfer,
- build-operate-and-transfer,
- build-own-and-operate,
- build-lease-and-transfer,
- build-transfer-and-operate,
- contract-add-and-operate,
- develop-operate-and-transfer,
- rehabilitate-operate-and-transfer, and
- rehabilitate-own-and-operate.

Other variants may be employed but require the approval of the President.

Projects under the BOT Law may be: (a) solicited, (b) unsolicited, or (c) directly negotiated. The solicited mode is a process in which bidders submit bids in response to a formal solicitation from the implementing agency, or the department, bureau, office, commission, authority of the national government, including government owned and controlled corporation ("GOCC"), government financial institution ("GFI"), and local government unit ("LGU") concerned, authorized by law or by charter to undertake

infrastructure or development projects.[27] The unsolicited mode involves the submission by private sector proponent of a project proposal to the implementing agency in the absence of a formal solicitation from the government, while the direct negotiation mode provides for a process whereby government is permitted to resort to direct contract negotiation with the private sector, rather than through a public bidding under proscribed conditions.

An unsolicited proposal may be accepted for consideration and evaluation by the implementing agency, provided it involves a new concept or technology and/or is not part of the list of the priority projects, and does not include a direct government guarantee, equity or subsidy. A direct government guarantee refers to an agreement whereby the Philippine government guarantees to assume responsibility for the repayment of debt directly incurred by the private sector proponent in implementing the project in case of a loan default. A direct government subsidy refers to an agreement whereby the government will: (a) defray, pay for or shoulder a portion of the project cost or the expenses and costs in operating or maintaining the project; (b) condone or postpone any payments due from the private sector proponent; (c) contribute any property or assets to the project; (d) in the case of LGUs, waive or grant special rates on real property taxes on the project during the term of the contractual arrangement; and/or (e) waive charges or fees relative to business permits or licenses that are to be obtained for the construction of the project, all without receiving payment or value from the private sector proponent and/or facility operator for such payment, contribution or support. The grant of usufruct of government assets, including among others, right-of-way, shall be considered as direct subsidy or equity unless government receives appropriate compensation pursuant to existing laws, rules and regulations, and guidelines. Direct government equity refers to the subscription by the government of shares of stock or other securities convertible to shares of stock of the project company, whether such subscription will be paid by money or assets.

The current President has indicated a preference for the solicited approach to promote transparency and integrity in government contracts.

NEDA JV Guidelines

The NEDA JV Guidelines, issued in 2008, apply only to all GOCCs, GFIs, state universities and colleges (SUCs), and government corporate entities ("GCEs"), government instrumentalities with corporate powers ("GICPs"), and expressly excludes LGUs. The Guidelines define a joint venture as a contractual arrangement whereby a private sector entity or a group of private sector entities on one hand, and a Government Entity (referring to GOCCs, GCEs, GICPs, SUCs, and GFIs) or a group of Government Entities

[27] BOT Law IRR, Section 2.1.

on the other hand, contribute money/capital, services, assets (including equipment, land or intellectual property), or a combination of any or all of the foregoing.

The parties to a JV share risks to jointly undertake an investment activity in order to accomplish a specific, limited or special goal or purpose with the end view of facilitating a private sector initiative in a particular industry or sector, and eventually transferring ownership of the investment activity to the private sector under competitive market conditions. It involves a community or pooling of interests in the performance of the service, function, business or activity, with each party having a right to direct and govern the policy in connection therewith, and with a view of sharing both profits and losses, subject to agreement by the parties. The NEDA JV Guidelines effectively provide for an alternative mode of procuring infrastructure projects. Unlike projects undertaken through the BOT Law, JVs as defined under the JV Guidelines do not undergo the same NEDA/ICC evaluation and approval, as those projects under the BOT Law.

The NEDA JV Guidelines provide for two modes of implementing the JV activity:

1. through an incorporated JV or
2. using a contractual JV.

A corporate JV involves the establishment of a JV company. This is the preferred mode under the NEDA JV Guidelines mainly because once incorporated the JV Company has a juridical existence separate from the JV partners. A JV company is defined as an entity registered with the Securities and Exchange Commission ("SEC") by the JV partners that shall perform the primary functions and obligations of the JV as stipulated under the JV agreement. The JV Company shall possess the characteristics stipulated under the NEDA JV Guidelines. A contractual JV is defined as a legal and binding agreement under which the JV partners shall perform the primary functions and obligations under the JV agreement without forming a JV company.

The general rule is that the JV partner should be selected through a competitive selection process, based on transparent criteria, which should not constrain or limit competition, and is open to participation, by any interested and qualified private entity. If there is a failure of competitive selection process, the implementing agency may undertake such selection through limited negotiations.

Under the NEDA JV Guidelines, project proponents can also submit unsolicited proposals similar to the mode of unsolicited proposal under the BOT Law. In this case, a competitive challenge should be undertaken in which third parties shall be invited to submit comparative proposals to the unsolicited proposal. Accordingly, the private sector entity that submitted the unsolicited proposal is accorded the right to match any superior offers given by a comparative private sector participant. This process is

undertaken when no proposals were received or no private sector entity is found qualified for the JV undertaking or the agency receives an unsolicited proposal.

