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APPLYING RESULTS-BASED FINANCING IN WATER INVESTMENTS

WATER PARTNERSHIP PROGRAM

GPOBA
The Global Partnership on Output-Based Aid

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GPOBA is a global partnership program administered by the World Bank. GPOBA was established in 2003 to develop output-based aid (OBA) approaches across a variety of sectors—among them infrastructure, health, and education. To date, GPOBA has signed 38 grant agreements for OBA subsidy funding for a total of US$155 million. GPOBA projects have disbursed over US$105 million based on independently verified outputs, directly benefitting approximately 7 million people. The program's current donors are the United Kingdom's Department for International Development (DFID), the International Finance Corporation (IFC), the Directorate-General for International Cooperation of the Dutch Ministry of Foreign Affairs (DGIS), the Australian Department of Foreign Affairs and Trade (DFAT), and the Swedish International Development Cooperation Agency (Sida). www.gpoba.org.

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Acronyms

AMC	Advanced Market Commitment
AusAID	Australian Agency for International Development
CBO	Community-based Organization
CCT	Conditional Cash Transfers
CF	Carbon Finance
CGD	Center for Global Development
COD	Cash-on-Delivery
CPI	Consumer Price Index
DfID	Department for International Development (United Kingdom)
ES	Environmental Service
FIT	Feed-in Tariff
GA	Government Agency
GHG	Ggreenhouse Gas
GPOBA	Global Partnership on Output-Based Aid
ha	Hectare
IBRD	International Bank for Reconstruction and Development
ICE	Information, Communication and Education Campaigns
IFC	International Finance Corporation
IVA	Independent Verification Agent
KfW	Kreditanstalt für Wiederaufbauthe (Germany)
LNG	Liquefied Natural Gas
LSMS	Living Standards Measurement Study (World Bank)
MDGs	Millennium Development Goals
MFI	Multilateral Financial Institutions
MW	Megawatt
MWC	Manila Water Company Inc. (the Philippines)
NGO	Nongovernmental Organization
ODA	Official Development Assistance
OBA	Output-Based Aid
OBD	Output-Based Disbursement
ODF	Open Defecation Free
O&M	Operations and Maintenance
OSE	Obras Sanitarias del Estado (Uruguay)
P4R	Program-for-Results
PBC	Performance-Based Contract
PBFH	Results-Based Financing for Health
PES	Payment for Environmental Services

PPA	Project and Performance Agreement
PSA	Pago por Servicios Ambientales (Payments for Environmental Services)
PPP	Public-Private Partnership
RBA	Results-Based Aid
RBF	Results-Based Financing
RE	Renewable Energy
REAGUA	São Paulo Water Recovery Project (Brazil)
RUC	Reference Unit Cost
SHS	Solar Home Systems
SIDA	Swedish International Development Agency
ToP	Take-or-Pay
UfW	Unaccounted for Water
VIMG	Village Irrigation Management Groups (China)
WII	Weather Index-based Microinsurance
WSS	Water Supply and Sanitation
WUA	Water Users Association

Note: All currency amounts are in U.S. dollars, unless otherwise noted.

Chapter 1

Introduction

Background

Over the last several years, the development practice and discourse has emphasized the need to link development financing and assistance to results. This change reflects incentives internal to donor agencies, such as tighter aid budgets and increasingly pressing accountability to domestic constituencies. At the same time, the increasing emphasis on tying development funding to results stems from disappointment in the results achieved by decades of development assistance, which based disbursement mostly on "inputs," and the subsequent discussions about the effectiveness of international aid that began taking shape in the late 1990s. In particular, various High Level Forums on Aid Effectiveness over the last decade (notably Paris in 2005, Accra in 2008, and Busan in 2011)[1] brought about a critical rethinking of aid goals and modalities that concentrated on criteria like country ownership, accountability, and management for results.

In this context, increasing attention has been given to results-based forms of assistance and funding that seek to provide greater incentives for achieving development outcomes and outputs. Results based financing (RBF) mechanisms can serve as alternatives to traditional official development assistance (ODA)—grants, loans, and guarantees—which is typically disbursed in advance of delivery.

There is no universally accepted definition of RBF. This commonly used label has been defined in different ways according to its objectives, the agencies involved, the level of the incentive(s), or the form of funding itself. Notably, the UK Department for International Development (DfID) identifies as result-based aid (RBA) any such approach whereby funds from bilateral or multilateral development agencies are used to incentivize developing country governments (See Pearson (2011)).

By contrast, this document adopts a very broad definition of RBF (see glossary, Appendix A) and it relies on the "principal-agent" model often used in economics to describe the features of the

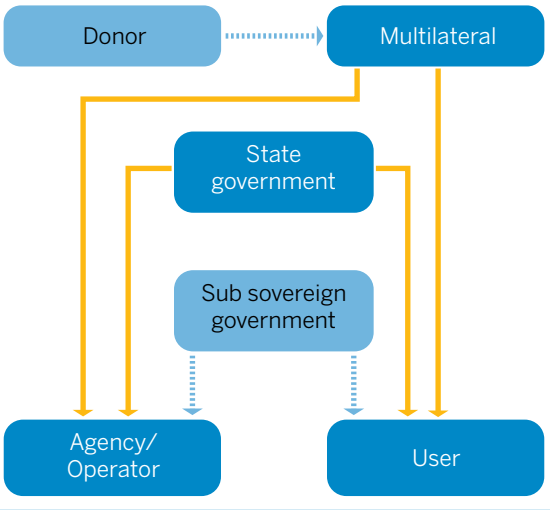
[1] The Paris Declaration on Aid Effectiveness, adopted by ministers and high-ranking representatives from 60 partner countries and more than 50 multilateral and bilateral development institutions, reaffirmed the shared determination to implement the Millennium Development Goals (MDGs) and the commitment to meet them through donors' harmonization and recipients' ownership. Donors and partners agreed to be measured as to whether they really have achieved the set goals. The midterm review that took place in Accra (September 2008) registered important progress but also highlighted the necessity of greater flexibility on the part of the donors to adapt to recipients' structures and the lack of ownership and capacity in a number of partner countries. More recently, at the Busan Forum in the Republic of Korea, global development leaders reviewed progress in improving the impact and value for money and recognized the growing importance of new development stakeholders such as new emerging donors, civil society, and the private sector.

[2] See Pearson (2011), Savedoff (2011) and ESMAP (2013).

approach. As seen in previous works on this topic,[2] the principal is a funder (regardless whether international or local) who delegates certain tasks to an agent. The agent assumes responsibility for achieving pre-defined results through some form of contract that postpones payment until delivery. In such broad terms, RBF can be established between multilateral organizations and recipient governments; federal and subnational governments; governments (or subnational governments) and public or private service providers; district authorities and local workers; or public programs and civil society organizations or families or individuals (Figure 1). Since the main intended audience of this document is World Bank staff, the discussion and case studies often deal with the level of the relationship between multilateral financial institutions (MFIs) and client governments. However, this document may lead to valuable insights for all practitioners dealing with RBF or exploring potential uses of RBF.

The most important benefits associated with RBF are:

Figure 1: RBF Instruments Can Include a Variety of Multilateral Institution-Government-Agent-User Arrangements



- Better quality of services because incentives are placed on quality and timely delivery
- Reduced corruption, due to increased transparency in the results-payment link
- Change in culture, from budget-driven to results-oriented
- Closer supervision as this is a necessary condition to issue payments
- Sustainability, particularly if the indicators are tracked throughout the project life
- Increased autonomy for the implementing agency as to "how" to deliver the results

However, RBF also comes at a cost, which is an argument often raised by critics of these instruments. The most important costs are:

- Transaction costs of developing the scheme that also requires large time investments during project preparation
- Higher costs of monitoring and supervision
- Risk of unintended distortions caused by ill-defined incentives

This document is intended to contribute to a better understanding of RBF instruments and the conditions for success or failure of the approach in water. Given the broad variety of issues and sectors covered, concrete examples are provided in an attempt to make the document as practical as possible in guiding the design of future RBF schemes.

