Experiences from Performance Based Non-Revenue Water Reduction Contracts

Adopting Appropriate and Realistic Requirements: – From Theory to Practice

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List of Abbreviations and Acronyms

BOQ	Bill of Quantities
CV	Curriculum Vitae
DMA	District Metered Area
FI	Financial Institution
IFI	International Financing Institution
NRW	Non-Revenue Water
PBC	Performance-Based Contract
PhD	Doctor of Philosophy
SDG	Sustainable Development Goal
UN	United Nations

FORWARD

For decades performance based Non-Revenue Water Management Contracts (NRW PBCs) have been proven to be a most efficient solution for water utilities in need of reducing high levels of NRW. These types of contracts provide a results-oriented framework that incentivizes service providers to achieve measurable improvements, in a defined time frame often resulting in significant reductions in water losses, improved operational efficiency, and increased revenue for utilities.

Recognizing the potential of NRW PBCs, development banks and funding are increasingly endorsing this approach. They acknowledge the dual benefits of achieving tangible outcomes while fostering sustainable financial practices within water utilities.

However, despite a few well documented successful examples, nothing often happens, serious mistakes are made in contract design and/or procurement related issues cause projects to fail. Several barriers impede their success, including suboptimal contract design, flawed procurement processes, inadequate capacity building, and misaligned stakeholder expectations. In some cases, even minor oversights in planning or execution have led to significant setbacks, undermining the potential of these contracts to deliver the desired outcomes.

This document examines common pitfalls in PBC NRW Contracts, provides examples of mistakes made and propose an appropriate and realistic approach for procuring NRW reduction contracts. Furthermore, it offers a practical guidance to enhance NRW contract outcomes, aligning with the Sustainable Development Goals and addressing the specific challenges of implementation within various contexts.

The authors hope this document serves as a valuable resource and addresses your needs effectively. Should you have any questions, require clarification, or wish to provide feedback, please do not hesitate to reach out.

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2 INTRODUCTION

Non-Revenue Water (NRW) is the term used to describe water that has been produced, supplied and is lost before it reaches the intended customer. These losses can occur due to various factors such as leaks in distribution pipes, unauthorized water use (theft), or inaccuracies in metering systems. Effectively managing NRW is critical for utilities as it directly impacts operational efficiency, financial sustainability, and the ability to provide a reliable and sustainable water supply to customers.

Water utilities in higher income countries, whether under public or private management, typically have considerable political and media pressure to minimise water losses. This can be due to the regulatory regime in place, water stress situations in each city/country or an awareness of the cost (both financial and environmental) of high-water losses. Regulatory powers can be (justifiably) quite stringent, with the regulator having the power to fine the utilities for failure to meet regulatory targets.

For the above reasons, outsourcing of certain water loss reduction activities is not a new practice. Many water utilities in Europe, the United States and even in low- and middle-income countries (for example, SABESP in Brazil) use private leak detection contractors to periodically survey their distribution network. This is most often done through the most basic form of outsourcing, where the contractor gets paid on a schedule of rates (e.g., per day or per km pipeline checked) regardless of the achievements made.

However, during the last 30 years, some utilities throughout the world have started to develop contracts with performance related payments (Kingdom et al., 2006). These are commonly referred to as performance-based contracts (PBCs). Under a PBC, an NRW management firm is contracted to implement an NRW reduction program, and payments are (to varying degrees) linked to performance achievements. Contract models and levels of performance-based payments can vary widely from one utility to another. This has led to the evolution of an NRW/leakage outsourcing framework and contract structure that incentivises water loss reductions. This framework is what has led to considerable technology innovation and the reduction in water losses in many countries over previous decades.

Given this innovation, and the United Nations (UN) Sustainable Development Goals (SDGs), which are clearly aligned with achievement of water loss reductions, one might have thought that we would have seen substantial moves towards mass adoption of similar frameworks across the World. However, adapting this framework to something suitable for low and middle-income countries, and even to some countries and regions that would be regarded as more high-income, has proved challenging. While there are some well-documented success stories (Kingdom et al., 2018, Wyatt, 2018, Dalton, 2019), the reality is that many projects have failed or not lived up to expectations.

Financial Institutions and utilities frequently initiate projects aimed at reducing NRW levels. To execute these projects successfully, they often set specific tender requirements which may not be realistic and/or pragmatic. The criteria established in these tenders play a pivotal role in determining the effectiveness and outcomes of NRW management initiatives.

This document details the critical mistakes to be avoided in the contract design stage, provides recommendations to convince decision makers and aims to mainstream the development of NRW PBCs. The document also makes the case that PBCs are not suitable in every situation. Where PBCs turn out not to be viable, flexibility is required to adapt the contractual approach to something more appropriate for a given situation.