Investments or JV agreements must be made only in activities directly and immediately related to and in furtherance of the primary corporate purpose, mandate, or charter of the investing Government Entity.[28] The JV should be clear in its intent to undertake specific activity that is responsive to national development goals and objectives.[29] The NEDA JV Guidelines provide that ownership and nationality requirements under the Constitution and pertinent laws should be followed, provided that the government entity's equity contribution in the JV Company shall be less than fifty percent of the outstanding capital stock of the JV Company. In the structure of the JV Company, the Government Entity must be given representation on the Board in proportion to its investment. The JV Company shall be permitted to itself derive income from the activities authorized under the JV agreement and during its term. The JV partners shall be entitled to receive dividends "and/or any other form of share from the net profits earned by the JV Company in accordance with the JV Agreement."[30] Since a distinguishing feature of the JV arrangement from procurement under the GPRA and BOT Law is the transfer of the activity to the JV Company, the JV Company is encouraged to stipulate a fixed period for the participation of the Government Entity. This period shall be determined by the attainment of the Government Entity's objective in pursuing the investment, or when the private sector partner is projected to be able to proceed with the JV activity without further need of government support. In the drafting of the incorporation documents of the JV Company and other contracts governing the relationship between the Government Entity and the private sector participant, the partners should consider the following:

- clearly defined business objectives,
- specified degree of participation and management roles of each party in the JV activity,
- defined contribution of capital and ownership rights to property,
- specified division of profits and losses,
- identified dispute mechanism to avoid management impasses that may produce deadlock or litigation,
- specified termination/liquidation of the JV Company and indicate buy-out provisions,
- specified confidentiality terms, and
- stipulated indemnification mechanisms.[31]

[28] NEDA JV Guidelines, Section 6.1.
[29] NEDA JV Guidelines, Section 6.2.
[30] NEDA JV Guidelines, Section 6.2 (d).
[31] NEDA JV Guidelines, Section 6.2 (f).

Similar parameters are to be observed in the formation of a contractual JV.[32]

For JV agreements, regardless of cost, approval is with the head of the Government Entity concerned, which refers to the governing board or its duly authorized official.[33] For JV activity requiring national government undertakings, subsidies, guarantees, clearance/approval of the Department of Finance ("DOF") and/or the Department of Budget and Management ("DBM"), as the case may be, shall be secured. Heads of Government Entities shall submit to NEDA the salient features and copies of JV Agreements for JVs valued at Three Hundred Million Pesos or more, together with documents required thereto for monitoring. During the course of implementation of the JV agreement, the concerned Government Entity shall submit an annual report on the status of its implementation during a current year to the DOF for monitoring purposes.

The Detailed Guidelines and Procedures for Competitive Selection for Public –Private Joint Ventures provides that the draft contract should clearly define the basis and legal relationship between the parties and their rights and responsibilities, including specific government undertakings to be provided relative to the JV activity. Specifically, the draft contract shall, as far as practicable, contain provisions on the following matters among others (see Item 4 of the Detailed Guidelines for full list):

- the date on which the agreement is established, executed, and considered effective,
- the names, addresses and identification of the parties, including type of business of each member of the JV,
- the name under which the JV will do business,
- the principal place of business of the JV,
- purpose, term and scope of the JV,
- project specifications and features,
- a statement that the parties are actually co-venturers for the project, whether or not the contract is in the name of all members,
- the establishment of a fund by the parties to finance the work, together with the amounts to be contributed by each party, with the fund being deposited in a special bank account under dual control, and all progress payments and other revenues being deposited in such account,
- a declaration of the participation of the parties and percentage in which profits and losses are shared, in proportion to the contributions of the party to the

[32] NEDA JV Guidelines, Section 6.3.
[33] NEDA JV Guidelines, Section 7.1 vis-à-vis Section 5.3.

working fund (the amount of contribution of funds by parties can be increased or decreased, depending on the contributions of equipment or expertise),

- if equity other than cash is to be contributed, a statement as to how the property will be valuated, and the ownership of the property during and after the effectivity of the JV,
- designation of one of the parties as general manager of the project, with authority to bind the JV Company; or in the alternative, the constitution of a management committee,
- implementation milestones, regular meeting schedules, financial and periodic JV and progress reporting procedure,
- establishment of JV bank account, and the appointment of chartered accountant and lawyer,
- undivided pro-rata interests held by the co-venturers on all assets of the JV,
- cost recovery scheme,
- indemnification and liquidated damages,
- performance and warranty bonds,
- warranty periods and procedures,
- grounds for and effects of contract termination,
- procedure for exit of Government Entity, or its substitution, and
- payout of funds.

Comparison of BOT and NEDA JV Guidelines

The following table presents a comparison of the salient features of the BOT Law and the NEDA JV Guidelines.

	BOT Law	NEDA JV Guidelines
Authorized implementing agencies	Departments, bureaus, offices, commissions, authorities, or agencies or the national government, including GOCCs, GFIs, SUCs, and LGUs	Limited only to GOCCs, GCEs, GICPs, GFIs, SUCs and excludes LGUs
Types of projects	Infrastructure and development projects	Any activity appropriate for development under JV and where JV will promote the achievement of implementing agency's goals
Contractual arrangements	Non-exhaustive list includes BT, BOT, BOO, BLT, CAO, ROT, ROO	Incorporated JV (where implementing agency's share should less than 50% of the outstanding capital stock) or contractual JV

	BOT Law	NEDA JV Guidelines
Modes of implementation	Solicited, unsolicited, and negotiated	Competitive selection, competitive challenge (similar to unsolicited mode), and limited negotiations
Approving body	For national projects – NEDA Board, for negotiated projects and projects with cost amounting to more than PhP300Million NEDA ICC, for projects less than or equal to PhP300 Million Contract variant that is not under list must be approved by the President	Head of the agency, with opinion from statutory counsel
Transfer of ownership	Generally transferred to government (at no added cost to government, except in BOO scheme), and subject to warranty over facility	Generally proceeds on divestment by agency (which may take place at any time during the life of the project)
Financing	Primarily from the private entities/proponents, but the government may provide contribution up to 50% of the project cost	Premised on share in capital, profit and loss, government entity share in capital of incorporated JV limited to below 50%