The health sector has been a pioneer in implementing RBF efforts, followed by other sectors including education, energy, and water (mostly water supply). Bilateral financing institutions such as the British Department for International Development (DfID), German Kreditanstalt für Wiederaufbauthe (KfW), Swedish International Development Agency (SIDA), and the Australian

Agency for International Development (AusAID) were early promoters of these instruments, together with development agencies like the Center for Global Development (CGD) and the Global Partnership on Output-Based Aid (GPOBA).

Within the World Bank Group, conceptual acceptance has grown as well, and pilot forms of results-based lending and assistance, including OBA, have been implemented in many projects around the world. For instance, in 2012, a new results-based lending instrument called Program-for-Results (P4R) was launched, while the International Finance Corporation (IFC) has supported and funded several development RBF instruments and facilitated their deployment in several projects.

Brief Overview of RBF Tools

The experience of RBF schemes so far has been somewhat selective and donor-driven. Nonetheless, from the many successful projects that have closed as well as others that are ongoing, the development community has been accumulating experience and gathering knowledge about the requirements and key factors of success for implementation.

The water sector has been part of this movement to adopt RBF instruments. To date, experience has been limited in terms of the RBF tools that have been adopted. For the most part, their application has been confined to projects dealing with water supply. Most of the RBF projects in the water sector use the output-based aid (OBA) approach for water supply. Some projects are also using output-based disbursement (OBD) for some broader water resources management projects and some sanitation applications (see glossary in Appendix A and case studies in Chapter 3).

Other RBF tools seem relevant and promising for potential application in the broader water sector (outside of water supply and sanitation). Table 1 presents these tools, highlighting their main objective and indicating the kind of incentive(s) they entail. While adopted in different sectors, these tools might be potentially relevant for the water sector, and water challenges related to climate change, as will be discussed further in this document.

Overview of the Document

Given the broad array of issues and the complexity faced by the water sector as a whole (from irrigation to flood protection, to water conservation and hydropower), there is great demand for further exploring the potential of results-based financing and tackling the questions still unanswered about many of its operational dimensions.

This document takes a closer look at some of the practical aspects of implementing various RBF water schemes. Chapter 2 provides an analytical framework to explore if and when RBF can be a viable option, shedding light on some key factors and preconditions that are necessary for RBF to work—with the understanding that it can be used either as an alternative or a complement to a more traditional input-based funding scheme. The goal of this analytical framework is to lay out the most important questions that need to be faced in the design phase of an RBF approach, including: a) How can the results be defined and measured?; b) Will the agent be willing and able to commit to deliver the results (i.e. comfortably bear the extra-risk linked to the RBF operations)?; and c) What is the optimal level of the incentive to the agent and how should it be funded?

Chapter 3 then revisits the concepts discussed in the analytical framework through the analysis of various case studies of RBF approaches in different water-related areas. Some of the case studies are based on actual projects already implemented or ongoing, while

Table 1: Common RBF Instruments: A Quick Reference Guide

Instrument	Definition	Main purpose	Type of incentive(s)
Advance market commitment (AMC)	A contract in which donors or governments make a legally binding pledge to pay for an innovation (result) if and when one is developed (originally conceived for vaccines)	To encourage the development and production of affordable technologies or procedures by creating a viable market for such new technology or procedure	Guaranteed prices (up to a certain quantity, donors or governments pay a higher price and afterward the developers receive a price affordable for the population)
Carbon finance (CF)	Resources provided to projects generating (or expected to generate) reductions in greenhouse gas (GHG) emissions in the form of the purchase of such emission reductions	To support actions that reduce the amount of GHG emissions over and above a baseline determined a priori	A reward in the form of carbon credits
Cash-on-delivery aid (COD)	A financing arrangement through which donors offer to pay recipient governments a fixed amount for each additional unit of progress toward a commonly agreed goal	To encourage client country governments to improve certain aspects of their performance, but allowing those governments to decide how to achieve those results	Reward for achieving agreed targets at a macro level
Conditional cash transfers (CCTs)	Programs that transfer cash to poor households that make specified investments in the human capital of their children or change their behavior to promote the children's welfare	To encourage the beneficiaries to adopt new practices that tend to improve their living conditions or chances of growing out of poverty	Reward for adopting new behaviors or habits or achieving certain personal development goals
Feed-in tariff (FIT)	An energy supply policy offering long-term purchase agreements for the sale of electricity generated through renewable energy (RE)	To support projects oriented to the adoption and deployment of equipment to generate electricity through RE	Guaranteed prices, typically including: guaranteed access to the grid; stable, long-term purchase agreements (15–20 years); and payment levels based on the costs of generating RE
Output-based aid (OBA)	A mechanism to support the delivery of basic services where policy concerns justify the use of explicit, performance-based subsidies	To facilitate access to basic services for the low- income segment of the population	Subsidy targeted to the eligible, low-income population. It is generally valued in relation to the cost of providing the service in question.
Output-based disbursement (OBD)	A disbursement mechanism between different levels of government for the delivery of clearly specified outputs	To stimulate execution of budgeted infrastructure plans by lower levels of government	Loans to federal/national government disbursed upon achievement of specified outputs

(*continued on next page*)

Table 1: Common RBF Instruments: A Quick Reference Guide *(continued)*

Instrument	Definition	Main purpose	Type of incentive(s)
Payment for environmental services (PES)	A voluntary transaction where a well-defined environmental service (ES) (or a land use likely to secure that service) is being bought by one or more ES buyer(s) from one or more ES provider(s) if and only if the ES provider secures provision of the ES	To encourage the preservation of certain environmental conditions that produce beneficial results for the beneficiaries	Payment for a specific service, once valued and rendered
Take-or-pay	A commitment from a buyer to either take delivery of and pay for a specified minimum quantity of goods or services over a specified period of time or pay for the contract value of that minimum quantity	To ensure a minimum revenue stream to the supplier of certain goods or services	Guaranteed prices and quantities

Source: Author's compilation. Please see Appendix A for sources for each definition.

others are an illustrative elaboration, given the lack of practical cases to use as sources. These theoretical constructions are based on the experience of the authors and have been discussed with expert RBF professionals and sector specialists. The main goal is to offer some concrete illustrations of the type of questions and operational dimensions that are likely to arise when considering an RBF scheme in various water-related schemes. The reader should use good judgment to adapt such considerations to the context and case at hand.

Chapter 4 presents some conclusions and lessons learned. The key challenges that are likely to be encountered in designing an RBF scheme deal with: the clarity and level of certainty of the relationships from input to output to outcomes (causal links); the ease and availability of measurable indicators; and, consequently, the optimal determination of the necessary incentive(s) to align the goals of the principal with the agents' deliverables.

Assessing the extent to which the principal is committed to reach the intended output/outcome, the sources of funds available, and the existence and quality of verification systems will guide the choice of the best tool that can minimize the risk of unintended distortions (such as rent-seeking or overproduction of rewarded goods/services) while matching the existing supply and demand conditions.

After the review of selected case studies, lessons learned are provided. Since RBF does not have universal application, the main recurring issues encountered in the broad water sector are used as a starting point to help narrow down the selection of which RBF tools may be most suitable for each specific context and situation.