3 Challenges with Developing NRW Contracts

In (most) low and middle-income countries, projects are generally funded by Financial Institutions (FIs), International and/or National, through loans or grants. In such cases the water utilities must meet the Financial Institutions requirements for procurement and contract structuring. Otherwise, the projects will simply not happen. This gives the Financial Institutions leverage to ensure that projects are well structured and procured. The Financial Institutions understandably want their investments to be successful. It is important to note that almost any viable performance contract can be designed to repay itself within the project lifetime and that with correct design loan amounts can be minimized.

In many NRW reduction contracts, the stipulated requirements in some areas can be impractical and problematic. This can affect potential projects from inception right through to NRW contract conclusion. Areas where such issues can occur include the following:

a) Duration of project preparation
b) Duration and over-complication of tendering and evaluation
c) Limited water network familiarisation period
d) Unrealistic water loss reduction targets and contract duration
e) Need for independent oversight
f) Financial and commercial issues
g) Understanding when PBCs are not the right solution
h) Insufficient planning to sustain project results

The following sections provide a detailed description of the above issues and suggest ways to mitigate against them, maximising the possibility of successful NRW reduction projects.

4 Duration of Project Preparation

A major challenge with implementing NRW PBCs is the time taken for such projects to reach the procurement stage from when they are originally proposed. Indicative steps and timescales adapted from the World Bank guidance document on NRW PBCs (Kingdom et al., 2018) are shown below:

a) NRW Project Screening (1-2 months)
b) Initial (Rapid) NRW Assessment (1-3 months)
c) (Optional) Field NRW Assessment (3-18 months)
d) NRW Reduction Plan (4-7 months*) – in some cases it is recommended that this step is integrated into the project*.
e) NRW PBC Design (3-5 months)
f) Contract Procurement (7-10 months)
g) NRW PBC Execution (4-7years) with Independent Oversight – *some projects may have duration up to 10+* years.

For a NRW PBC project to be viable, it needs to be appealing to three relevant parties:

i. It should provide a clear return on investment for the client utility
ii. It should be a viable and bankable project in the view of the funding agency – *the term "bankable project" is used to signify that the estimated NRW savings from the project, has a favourable Internal Rate of Return (IRR)*
iii. It should provide a reasonable profit for a knowledgeable private sector service provider

Once a utility expresses interest in implementing an NRW PBC, and can source the funding for such a project, it should be progressed to procurement within a reasonable period. An initial project screening, immediately followed by a rapid NRW assessment should determine if a viable project can be implemented. With proper design, it is typically possible to achieve significant impact, even when NRW levels are low. Dependent on the findings of these initial steps, a decision needs to be taken on whether to embark on a more detailed field NRW assessment or whether sufficient data already exists for an NRW reduction project to be scoped and procured.

The baseline NRW levels and potential future savings are important as project benefits for the utility. These should be approximated during an initial (rapid) NRW assessment.

Since most of the NRW baselining and detailed technical design and planning will be done by a successful NRW contractor, there may be no need for lengthy technical studies. What is important at the initial stage is a robust cost estimate. This depends primarily on the system size (length of mains, number of service connections (and thus DMAs), number of customers (meter replacement) and the cost of civil works related to the relevant activities which can be market specific and not so much on the level of NRW or the planned reduction.

In such a scenario, the detailed field NRW assessment would be undertaken by the NRW contractor during the water network familiarisation period (referred to further below) following contract award.

It should however be acknowledged that while leaving the detailed field assessment to the NRW contractor can result in projects being procured quicker, it creates the risk that conditions on the ground may turn out to be different than originally assumed. If conditions on the ground following detailed investigation by the NRW contractor make an NRW PBC unviable (despite having been procured as such), then there needs to be contractual flexibility to adapt the PBC contract to something more suitable, such as a conventional District Metered Area (DMA) establishment and NRW reduction project based on admeasurement or an auditable BOQ process where all deliverables are measured and paid for accordingly as per the pricing in the tender / contract document.

Regardless of which NRW reduction contract model turns out to be most suitable, there must be a commitment to move from the initial assessment stage to the procurement stage without unnecessary delay. Protracted delays can result in major changes to network characteristics not being captured in the final tender documents.

IFI financing is usually available within a specific time window. Unnecessary procurement delays can cause the narrowing or even closure of that window. This can result in viable projects being scaled back or even cancelled altogether.

Once the political will exists, financing has been secured and viable projects have been identified, there must be a commitment to move forward in the collective interests of the three parties 1) client utility 2) financier and 3) private sector service provider. The remainder of this document attempts to balance the best interests of all three of these parties in encouraging the development of these projects.