Appendix A presents a glossary of RBF terms for those who are not yet familiar with all of the concepts and acronyms associated with the subject. To promote an interest in developing new RBF schemes or tackling issues in new areas, specific results and indicators that could be relevant for different sectors are presented in Appendix B.

Chapter 2

Analytical Framework

Applications of RBF in the water sector should be assessed with regard to their suitability to a specific project. The analysis should address the following questions:

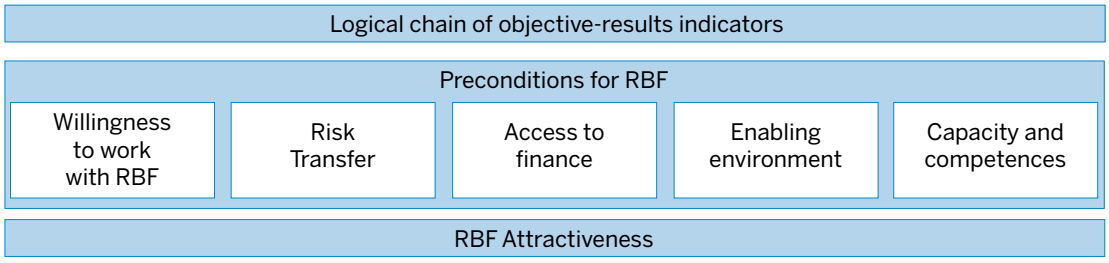
1. How can the objective(s) and results be defined and measured?
2. What are the preconditions for a feasible RBF scheme?
3. Is RBF attractive in comparison to more conventional approaches and solutions that do not use RBF?

These questions are a key component of the analytical framework of this document (Figure 2). The discussion that follows answers the questions to provide guidance in exploring potential applications of RBF. In real life, the reasoning sequence may differ from the one followed here. Many of the analytical aspects presented could be considered simultaneously and iteratively.

Establishing Objectives-Results-Indicators

The most promising features of the RBF approach aim to tie the disbursement of funds to the achievement of results. This brings the identification of such results front and center. The possible ambiguity of RBF—as discussed in O'Brien & Kanbur (2013, p. 4)—is that almost anything can be regarded as a "result" (even an input). Thus there must be a clear agreement on where the desired results fall in a chain of causality from inputs to outputs to outcomes. Figure 3 shows a simplified graphic representation of the claim of RBF approaches in general.

Figure 2: Overview of the Analytical Framework



First and foremost, for RBF instruments to be effective, it is vital that the desired higher *objective* (or outcome) can be translated into clear, achievable and measurable *results* (typically lying somewhere between outputs and outcomes).[3] Second, it is essential to have *indicators* that allow the results to be measured in such a way that disbursement of finance can be precise and reliably tied to results.

When the chain between these three elements is not robust—meaning that the indicator does not adequately represent the expected results that are univocally linked to the objective of the intervention— the scheme risks being ineffective or even counterproductive (it may generate negative incentives). For example, allocating some form of financial incentive based on increasing irrigation infrastructure, but without ensuring that water is adequately priced, may have the unintended effect of stimulating inefficient or wasteful use of water. On the other hand, when the causal relationship that links these three elements is robust, the chances for success are very high (Figure 4).

Identification of Objectives and Results

As projects financed using RBF instruments base payments on the expected results, there must be a strong correlation between the objective and the expected result. For instance, if the objective of an irrigation project is to reduce the volume of water used by the farmers, the expected result should be closely linked to such volume. Sometimes, an objective can be achieved by a combination of results. For example, reducing water-related diseases may be the ultimate objective of a project that increases access to improved piped water. Yet, to reach the desired goal in a disadvantaged area means not only ensuring that an adequate number of water points is built (either communal or in households), but also that water is consistently supplied to the new infrastructure, water quality is safe, and adequate sanitary conditions in the targeted neighborhoods and households are also met.

[3] See the glossary in Appendix A for the distinction.

Figure 3: Simplified Mapping of RBF Approaches on a Results Chain

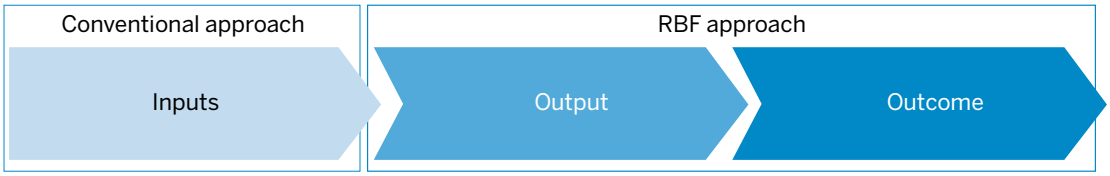
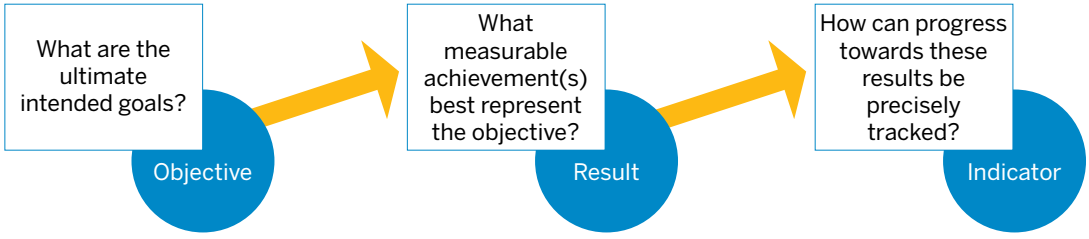


Figure 4: Relationship in Results-Based Financing between Objectives, Results, and Indicators



Generally speaking, the result should be expressed as a concrete, tangible output or outcome that is not subject to ambiguity. Some ways to define the results include a hard output, instances of provision of a service, or improvement in certain parameters indicating living standards or income of the beneficiaries. Alternatively, the result can be expressed as an improvement in certain aspect(s) of the living conditions or income levels of the targeted population. The baseline and way to measure these improvements should be very clearly specified, ideally using or building on metrics that are already used in the country statistics system.

The degree of certainty of the causal link between a measurable result (number of public water points built) and the ultimate objective (reduction of water-related diseases) is strictly sector-specific and can be strengthened by consulting literature and evidence. To the extent possible, the definition of the result should cover an outcome or provide some assurance about the sustainability of the project objective. In the case of results defined as hard outputs (such as irrigation inlets, on-site sanitation facilities, and water supply or sewerage connections), the inclusion of a second result (or intermediate outcome) that will trigger additional payments should be considered. These second tier results could be technical in nature (sustained provision of adequate quantities of irrigation water, regular emptying of septic tanks, satisfactory water or sewerage service) or could be related to a financial aspect of the project (such as the collection of the corresponding fees).

The result can be tracked at various levels: national or federal, provincial or state, community, or even the individual level. The choice of level is case-specific. In some instances, a national program may be implemented through lower-level action plans, with their associated results contributing to higher-level results; thus there may be a chain of cascading incentives. Whether this is set up and what form it may take will depend on the capacity and sophistication of the client country governments.