5 Duration and Over-Complication of Tendering and Evaluation

Once projects progress to the procurement stage, it is important that the procurement requirements are well designed and that the procurement is executed in a timely fashion, like the original project identification and preparation process. Procurement notices should be published where they will be noticed by potential bidders.

Issues that can affect the procurement process positively or negatively include:

a) Qualification requirements (Need for pre-qualification?)
b) Use of high academic qualifications or excessive experience requirements of Key Experts
c) Voluminous Submissions of required Bid Documents
d) Fair and Equitable Contract Model
e) Quality or Cost Based Selection?

Ways of addressing these procurement challenges are detailed in the sections below.

5.1 Qualification Requirements

5.1.1 Is Pre-Qualification Required?

The appropriateness of the contractor pre-qualification process must be questioned. Pre-qualification typically adds at least a year to the procurement process. Network characteristics may have changed massively since the original NRW assessments were carried out by the time the contract is finally awarded. The originally proposed contractor specialist staff may not be available by the time the project commences. Good quality staff will not be sitting around waiting for projects to start.

Pre-qualification is not always needed if stringent post-qualification criteria apply. It is important to highlight the qualification criteria so that companies who can't meet them are discouraged from wasting time and money on unsuccessful bids.

5.1.2 Appropriate Qualification Criteria

Conversely, extremely high (and totally unnecessary) qualification criteria have many disadvantages. They limit the number of potential bidders, discourage small but well qualified companies from participating and can force companies into ineffective Joint Ventures, which add no value. For example, asking companies for significant utility operation and maintenance experience is not necessary for an NRW contractor.

The length of time it takes for these projects to come to fruition could cause the small number of contractors, who can meet such current stringent criteria, to lose interest in this type of project.

5.2 Academic Qualifications

The proposed professional team of the NRW contractor is generally a key requirement of any tender evaluation. The pros and cons of emphasizing education in NRW tender requirements are detailed below, followed by recommendations for a more balanced approach to this requirement.

5.2.1 Pros of Emphasizing Education in NRW Tenders

5.2.1.1 Standardization and Objectivity:

a) *Clear Criteria:* Educational qualifications provide a clear and standardized metric for assessing candidates. This standardization can help ensure fairness and objectivity in the selection process, reducing bias and favouritism.
b) Benchmarking: Degrees and certifications from recognized institutions offer a reliable benchmark of a candidate's foundational knowledge and skills. This benchmarking can be

especially important in international projects where varied educational systems and qualifications might exist.

5.2.1.2 Updated Knowledge Base:

a) Current Curriculum: Educational programs, especially those in engineering, environmental sciences, and water management, are regularly updated to reflect the latest industry standards and technological advancements. This ensures that personnel have up-to-date knowledge, which is crucial for the dynamic field of NRW management.

b) Theoretical Insight: A reasonable educational background provides a deep theoretical understanding, which is essential for addressing complex issues in NRW management. Understanding the theoretical underpinnings can lead to innovative solutions and approaches that might not be evident through practical experience alone.

5.2.1.3 Professional Development:

a) *Encouraging Learning:* Emphasizing education fosters a culture of continuous learning and professional development. It encourages individuals to pursue further education, certifications, and training, keeping them updated with the latest advancements in their field.

b) *Credentialing:* Educational requirements often align with ongoing professional development and credentialing, which can help maintain high standards within the NRW sector. Certifications and further education can serve as proof of a commitment to the field and a willingness to adapt and grow.

5.2.2 Cons of Emphasizing Education in NRW Tenders

5.2.2.1 Limited Practical Experience:

a) *Hands-on Skills:* Educational qualifications do not always equate to practical skills. Personnel with recent degrees may lack the hands-on experience necessary for effective NRW management. On the other hand, highly academically qualified staff, such as those holding PhDs, bring valuable theoretical knowledge, advanced research skills, and analytical expertise, they may not always possess the practical grounding required for specific tasks in applied NRW reduction field activities. This disconnect leads to challenges in effectively applying actionable solutions tailored to real-world scenarios. Practical experience often provides insights and skills that cannot be fully acquired in a classroom setting nor through high academic qualifications.

b) *Real-world Application:* The ability to apply theoretical knowledge in practical settings is often gained through experience rather than formal education. This gap can be significant, especially in fields that require problem-solving and adaptation to real-world conditions.

5.2.2.2 Exclusion of Skilled Workers:

a) *Experienced Professionals*: Highly skilled workers who have acquired extensive practical knowledge over years of experience may be excluded if they lack formal educational credentials. This exclusion can result in the loss of valuable expertise and insights that come from years of on-the-job learning and problem-solving.

b) *Diverse Perspectives:* Experienced personnel can offer diverse perspectives and solutions that may not be covered in academic programs. Their practical insights and hands-on

knowledge can be invaluable in creating effective and innovative solutions for NRW management.

5.2.2.3 Potential Skill Gaps:

a) *Specialized Knowledge:* Certain roles within NRW projects require specific experience that education alone may not provide. These gaps can lead to inefficiencies and the need for additional training. For example, understanding the intricacies of local infrastructure or having experience with specific water management technologies might only come from practical experience.

b) Adaptability: Experience often teaches adaptability and problem-solving in dynamic environments. These skills are crucial for effective NRW management but may not be fully developed through education alone. The ability to react to unexpected challenges and find practical solutions is often honed through years of experience.

5.2.3 Balanced Approach towards Education and Experience

There should be a balance between education and experience in any NRW tender. Relevant experience should be accepted in lieu of academic qualifications. For certain positions, experience is more relevant. For example, it is difficult to envisage any key staff positions in which a PhD would make a candidate more qualified for an NRW contract. Further details of a suggested more balanced approach are provided below.

5.2.3.1 Combination Criteria:

a) *Hybrid Model:* A balanced tender requirement that considers both education and experience can provide a more comprehensive evaluation of a candidate's qualifications. This hybrid model ensures that candidates possess both the theoretical knowledge and practical skills necessary for effective NRW management.

b) *Weighted Scoring:* Implement a weighted scoring system where both educational qualifications and relevant experience are given appropriate consideration. This system can help balance the benefits of education and experience, ensuring a well-rounded selection process.

Greater weight should be given to the technical methodology than the proposed key staff in a tender submission. This will help avoid bidders from using CVs to enhance their scores in a technical evaluation, only to then change the key personnel following contract award.

A timely tender process should again be emphasised when considering this aspect of the tender evaluation. A delayed tender process can result in proposed key personnel moving on to other projects prior to contract award.

5.3 Challenges with Voluminous Tender Submissions

A balance needs to be struck between comprehensiveness and conciseness of tender submissions. This is in the interest of the bidders (avoiding submitting voluminous unnecessary information) and the client utility (having to evaluate such information). This balance is considered further in the sections below.

5.3.1 Efficiency and Clarity:

a) Conciseness: Allowing submissions to extend to thousands of pages can lead to information overload. Evaluators may find it challenging to sift through extensive documents to identify key qualifications and project proposals. This lack of conciseness can delay the selection

process and result in critical information being overlooked. For the evaluator that is not an expert in the subject matter may consider that a bidder delivering a volumous tender submission may be more experienced that a bidder delivering a concise document.

b) Clarity: Concise, well-organized submissions facilitate a clearer evaluation process. They enable evaluators to quickly understand the strengths and weaknesses of each proposal. Clear and concise submissions highlight the most relevant information, making it easier to compare candidates and make informed decisions.

5.3.2 Resource Allocation:

a) Time and Cost: Evaluating voluminous submissions is time-consuming and costly. It requires significant human resources to review and assess each document thoroughly. This resource allocation can be a burden, especially for utilities and IFIs operating under tight budgets and timelines.

b) Efficiency: Streamlining the submission process by either setting page limits, encouraging concise submissions or requiring executive summaries can enhance efficiency. It allows evaluators to focus on the most critical aspects of each proposal, leading to quicker and more effective decision-making.

5.3.3 Quality over Quantity:

a) Relevance: Voluminous submissions often contain repetitive or irrelevant information. Emphasizing quality over quantity ensures that the most pertinent information is presented, facilitating a more straightforward evaluation process.

b) Focused Content: Encouraging focused, and concise submissions can lead to higher-quality proposals. It forces applicants to prioritize the most important information, which can improve the overall quality and relevance of the proposals.

5.3.4 Streamlining Tender Submissions:

a) Page Limits: Set clear page limits for tender submissions to encourage concise and focused proposals. This requirement can help reduce information overload and ensure that the most relevant information is highlighted.

b) Executive Summaries: Require concise executive summaries that provide an overview of the most critical aspects of each proposal. These summaries can facilitate quicker and more effective evaluations.

c) Evaluation Templates: Provide standardized evaluation templates to guide applicants in presenting their information clearly and concisely. These templates can help ensure consistency and comparability across submissions.

d) Evaluation Criteria and Scoring: Clear and transparent evaluation criteria ensure a fair and competitive process that identifies the most suitable bidder for the project. Below is a list of common criteria and how scoring systems can be structured:

i. Technical Criteria (e.g. 60%-75%)