The most critical link of the chain is the relationship between objective and result because this link determines the effectiveness of the RBF financial incentive. This link is also at the core of the somewhat controversial performance-based conditionality, because it is here that the potential distortion of incentives can happen if the principal and agent have different goals, or resources can be misallocated if the wrong results are rewarded. For example, the supply of water for irrigation in Bangladesh has increasingly relied on groundwater aquifers (reaching about 80 percent of irrigation water). Many experts now warn that overexploitation of groundwater is causing a rise in contamination of aquifers with arsenic, which could then enter the food chain, increasing health hazards. It is not uncommon in South Asia to adopt volume-based subsidies to the energy tariff, which in turn can promote over pumping of groundwater. A sustainable RBF scheme, in this case, should promote the exploitation of the country's vast surface water resources and also reward the decrease in groundwater use. Table 2 below illustrates why certain options for the chain of objectives-results-indicators have better chances of success than others.

As seen in the irrigation example in Table 2, linking a farm's reduction of the consumption of irrigation water to the introduction of a new technology seems too weak a link between objective and result because new technology does not necessarily lead to lower consumption. Even if all farmers install the new technology, they could opt to grow a more water-intensive crop, increase the number of crop cycles, or cultivate a larger area in their farms, leading to higher water consumption. Using the "number of systems sold" as an indicator illustrates how the choice of the

Table 2: Selection of Optimal Approaches to Defining Results and Indicators

Problem	Objective	Result	Indicator	Comment
Higher than desired consumption of irrigation water	Reduce consumption of irrigation water at the farm level	Water-efficient technology installed	Number of systems installed	Weak link between objective and result
			Number of systems sold	Adds a weak indicator
		Lower volume provided to tertiary canals	Volume of water provided to tertiary canals	Strong links, but free rider issue needs to be addressed
	Reduce losses in the conveyance system	Conveyance system refurbished	Kilometers of canals with lining	Weak link between objective and result
		Reduction of water losses in conveyance system	Volume of water lost in conveyance system	Strong links

indicator itself (number of pieces of equipment purchased) can undermine the scheme if it is weakly linked to the ultimate objective (reducing water consumption).

By contrast, when a more precise result is used—lower volume to tertiary canals—it is very clear that objective, result, and indicator are aligned. However, despite a strong indicator, there still could be uncertainty about who receives the incentive and how this is defined. Given the difficulty in measuring how much water goes to each individual farm, a set of rules should be set to avoid the free rider problem, as some farmers may be making an effort to reduce consumption while others may continue with the old practices and still reap the benefits (if paid to a water users association, for instance or distributed uniformly among all farmers within the scheme).

Choice of Indicators

Since the value of the indicator will determine the amount to be paid to the agent, it is critical that the indicator be properly defined, unambiguous, and easy to measure or calculate (that is, the parameters to be used in its calculation should have similar characteristics). The indicators should be SMART:[4]

- **S**pecific: Closely linked to the a specific area of improvement
- **M**easurable: Able to capture quantifiable progress
- **A**chievable: Achievable within the life of the project and thus suitable to trigger payments
- **R**elevant: Reflect information that is important and helpful in tracking progress toward the intended objective
- **T**ime bound. Progress can be tracked at a desired frequency for a set period of time

Defining, measuring, and verifying SMART indicators are necessary conditions to the successful preparation and implementation of an RBF operation. Selecting the protocol for calculating the indicator can be just as important. This is particularly the case for complex outcomes (such as standards for treated effluent returned to water bodies) or outcomes involving sustainability.

In cases where the result is a hard output, the indicator will most likely be the number of those outputs that were produced or delivered by the agent. In such cases, there should also be a reference to the standards that will be used

[4] Bogue (2005).

to verify compliance. For example, in the case of the provision of a certain service, the number of months of satisfactory service provision or the achievement of a set period of such satisfactory service provision could trigger the payment.

If the objective is to reinforce the financial sustainability of a service, a dual result could be set. A technical objective—compliance to service standards—could be established, using a pass-fail indicator. If the technical objective was passed, the financial result could be set, in the form of a collection rate.

When the result corresponds to a parameter tracked by the national statistics system, the indicator used in such system could be used to determine the amounts to be paid to the agent. Starting from a baseline, also adopted from the system, the improvements against it could then be used in that calculation. However, special care would need to be taken to assess the strength of the system. Periodic verification may be warranted to ensure that the principal will not be paying for inflated results. More examples of objective–result–indicator chains can be found in Appendix B.

Verification

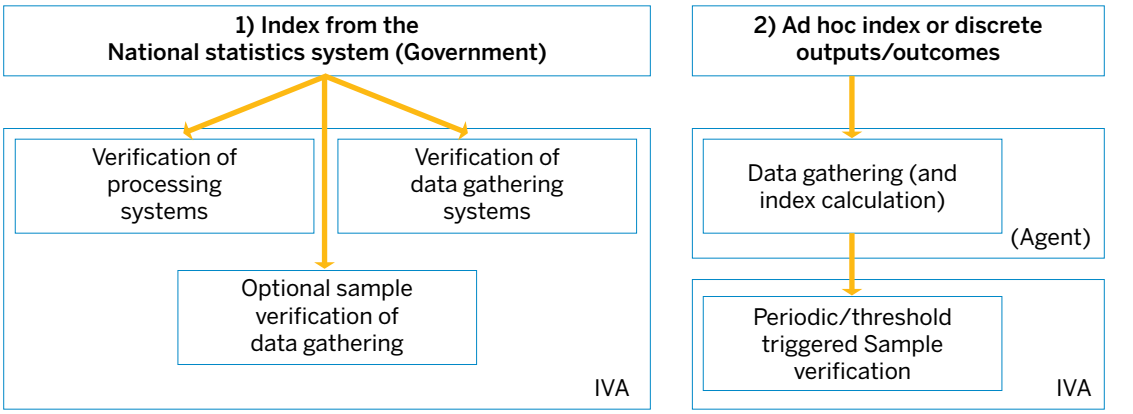
One of the cornerstones of any RBF project is verification, as disbursements will be made only after results have been independently verified. The qualifications and independence of the person or entity that will carry out the verification process—the independent verification agent (IVA)—should be ascertained carefully. In practice, there may be a tension between the quality and cost of the work done by the IVA, as it may be difficult to find a qualified IVA in developing countries, and hiring an international group could be costly. It is sometimes possible to use a combination of local and international professionals, as was done in a water supply project in rural Vietnam by the Global Partnership on Output-Based Aid (GPOBA). Quarterly verifications were carried out by two local reputable professionals, who were joined every six months by an international expert. The brief note by Loening and Tineo (2012) offers some practical insight from GPOBA's experience in hiring and supervising IVAs.

If the scheme is using government-generated indicators to measure the results, the IVA will need to verify the strength of the mechanism to generate the indicators (information gathering and processing). From time to time, the IVA may need to carry out field visits and verify a sample— although this can be costly. For schemes using discrete results to trigger payments, the agent can prepare a report showing the results achieved in sufficient detail so the IVA may proceed to verify samples of the total number of results claimed by the agent.

The verification could be done periodically (say, every three months) or any time a minimum number of results has been achieved and claimed by the agent. This will depend on the predictability of the number of results that can be achieved by the agent. In general, if results reported are predictable and steady, a periodic verification schedule could be set forth. For more unpredictable situations, a minimum threshold could be a convenient way to avoid costly verification missions for low disbursement amounts to be paid (see Figure 5).

Sample verification should be based on sound practice according to inferential statistic theory. Good verification practice starts with the design of a proper sampling strategy that will allow stakeholders to reach the desired conclusions about the overall intervention area (such as "the new connections have been successfully installed") with sufficient certainty (statistical significance of the test), while doing so in an economical way (power calculations allow estimating the minimum sufficient sample size). Devising a good sampling strategy is a complex task because it requires a mix of theoretical knowledge in sampling theory and statistics, as well as practical understanding of the measured

Figure 5: Verification Process by Type of Indicator



output and context. For instance, sampling a homogenous universe of beneficiaries concentrated in intensely populated urban slums is very different (in terms of costs and logistics) from sampling an ethnically diverse population located in a broad and sparse rural region. Thus it is of utter importance to procure IVA (or external expert) that can properly comply with this task.[5] Typically, the IVA (or other agency in charge) also establishes a baseline before the project start, such that the results achieved with the intervention may be unambiguously attributed to it and were not instead pre-existent.