1. Methodology and Approach
2. Experience and Expertise
3. Resources and Capacity

ii. Financial Criteria (40%-25%)

1. Price Competitiveness
2. Cost Breakdown and Transparency

5.3.5 Compliance Criteria:

Ensure that the bid complies with administrative and legal requirements:

a) Adherence to Specifications
b) Meet financial requirements

5.3.6 Presentation Meeting:

An important step, that generally is not included in tender evaluation process, is a presentation of the technical NRW reduction strategy and technical approach. Such a presentation provides the utility with the opportunity to better understand the technical proposal and interact with the bidders, assess their level of analyses and experience. In the age of Artificial Intelligence producing good documents becomes less and less challenging and the human factor should be assessed and scored.

5.3.7 Bid Evaluation / Probity Advisor:

Normally, utilities appoint a bid evaluation committee mostly comprising utility staff. This practice often creates conflicts with bidders, as it can lead to perceptions of bias, favouritism, or lack of impartiality in the evaluation process. To mitigate these concerns, utilities can include independent experts, external advisors, or probity specialists to ensure the integrity, fairness, and transparency of the contract evaluation process. The probity advisor's duties include monitoring compliance with policies and procedures, identifying potential conflicts of interest, providing impartial advice to address probity issues, and ensuring that decisions are made objectively and ethically. A probity advisor's impartial guidance helps ensure decisions are defensible and the process withstands scrutiny.

5.4 Fair and Equitable Contract Model

It is essential that all parties involved in a contractual agreement are treated justly, with balanced rights, obligations, and risks. This approach promotes transparency, mutual respect, and trust, preventing exploitation or unfair advantage by any party. Such a model typically includes clear terms, dispute resolution mechanisms, and a focus on collaborative outcomes.

5.4.1 Contract Model

The contract model is determined when the tender documents are prepared. The risk profile must be balanced between the parties, with a mix of fixed and incentive-based payments. Development banks typically have their own guidance documents and standard forms of contract for different models of contract execution. It is important these are adhered to when allocating risk between the parties. There are examples where the tender design team completely ignored the above general guidance document and specific project appraisal report which resulted in procurement failure (no compliant bids).

DMA design, implementation and development of the NRW reduction strategy should be the responsibility of the contractor. An NRW contractor should not be held liable for performance targets based on the DMA designs of a third party. This is a recipe for project failure, either at the procurement stage (through no compliant bids being received) or during execution with

performance targets not being achieved. There have regrettably been too many examples of such projects over the past decade.

5.4.2 Independent Oversight

It is important that NRW PBCs have independent oversight. As agreement of performance targets and incentives can be challenging and adversarial, independent oversight is necessary to ensure all parties are treated fair and equitably and can have confidence in the process. This should reduce the likelihood of formal contract disputes. This need can normally be met by an individual consultant acceptable to both parties. Costs for independent oversight should be evenly split between the contracting parties.

5.4.3 Output Based Approach

As a rule, the contract should avoid enforcing a specific set of actions and a detailed design and should focus on the target that needs to be achieved. In other words, the deliverable shouldn't be installing a certain number of pipes or changing a fixed number of meters but to reduce the losses to a certain point.

This is critical for project success for the following reasons:

a. More flexibility means more risk for performance can be assumed by the contractor.
b. Adjusting to project and utility changes that will happen during the project lifetime.
c. Decreased overall cost as the contractor must consider the cost of the actions he is implementing.

5.4.4 Service Level Agreements

To ensure the viability of the contract the client should include a service level agreement as an integral part of the contract. Service level agreements should include specific items as per the project scope for example if the utility preforms part of the civil works this needs to be done in timely manner and adjust the compensation accordingly if there are any delays. Different type of metric that need to be addressed are related to water supply or the failure to enforce legal obligations on illegal consumers.

5.4.5 Financial Considerations

Cost indexation clauses are essential in delivering long-term services to ensure financial sustainability and avoiding situations where bidders may overprice the works in anticipation of high inflation rates. There should a clear mechanism in the contract for adjusting prices based on credible inflation indices. A dual indexation mechanism—one for local costs and another for imported components can help in addressing situations where imported goods and services are envisaged in the execution of the project.

Currency fluctuations can pose substantial risks for international companies operating in developing markets, particularly when revenues are earned in local currency while some costs are incurred in different currency. In such cases, if initially stipulated and defined in the bid documents, contracts may allow for partial payments, in hard currencies (e.g. USD or EUR) to reduce exchange rate risks.