When designing the project, it is advisable to consider the right balance between the cost of each verification exercise and the amounts claimed by the agent. Otherwise, the verification costs could be quite large relative to the total amount of the project.

Five Preconditions for RBF

Five aspects must be considered to determine whether it is possible to use RBF:

1. The key **stakeholders** are willing to work with RBF
2. The agent is capable of assuming **additional risk**
3. The agent has **access to finance** to fund the project until the RBF payments are received
4. The **environment** is suitable to the use of RBF
5. The key stakeholders have the **capacity and competences** to develop and implement the RBF mechanism

Precondition 1. Willingness to Work with RBF

The willingness of the principal and agent to use RBF is a condition *sine qua non*. The aspects of novelty together with an established culture of input-based ODA may be a non-trivial obstacle when piloting RBF approaches, especially in untested sectors. This is why building a strong and convincing case to explain the benefits and costs of RBF to the client is a crucial first step for the RBF practitioner. This requires an analysis of all the elements in the analytical framework, and specifically the assessment of the attractiveness of RBF. A growing body of evidence illustrating successful examples and the potential

[5] Among other resources, the World Bank's experience with the Living Standards Measurement Study (LSMS) has generated valuable experience and tools that can assist in survey design.

advantages of using the RBF approach may provide additional comfort.

Precondition 2. Risk Transfer

Shifting the funding after the delivery of the agreed results implies assessing whether the agent is in a position to take on the additional risk and to what extent the agent can bear and manage the additional risk introduced by RBF tools. Taking on the additional risk posed by the RBF mechanism can be a problem for small service providers when they are not allowed to take on debt to pre-finance some of their operations.

The main additional risk that the agent will have to take on is linked to the financial risk to fund the cash flow gap between the project implementation costs and the RBF payments until the results are delivered. In most cases there are ways to reduce this risk: for instance, linking a share of the payments to intermediate results or combining input-based and results-based approaches. The hypothetical scenarios described in Box 1 show how the risk may be shifted according to what level of agency is more receptive to the incentive.

An adequate risk analysis will have to be performed. The approach to it is the same as with traditional financing instruments, as it relates to ensuring that each risk is borne by the party better suited to manage it. Box 2 provides a brief summary of the main risks to consider in such an analysis.

Precondition 3. Access to Finance

Even if the agent can take on the additional risk, RBF may also require that adequate resources are available to the agent to pay in advance for the goods and services needed to deliver the results. Agents can tap a range of sources to obtain the required funds:

- **Internally generated cash flow**: Private or government-owned companies may be able to use the proceeds of their

Box 1. Transferring Risk to the Agent: An Example of Watershed Protection

If a national government needs to increase the area of protected watershed, given an existing census of selected watersheds to be protected, a donor could reach an agreement with the country to disburse a certain amount for each percentage point increase of protected area, starting from the initial value at the time of the census: a so-called cash-on-delivery (COD) aid agreement.[a] Of course, the data should be reliable; so should the mechanisms to determine whether conditions have been met to consider that a new area is protected, so the result can be easily verified and the indicator calculated to define the amount to be paid.

If the national government is directly responsible for protecting the watershed, a COD-type of agreement should suffice, and the national government would define how to achieve the expected results. If there are multiple reasons for protecting the watershed, and multiple levels of governments have responsibilities, the national government could sign various kinds of agreements with the state/provincial governments to carry out the projects. These agreements could use different RBF instruments (as well as traditional ones), depending on the circumstances.

If watershed protection helps regulate flows in rivers that traverse cities, reducing flood damage by lowering the peak flow, cities could pay to protect the catchment, instead of implementing other flood protection/prevention measures. A Payment for Environmental Services (PES) agreement could be used, for instance (see Appendix A). Conversely, if the protection project requires state/provincial governments to implement infrastructure works, an output-based disbursement (OBD) agreement could be the way to go. Finally, protecting a forest could also be linked to carbon finance provided that certain conditions are met.

[a] See Appendix A for more information about COD agreements, as well as PES and carbon finance.

Box 2. Types of Risk Related to RBF and Ways to Reduce Those Risks

Performance risk: This risk must be borne by the agent for the scheme to be considered results-based financing. To reduce this risk, it is vital that the delivery of the expected results remain under the agent's control, as much as possible. The results should fall under the agent's area of expertise or should be the main aspect of its trade or business. Results should be defined very clearly, as well as the way progress in attaining those results will be monitored and verified. Obstacles to performance should be reduced, neutralized, or eliminated. For instance, the agent should have access to all materials, information, or other elements required in a timely manner.

Payment risk: This risk can be minimized by ensuring the agent that there will be no delays or withholding of payments once the results have been delivered and verified. Selecting a trustworthy fiduciary agent and clearly defined and actionable disbursement procedures can help create confidence that delivery of results will translate in prompt disbursements reducing the financial burden for the agent.

Demand risk: In some cases, the agent could take on the project and find out that there is less demand than expected for the service or product the agent committed to deliver. If the project requires high startup or fixed costs, and recovery of those costs depends on the quantity of product or service provided that is taken up by the public, demand risk could be significant. To reduce this risk, the principal can guarantee a minimum quantity to be purchased (it can also guarantee a price), ensuring a minimum revenue stream for the agent. However, this is a risk that now will be borne by the principal. Another way to minimize this risk, independently of who will bear it, is to conduct thorough demand studies, to understand the size of the market targeted by the project.

Cost variation risk: In RBF projects, cost variations may pose a significant risk because the remuneration is set at the onset of the project (sometimes an auction can be held to set a unit payment while at other times this is fixed from the design stage); the agent is allowed to procure materials on services needed to deliver the results that will trigger those payments. This is a key feature of most RBF instruments, as it allows the agent to use its expertise to secure the lowest cost it can and make the most out of the project (conversely, a risk affecting the principal is the one of overpaying for the results). In projects that use traditional financing instruments, the procurement process is monitored by the financing institution; cost variations can be detected before closing the contracts and dealt with accordingly. In RBF, if there is a reasonable anticipation that, due to circumstance beyond the agent's control, costs may vary in ways that can affect the project financial equilibrium at risk. A way to adjust the remuneration accordingly could be stated in the legal documents. The principal should consider the impact that any remuneration increase could have in the quantity of results to be delivered by the agent or the total cost of the project, if quantities are to be kept unchanged.

Other risks: These include *collection risk* (beneficiaries are not able or willing to pay their portion of the agreed price); *political risk* (currency transfer restrictions, expropriation and breach of contract, war and civil disturbance); and *regulatory risk* (for instance, if the principal is unwilling or unable to adjust tariffs in line with increasing cost of service delivery). These risks should be dealt with in a similar fashion as in traditionally financed projects.

regular business cycle as a source of funds to deliver the expected results.

- **Government budgets**: An agent may receive government subsidies if the business is not financially self-sufficient and it is eligible for a subsidy.
- **Supplier credits**: An agent could receive materials to be paid for later; reducing the time lag between paying for the materials end getting paid for the results achieved using them.
- **Loans**: Commercial or government-owned banks could provide funding to start the project based on the capacity of the agent to repay the loan. Agents with a good financial history and solid balance sheets will be in a better position to use these sources of funding.
- **A dedicated national facility**. Creating such a facility is also an option. For instance, GPOBA supported the creation of the Honduras OBA Facility; the

government provided $1 million to fund bridge loans, but only to agents implementing public projects.