5.4.6 Liability and Insurance

Liability is a critical aspect that must be clearly outlined in bid documents and contracts to safeguard both clients and contractors from excessive financial exposure. Providing a clear and comprehensive explanation of liability is crucial for preventing disputes and effectively managing risks. It is important to explicitly define what constitutes liability, including direct, indirect, consequential, and punitive damages, where applicable.

Insurance is a crucial element in contracts, functioning as a key risk management tool to protect all parties involved. It provides essential protection for both the client and the contractor against liabilities stemming from contractual obligations, ensuring financial security and stability in the event of a claim. Therefore, it is essential to adequately and clearly address this aspect in the contract to prevent unnecessary complications during its execution.

5.4.7 Regulatory Compliance and Dispute Resolution

Regulatory compliance is a fundamental aspect of any contract, ensuring that all parties adhere to applicable laws, standards, and industry regulations. It minimizes legal and financial risks by promoting ethical practices and preventing violations that could result in penalties or reputational damage. Clearly defining compliance obligations in the contract ensures that all parties understand their responsibilities and establishes a framework for monitoring and reporting adherence.

Effective dispute resolution mechanisms are essential for addressing conflicts that may arise during contract execution. Including clear procedures, such as mediation, arbitration, or litigation, helps manage disagreements efficiently and minimizes disruptions. These provisions should outline the preferred resolution methods, timelines, and governing laws, fostering a structured approach to resolving disputes while maintaining professional relationships.

5.5 Unrealistic Water Loss reduction targets and contract duration

5.5.1 Context and Challenges

The project scope, targets, and timelines must be challenging yet achievable. Unrealistic scoping study outcomes can lead to procurement failure due to non-compliant bids or inability to meet overly ambitious targets, ultimately harming the credibility of NRW PBCs. A thorough and realistic assessment during the scoping phase is essential considering the realities on the ground and adopting a pragmatic approach.

Fixed targets should be avoided as they can misalign incentives—low targets fail to motivate contractors to maximize NRW reduction, while excessively high targets deter bidders or inflate costs. Performance evaluation and payments should focus on absolute NRW reduction volumes, rather than percentages, to ensure clear and fair assessment of contractor achievements.

5.5.2 Unrealistic Water Loss Reduction Targets

Unrealistic water loss reduction targets refer to goals that are set without considering the practical limitations, current infrastructure conditions, and available resources. Such targets can lead to several issues:

a) Inaccurate Baseline Data

Lack of Accurate Assessment: In many cases, the initial assessment of water loss levels might be inaccurate due to outdated or unreliable data.

Underestimating Complexity: The complexity of water loss issues is often underestimated, leading to overambitious targets.

a) Technological and Infrastructure Constraints

Aging Infrastructure: Many water distribution systems have aging infrastructure that requires significant investment and time for replacement or repair.

Technological Limitations: Available technology for detecting and reducing water loss might not be sufficient to meet overly ambitious targets.

b) Financial Constraints

Budget Limitations: Water utilities may not have the necessary financial resources to invest in the required technologies and infrastructure upgrades.

Economic Pressure: Unrealistic targets can lead to inefficient use of financial resources, diverting funds from other critical areas.

c) Human Resource Challenges

Skill Gaps: There may be a shortage of skilled personnel trained in advanced water loss reduction techniques.

Training and Capacity Building: Adequate training programs and capacity-building initiatives may take time to implement.

d) Environmental and Regulatory Factors

Regulatory Compliance: Stricter regulatory requirements can limit the flexibility of water utilities in implementing water loss reduction measures.

Environmental Impact: Some water loss reduction measures might have adverse environmental impacts, requiring careful consideration and mitigation.

5.5.3 Contract Duration and Its Impact

The duration of contracts related to water loss reduction projects significantly impacts their success. Short contract durations can exacerbate the challenges posed by unrealistic targets:

a) Insufficient Time for Implementation

Project Planning and Design: Comprehensive planning and design phases are critical for successful project implementation, and these require adequate time.

Infrastructure Upgrades: Major infrastructure upgrades and replacements cannot be completed within short timeframes.

b) Pressure to Deliver Quick Results

Quality Compromise: The pressure to achieve quick results can lead to compromised quality of work and short-term fixes rather than sustainable solutions.

Incomplete Projects: Projects may be left incomplete if they cannot be finished within the contract period, leading to wasted resources and efforts.

c) Lack of Supply Continuity

Disruption of Services: Short contract durations can lead to frequent changes in contractors, disrupting the continuity of services and project management.

Knowledge Transfer Issues: Continuity is crucial for effective knowledge transfer and capacity building within the utility.

d) Financial Instability

Inconsistent Funding: Short contracts can lead to inconsistent funding and financial planning, affecting the overall stability of water utilities.