Depending on the amounts involved and available sources, the situation and analysis may vary. For instance, if a large contractor, irrigation provider, or utility needs to access the funds for the project, the banking sector may be sufficient, if it is adequately developed. However, if the banks are not use to funding this kind of operation, working with them to create confidence or even introducing some kind of guarantee scheme may be necessary.

There are ways to overcome financing issues; the existence of the RBF agreement could be part of the solution, as well. When funding is not easily available, the RBF design may be revisited or integrated with traditional, input-based instruments. For example, if an irrigation scheme ranging from primary canals to farm outlets involves an investment amount that is too high for the agent to pre-finance, the project could have intermediate outputs like a full stretch of primary or secondary canals that will be paid when finished; then the tertiary canals and farm outlets can be paid based on the original indicator. If this arrangement is not possible, the primary and secondary canals could be financed through a traditional loan, while the rest could be done using an RBF scheme.

It is also important to note that the amount in question will generally be much less than the total cost of the project, as it will only equal the amount required to deliver the first batch of results, or—more accurately—the maximum negative cash flow expected in any one cycle of result delivery and payment.

Conversely, if the scheme requires end users or beneficiaries to buy and install certain hardware before they can receive a subsidy or rebate, there might be a need for a microcredit institution to be present and active in the community. If this is not the case, reinforcing the microfinance sector could be one choice. Alternatively, other schemes could be tried, such as the sanitation lottery, which played an important role in the drive for "open defecation free" status in rural villages in Bangladesh and India.

The RBF financing agreement could also work as a guarantee instrument to negotiate loans for the initial funding, as the bank that could provide the loan will still need to assess the capacity of the agent to deliver the results as expected. However, the bank should have more certainty about the availability of funds to pay back the loan given that the RBF financing agreement indicates that payments will be automatic once the results are verified. A clause stating some kind of direct payment from the RBF fund to the lending bank once the results are verified may also be introduced in the RBF agreement. The case of Lighting Africa, presented in Box 3, illustrates how financial institutions have been incentivized to progressively enter the new market of off-grid lighting solutions for poor customers.

Precondition 4. Enabling Environment

The extent to which the environment can enable an RBF approach determines the applicability of the RBF approach—or, more precisely, how far along the input-output chain the RBF mechanism can place its incentive. It also determines to what extent supporting measures are needed to overcome bottlenecks in the enabling environment. Accordingly, the assessment of the enabling environment is not static but rather dynamic and so is the range of RBF instruments that could be applied at different points in time (see the example discussed in Box 4).

The measures to improve the enabling environment can be part of the RBF mechanism. For example, if a government is weak and does not have the current capacity to manage RBF mechanisms, it can still be possible to place less emphasis on the output indicators (and more on input); define supportive measures (capacity

Box 3. Creating Incentives to Financial Institutions to Participate in Small-Scale Irrigation

Through much of Africa, the incentives for financial institutions to support irrigation and for farmers to invest in it are lacking. The provision of financial services for smaller-scale investments in irrigation is discouraged by gaps in transport and communications infrastructure, and uncertain legal frameworks, and in land and property registries. Contract enforcement and legal arrangements to facilitate leasing are often not in place.

Often the only available financial institutions to support small-scale irrigation finance are commodity-based credit providers, such as exporters, input suppliers, and marketing cooperatives. Increasing the variety of financial products and services offered and extending their outreach to a wider array of rural clients would be highly beneficial. Providing a *combination of financing and insurance* can reduce production risk. Well-designed insurance products can substitute for traditional collateral. *Leasing* is often a good alternative to lending for rural finance institutions and a good alternative to borrowing for farmers, and for farmers, this is a way to gain access to equipment for small-scale irrigation, and having the equipment itself serve as collateral.

Lessons from the "Lighting Africa" Experience

The Lighting Africa program (see *http://www.lightingafrica.org/*) supports the development and distribution of safe, clean, affordable off-grid lighting to Africans not yet connected to a grid. The purpose of the program is to catalyze and accelerate the development of markets for affordable, modern off-grid lighting solutions. Some of the lessons learned from the program could be adopted to support investment in small-scale irrigation technology, potentially involving RBF schemes.

A big challenge in mobilizing financing and investments for off-grid lighting has been the lack of knowledge about the industry and the perceived high risk of investments. The program's effort in defining shared and verified quality standard for the lighting devices accepted under the program helped reassure financial institutions about the technology and demand for the devices.

Access to finance was identified by distributors as one of the biggest challenge to scaling up the solar lighting market, constraining their ability to carry adequate stocks and extend credit to retailers. As a result, Lighting Africa offers risk mitigation instruments to commercial financial institutions in order for them to provide long-term growth capital, short-term working capital, and trade finance to manufacturers and distributors.

At the consumer level, many rural consumers are deterred from buying off-grid lighting products because the upfront costs are high. Lighting Africa is providing training and creating awareness for microfinance institutions on the opportunities for consumer lending. In addition, the quality benchmarks and warranties provided by manufacturers of products that have passed Lighting Africa quality standards have provided a level of security for microfinance institutions to provide consumer loans.

Possible RBF Solutions for Small-Scale Irrigation

International donors could encourage local banks to offer credit to farmers, backing them up with interest rate subsidies and/or a (partial) guarantee that could be linked to the number of small farmers supported, and made conditional on independent verification. Credit could be extended for proven technologies, and require some form of collateral and investment by the beneficiaries. Banks could engage the national agricultural institute to certify the technology proposed.

building); and include these in the RBF mechanism. The balance between both input and output indicators and the supporting measures can change over time, as often is the case in the World Bank's recently launched Program for Results (P4R) approach.

An enabling environment can also depend on the availability of relevant data. An example can be found in the case of weather index-based insurance used to reduce flood- related risks (see the discussion of Hypothetical Case 1, on irrigation technology subsidies and weather

Box 4. RBF vs. "Traditional" Solutions as Applied to Irrigation

Morocco's drip irrigation policy illustrates the importance of understanding all the contextual conditions when designing an effective policy, particularly one using RBF (see FAO (2012) and Kuper et al. (2009) for more details on such policy).

In this case, the traditional infrastructure subsidy solution presented two main issues. First, drip irrigation is ideal for certain types of crops, but they are not typically grown by poor /small farmers in the country. Second, international experience shows that development of drip irrigation can lead to greater water consumption if water abstraction is not controlled. Drip irrigation tends to produce higher crop yields than flood irrigation. These greater yields require greater crop water evapotranspiration (ET) to sustain those higher yields. In Morocco, groundwater is abstracted by private farmers, with almost no control by river basin agencies (RBAs) — despite the water law, which states that all water users must register their wells and apply for an abstraction authorization. Hence, groundwater abstraction is currently much higher than the renewable volume in most aquifers.

Assuming that a potentially appropriate RBF solution has been identified, the next step is to check the existence of the relevant enabling conditions. In this particular example it would be relevant to assess how much the country owns the goal of water conservation, or how much capacity the agricultural governance institution in charge has to oversee/verify the RBF conditions, and the extent to which the microfinance sector is developed in the country.

Morocco Drip Irrigation Case

Typical Problem in Sector: (irrigation)	Available Indicators	How close is the indicator to the desired outcome?	Traditional solution	RBF Solution
Improve water productivity in irrigation in the context of water scarcity	Crop production: per unit water supply & per unit water delivered	This indicator may not incorporate the aspect of efficient use of the available water (ultimate goal when facing water scarcity)	Universal government-funded subsidy for the acquisition of on-farm drip irrigation equipment (e.g. Morocco)	1) Support the supply chain in an adaptive manner for example through matching grants to financial institutions that lend to new technology supply for small farmers (such as in the Lighting Africa example illustrated in Box 3).
				2) Continue to subsidize drip irrigation equipment but linking a % of the disbursement to long term functioning of the drip irrigation infrastructure/ optimal crop selection/water abstracted volumes (conditional on hectares of irrigated area).

microinsurance for small-scale farmers, in section 3.2.1). The literature on these schemes (for instance, Hellmuth, Osgood, Hess, Moorhead & Bhojwani, 2009) illustrates the difference in data requirement between drought episodes and floods. For droughts, a single parameter (rainfall) can be sufficient for the prediction, while a composite index is necessary to fully describe a flood event— and therefore design flood-index insurance. The relevant variables that must be correlated with crop damage include the depth and duration of water discharged during the flood, and the timing of the flood.

The implementation of flood-index insurance also requires a reliable and consistent measure of the index. This is why remote sensing and

geographic information systems are useful tools that may enable objective and accurate assessment of the extent and duration of flooding at high resolution, if the required data (topography, hydrology, land use, farmer's location, and infrastructure) are available.

Given the additional risk borne by the agent, the confidence in legal and regulatory frameworks is critical to the success of RBF. If a government has a strong track record of honoring contracts and caring about the financial sustainability of efficient service providers, the agent will be more lenient toward assuming more risk.

In some circumstances, if there are weak regulations regarding cost recovery and resolution of disputes, the well-known mechanism of regulating by contract could be used, as is often done in public-private partnership (PPP) agreements.

Creating special vehicles for disbursement, such as escrow accounts, and selecting fiduciary agents that will disburse automatically once the specified conditions have been met and verified—thereby preventing any political intervention—will go a long way toward reducing payment risk and giving more confidence to potential agents to enter into an RBF agreement.

Precondition 5. Capacity and Competences

The principal should be in a position to administer the scheme and collaborate with the agent to resolve implementation issues. The principal should also be able to provide assurance that it has the capacity to oversee project implementation and follow up on the verification process, starting by hiring an independent verification agent (IVA) as early as possible to guarantee that there will be no delays in verifying the first results delivered by the agent; such delays can be costly in financial terms.

The agent should have the technical qualifications and capacity to deliver the results, as in input-based projects, but should also have the financial capacity to absorb the additional risk and to obtain the funding required to deliver the expected results before being paid.

Capacity is a necessary precondition which is highly relevant on the beneficiary's side of the scheme. RBF often requires that individuals or households actively engage in a program (take-up rate), and be willing and able to pay for their share of the cost and adopt new practices, habits, or technologies for the project to progress smoothly. For these reasons, the importance of doing sound prefeasibility assessments in the design phase for an RBF scheme cannot be overstated. Misunderstanding or overestimating beneficiaries' intention to participate in a program or pay for a service will be much worse when the service supplier is counting on a certain level of results for the investment. If end-beneficiaries will be required to pay a portion of the cost of delivering the results, it is necessary to carry out a willingness and ability to pay study during project design. When the willingness or capacity level of relevant stakeholders is determined in advance, mitigation measures to increase participation can be taken before launching the project. In cases where behavior change is key to a successful result, as is the case in some health sector schemes, then information campaigns (about project requirements and expected benefits) or other types of social marketing to people who will be participating will be needed to ensure the success of the RBF.

Determining the Attractiveness of RBF

Finding incentives that can effectively and efficiently influence the agent to deliver the principal's expected results is undeniably an attractive approach.

However, the many benefits of RBF, discussed in Chapter 1 and illustrated by the case studies in Chapter 3, must be weighed against

the costs. In particular, transaction costs of developing and monitoring the scheme can be substantially higher than in a conventional, input-based scheme.[6]

Past experiences have shown that there can be a trade-off between preparation and supervision costs, as supervision tends to be lighter in RBF projects due to the focus on results. Moreover, transferring additional risks to the agent will lead to higher pricing under an RBF approach. Importantly, however, these risks are also present in projects that are not using an RBF approach. The question therefore is whether the pricing of the risks in an RBF approach is higher than it is in the non-RBF approach—where such pricing is often implicit. A thorough analysis must consider these implicit prices.

The attractiveness of RBF must be assessed in comparison with other instruments such as traditional investment lending to see if RBF works better and decide whether the additional costs (transaction costs, monitoring, and risk pricing) are exceeded by the additional benefits (e.g. delegation of input procurement to the agent, greater certainty of delivering results). Unfortunately, conducting this analysis is extremely difficult, for a variety of reasons. The same challenge faces RBF projects as evaluating any development project: that is, the lack of a counterfactual to prove that the scheme is the credible cause of success, as opposed to other exogenous factor beyond the control of the evaluation.

As discussed in the analytical framework, the RBF approach may work if certain preconditions are verified. Furthermore, its effectiveness may be heavily dependent on the correct identification of the results that can trigger a payment, and the optimal level and/or pacing of the disbursements. It might be difficult to provide conclusive evidence, as there have not been many comparable situations where RBF and input-based approaches have been used—which would provide the basis for such analysis. However, there are some RBF projects being implemented that include a component specifically intended to gather such evidence. One such project is the REAGUA case in Brazil, featured as a case study in section 3.1.1. Some initial evaluation work conducted by GPOBA in recent years also sheds light on these matters and is discussed in Box 5.

Meanwhile, this document offers a contribution by providing a series of case studies in Chapter 3 that can be used as a thought-provoking illustration for development practitioners in a case-by-case decision whether to adopt an RBF approach. Chapter 4 draws on experience around the world to date to discuss ways of overcoming the main challenges to RBF and offers a series of principles to tailor RBF arrangements for success.

While more evidence is gathered over time, there are also some indirect ways to assess the attractiveness and suitability of RBF schemes (see O'Brien & Kanbur (2013, pp. 19,20). One is an assessment of the strength of the results framework of RBF interventions. A second indirect but simple proxy for overall success of a scheme (given that disbursement is tied directly to the end outcomes being sought) is the pace and scale of disbursement (unlike an input-based investment operation, where disbursement merely conveys that the funds have been spent). Finally, independent evaluations of performance can provide valuable insights, especially when multilateral financial institutions like the World Bank run harmonized reviews and evaluation of the portfolio of operations. The growing emphasis of accountability and the efforts in harmonization of output and outcome indicators offer promise for increasing comparability among alternative schemes.

[6] See, for example, the case study of the REAGUA project in São Paulo, Brazil, examined as in Chapter 3. A prefeasibility engineering study was conducted as part of that project.

Box 5. Evaluation Studies of GPOBA

While establishing a convincing counterfactual to evaluate the effectiveness of output-based aid (OBA) remains a big challenge, GPOBA has conducted some studies to collect evidence on how OBA subsidies used in various pilot projects have incentivized the supply of basic infrastructure service for low-income users. A recent impact evaluation focused on the solar home systems (SHS) program in Bangladesh, which includes result-based subsidies to microfinance-based suppliers of Solar Home Systems in rural areas. The evaluation analyzed the demand for SHS in off-grid poor rural areas. Through a simulation model, the study looked at various options to scale up this program to estimate how different subsidy levels (combined with different conditions on the government loan that is currently supporting the microfinance partners) would change the demand for solar systems in rural villages. The exercise shows what a delicate equilibrium (of household subsidy, government loans to accelerate supply, and strict verification of quality standards) has allowed microfinance agents to basically create a brand new SHS market— while ensuring that the financial burden on poor rural customers remained acceptable (Hamad et al. 2013).