Economic Viability: Long-term financial viability of water loss reduction projects requires sustained investment and commitment.

5.5.4 Strategies for Realistic Target Setting and Effective Contract Management

To address the issues associated with unrealistic water loss reduction targets and contract duration, the following strategies can be employed:

a) Data-Driven Approach: Use accurate and up-to-date data to set realistic and achievable targets.
b) Realistic Goals: Set achievable goals that allow for gradual improvement and flexibility to adapt to changing circumstances.
c) Utility Staff Engagement: Imperative for the utility to have ownership of the project and to have utility staff involved from the very commencement in the project execution.
d) Long-Term Contracts: Opt for longer contract durations that provide sufficient time for planning, implementation, and monitoring of water loss reduction projects.
e) Phased Implementation: Implement projects in phases, allowing for periodic reviews and adjustments based on progress and challenges encountered.
f) Familiarization Period: Allocate adequate time at the start of the contract for understanding the operational environment, collecting and reviewing data, conducting analyses, and planning project activities. Enhanced Financial Planning
g) Sustainable Project Funding: Develop sustainable funding models that ensure consistent financial support for water loss reduction initiatives.
h) Cost-Benefit Analysis: Conduct thorough cost-benefit analyses to prioritize investments in areas with the highest potential for impact.
i) Innovative Solutions: Leverage innovative technologies for water loss detection and management to deliver best possible project outcome.
j) Capacity Building and Training: Engaging utility staff from the start of the contract fosters knowledge development and skill enhancement, resulting in a well-trained workforce capable of efficiently operating and maintaining the upgraded network.

Setting realistic water loss reduction targets and ensuring adequate contract duration are critical for the success of water loss reduction initiatives. By adopting a data-driven approach, project ownership, and ensuring sufficient time and resources, water utilities can achieve sustainable water loss reduction, ultimately leading to improved efficiency and reliability of water supply systems.

6 QUALITY OR COST BASED SELECTION

Contract award should be based on a combination of quality and cost-based selection. Awards should not be made exclusively on cost. Bidders with the best project team and/or the best technical proposal might not be selected because of a small, totally insignificant, price difference. One cent cheaper should not be an argument.

There should be either different weightings for technical and financial proposal (e.g. 70/30, 50/50 or at least 30/70) or a selection of proposals which are in a certain price range (e.g. all proposals not more than 20% more expensive than the lowest responsive bid). For the latter approach, there can be an invitation of the key project team to present the approach, followed by a thorough Q&A session.

7 LIMITED WATER NETWORK FAMILIARISATION PERIOD

A PBC for NRW reduction contract should include a suitable water network familiarisation period. This refers to a designated timeframe during which the contractor, are introduced to the specifics of operating, maintaining, and troubleshooting a water distribution network. This is particularly important if there were only limited field NRW assessments during the project scoping stage.

This period is crucial for ensuring that all relevant personnel are adequately trained and familiar with the systems and procedures specific to the water network they will be working with. Below are the key aspects and components that characterize this period:

7.1 Objective

The primary objective of the familiarisation period is to equip the contractor with the necessary knowledge to reduce the water losses effectively. This includes understanding the infrastructure, operational procedures, safety protocols, and emergency response actions.

7.2 Duration

The duration of the familiarisation period can vary depending on the complexity of the water network and the level of experience of the contractor's staff and on the level of commitment of the utility. It might range from several weeks to a few months. During this time, the contractor is expected to collect network data and information and to familiarise with network system and operation.

7.3 Field Visits

Site Tours: The contractor's staff to visit water treatment plants, pump stations, and key distribution points to observe and understand network operations.

Shadowing: The contractor's staff to work alongside utility staff to gain practical insights on key network operation and maintenance activities.

8 INSUFFICIENT PLANNING TO SUSTAIN PROJECT RESULTS

Insufficient planning to sustain project results refers to the failure to adequately prepare for the long-term maintenance, support, and integration of project outcomes. This can lead to a range of negative consequences, including the deterioration of benefits achieved during the project. Effective planning must encompass a holistic view of the project lifecycle, from initial conception through to long-term operation and maintenance.

It needs to be understood that in several situations in developing countries, the water utility will not have the capacity and means to operate the DMA system and continue to carry out NRW interventions. Capacity building before handing over is useful but does not solve the problem. Lack of management focus, lack of OPEX for the procurement of materials and insufficient capacity (staff, vehicles, ...) are the main problems. The earlier this can be openly discussed, the better. Once an NRW PBC starts, thoughts should quickly move to how the utility can build on and sustain the project benefits.

The following are key areas which need to be considered by the utility for sustaining project results:

a) Holistic Approach: Adopt an integrated approach that considers all aspects of the project lifecycle, including initial implementation, ongoing maintenance, and eventual decommissioning or transition.

b) Training Programs: Invest in training programs to develop the skills and knowledge required to sustain project results. An effective way to train utility staff is to be seconded to the contractor during the project execution.

c) Financial Planning: Establish long-term financial plans that account for maintenance, upgrades, and potential cost increases.

d) Adaptive Management: Implement adaptive management practices that allow for ongoing learning and adjustment based on feedback and changing conditions.

9 UNDERSTANDING WHEN PBCS ARE NOT THE RIGHT SOLUTION

NRW PBCs are not a panacea for all situations. While reducing NRW is always a good thing for a water utility, NRW PBCs are but one way to achieve this objective. However, a PBC should not be insisted on if conditions are not suitable. This is a danger if a funding agency pushes a PBC as the answer to the problem

If the network infrastructure and water supply conditions are not conducive for a PBC, another contract model is likely to be more suitable. This could be a conventional consultancy or BOQ arrangement for DMA establishment, NRW reduction project, a network infrastructure upgrade or water supply augmentation project.

An example: a utility in a developing country entered a PBC to reduce high levels of NRW. The contract aimed to achieve NRW reduction targets and to improve levels of service, but several factors rendered the approach unviable:

a) Lack of Accurate Data: There was insufficient and unreliable data on network infrastructure thus making it difficult to setup DMAs and progress speedily with water loss reduction activities.
b) Inadequate water supply: The utility was not able to respond to the continuous water supply conditions stipulated in the contract for the contractor to properly set up water loss baselines and carry out water loss activities under steady supply conditions.
c) Timely Decision-Making Challenges: Crucial decisions that needed to be made at times during the execution of the contract by both parties were not given the required attention and importance thus dragging project progress further into unnecessary delays and finally not achieving what it was originally set out to achieve.
d) Project Ownership: It was evident that the utility did not appreciate the importance of taking ownership of the project.

PBCs for NRW reduction are most effective in environments with reliable data and information, stable water supply and strong institutional support. Utilities facing systemic issues may require preliminary capacity-building initiatives before embarking on performance-based contracting. A decision not to proceed with a PBC should be taken for the right reasons if circumstances dictate.

If a contract was originally procured as a Performance Based, but in the course of its execution turns out not to be suitable based on detailed field investigations and data review, then there should be flexibility in the contract to adapt the Performance Based conditions towards a more suitable approach, such as a conventional admeasurement-based DMA establishment and NRW reduction approach.

10 KEY OBSERVATIONS

The document outlines the complexities and strategies associated with tendering for Non-Revenue Water (NRW) Reduction Projects under Performance-Based Contracts (PBCs). Below are the key conclusions:

10.1 Efficiency of NRW PBCs:

a) NRW PBCs are effective in reducing water losses, improving utility efficiency, and increasing revenues.
b) Successful projects align with measurable performance targets within a specific timeframe.

10.2 Challenges in Tendering and Contract Design:

a) Prolonged Project Preparation: Lengthy preparation and procurement stages can cause delays, leading to outdated project scopes and disengaged stakeholders.
b) Overcomplicated Tendering: Overly stringent qualification criteria, voluminous submission requirements, and unrealistic targets deter bidders and complicate the process.
c) Unrealistic Targets: Impractical water loss reduction goals undermine project credibility and success.

10.3 Balanced Approaches in Evaluation

a) A mix of academic qualifications and practical experience for personnel is recommended.
b) Focus should shift from rigid qualifications to a combination of skills, methodology, and hands-on experience.

10.4 Critical Contract Elements

a) Contracts must balance risk between utilities and service providers with fair incentive structures.
b) Adequate network familiarization and flexible contracts help adapt to unforeseen challenges.

10.5 Non-Sustainability Concerns

a) Long-term project sustainability is threatened by insufficient planning, lack of operational resources, and inadequate capacity-building within utilities.
b) Effective knowledge transfer, adaptive management, and financial planning are critical for sustaining results.

10.6 When PBCs Are Not Suitable

a) PBCs are ineffective where data is unreliable, infrastructure is inadequate, or institutional support is weak.
b) Conventional projects or capacity-building initiatives may precede PBC implementation in such environments.

11 RECOMMENDATIONS

a) Accelerate the transition from preparation to procurement to avoid delays and maximize funding.
b) Simplify tendering processes with clear evaluation criteria and realistic targets.
c) Focus on practical solutions over theoretical ideals, ensuring stakeholder engagement and operational continuity.

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