Another lesson yielded through a GPOBA evaluation study is that, given the increased risk for the agent (due to initial financial commitment), it is critical to center the project design on solid evidence and tested assumptions that can be collected via feasibility studies and ex ante evaluation. More specifically, a baseline household survey among slum dwellers in Mumbai, India investigated the willingness to pay (WTP) assumptions behind adopting OBA subsidies to tackle issues of affordability surrounding the connections, from informal to regular electricity connections. The survey highlighted how the targeted slum households had critical concerns about the electricity consumption fee (or the monthly bill resulting from regularization). Furthermore, some issues of slum governance greatly affected the families' decision to enroll in the regularization program. In a similar case, correctly assessing the beneficiaries' real WTP is a crucial determinant of their decision to enroll in the program. This, in turn, will significantly affect the agent's revenue expectations when engaging in the RBF intervention (Mimmi 2012).

Chapter 3

RBF Case Studies

Real-life Case Studies

Experience with RBF in the water sector is limited in terms of the tools that have been adopted, and for the most part, has been confined to water supply projects. Most of the RBF projects in the water sector use the output-based aid (OBA) approach for water supply. However, some wider water resources management projects, as well as some sanitation projects, have used output-based disbursement (OBD). The cases that follow describe some of these experiences and help illustrate in more detail the concepts discussed in Chapter 2.

Case 1. Tackling Water Scarcity in São Paulo (OBD Approach)

Project Name and Time Frame: São Paulo Water Recovery Project (REAGUA), Brazil (P106703), (2008–2015)

Problems/Issues: i) general water shortage in the São Paulo region, ii) poor/inadequate level of water network infrastructure, resulting in considerable water losses, iii) limited financial and technical capacity within water utilities, and iv) limited attractiveness of some types of interventions to address water scarcity.

Background: The state of São Paulo is one of the world's most urbanized areas and emblematic of the urban challenges facing Brazil. Despite relatively high coverage rates, the state faces problems of water scarcity and pollution due to the low availability of water, high level of demand, and lack of proper wastewater collection and treatment. The objective of the project is to increase the availability of clean water in the critical watersheds in the state of São Paulo, but more investment was judged insufficient without improving the efficiency and sustainability of the water supply and sanitation (WSS) systems. Although concentrating on the WSS service, the project serves three objectives: making more water available for WSS services; improving the environmental conditions in the critical watersheds; and reducing the stress on the water resources of those watersheds.

Object of the RBF Incentive: The recipients of the RBF incentives are water service providers located within the selected five critical watersheds of São Paulo (in terms of water scarcity). Only three types of WSS service providers are eligible for financing: public companies, municipal-owned and state-owned companies. In order to avoid cross-subsidization and facilitate regulation and accountability,

private companies and municipalities' own departments that provide WSS are not eligible to receive funding.

Risk Allocation: Under the proposed results-based scheme, project funds will be disbursed to incumbent providers of water services (municipal-owned or state-owned) against agreed and independently verified outputs. Therefore, performance and financial risks are shifted from the state government of São Paulo (GESP) to the selected service providers via funding that is explicitly linked to the achievement of the project objectives (i.e. cubic meters of recovered water, number and capacity of wastewater reuse facilities built, active connections to wastewater network built). WSS service providers must provide at least 10 percent in upfront financing as evidence of their commitment to increase efficiency and to achieve sustainable results.

Enabling Environment for Adopting RBF-Strengths (+) and/or Weaknesses (–) Encountered:

(+) *Enabling regulation* in place
(+) *High-level of government ownership* through the implementing agency, the State Secretary for Water Supply, Sanitation, and Energy (SSE)
(+) *Monitoring capacity* provided by SSE and the independent verification agent (IVA)
(+) *Adequate fiduciary system* solidified and tested through the World Bank's 25-year programmatic engagement in the State's WSS sector
(–) *Delays* due to complex output-based financing mechanisms that remains untested in some sectors
(–) *Cooperation and coordination difficulties* between municipalities and sector operators
(–) *Lack of institutional and technical capacity* in some municipalities and service providers.

Definition of the RBF Incentive: Output-based disbursement (OBD) in the form of subsidies (partly funded by a loan from the World Bank/International Bank for Reconstruction and Development, IBRD) from the state government to the service providers upon verification of outputs (such as the completed wastewater treatment plant) that are directly tied to outcomes (cubic meters of treated wastewater).

Table 3 provides a definition of the outputs linked to disbursement. The calculation of unit costs to price the outputs was one of the most complex aspects of project preparation. Not only were different sources used, but calculations factored in the different starting levels of technical performance, such that the unit cost would encompass the different level of effort needed according to the baseline situation of the service provider.

Triggers for RBF Payment: A reference unit cost (RUC) has been set for every output. Payments are made as follows: i) upon delivery of an output: 70% of RUC * output measure and ii) after a period for fulfilment of sustainability conditions: 30% of RUC * output measure. In the case of the Water Loss Control and Reduction Subprojects, the proportions are 60% and 40% instead, as for such outputs the sustainability factor is of utmost importance.

Sources of Funds Used in the RBF Case: The total project cost is estimated to be close to $108 million, including a Specific Investment Loan (SIL) from IBRD, financing from the State Government of São Paulo (GESP), and pre-financing by water utilities (around 10% of total costs).

Verification Process: The process entails reporting by suppliers, monitoring by SSE and regular audits by IVA.

Table 3: Output Definitions for the REAGUA Project in São Paulo

Activity	Output
Water Loss Control and Reduction Subprojects	Cubic meters of recovered water as measured against the baseline set forth in the PPA
Water Rational Use Subprojects	Water saving appliances installed and environmental campaign executed
Treated Wastewater Reuse Subprojects	1. Wastewater reuse facilities (treatment plant, transport and reservoirs) built and operational 2. Wastewater reuse facilities operating in accordance with operational standards set forth in the PPA
Wastewater Collection Network Subprojects	1. Engineering designs, required licenses and contractor's mobilization 2. Service lines and connections built 3. Active connections operating in accordance with operational standards set forth in the PPA
Wastewater Transport System Subprojects	1. Meters of gravity wastewater pipes installed 2. Meters of forced wastewater pipes installed 3. Wastewater pumping stations installed 4. Wastewater transport system operating in accordance with operational standards set forth in the PPA
Wastewater Treatment Plant Upgrading and/or Construction Subprojects	1. Earthworks and foundation works completed 2. Physical structure of wastewater treatment plant completed 3. Construction completed and wastewater treatment plant in testing mode 4. Wastewater treatment plant operating in accordance with environmental standards set forth in the PPA

Note: PPA = Project and Performance Agreement.

Institutional and Implementation Arrangements: The state of São Paulo is the borrower, and it has delegated execution of the loan to SSE. The key institution responsible for the preparation and implementation of the project is SSE. The service providers are either state-owned Sabesp or municipal-owned (Figure 6).

Highlights of the Case Study

In OBD schemes, every output is priced ex ante using unit reference costs. Thus it is fundamental to get a reliable determination of unit costs for funds to be efficiently spent. As a consequence, outputs must be tangible and measurable; otherwise, establishing a unit reference cost would become complex and unreliable.

Observed Results: The project is ongoing. One intermediate result of the project is to build a solid monitoring framework and capacity at the state level (for instance, the engineering models built to estimate unit cost of outputs).

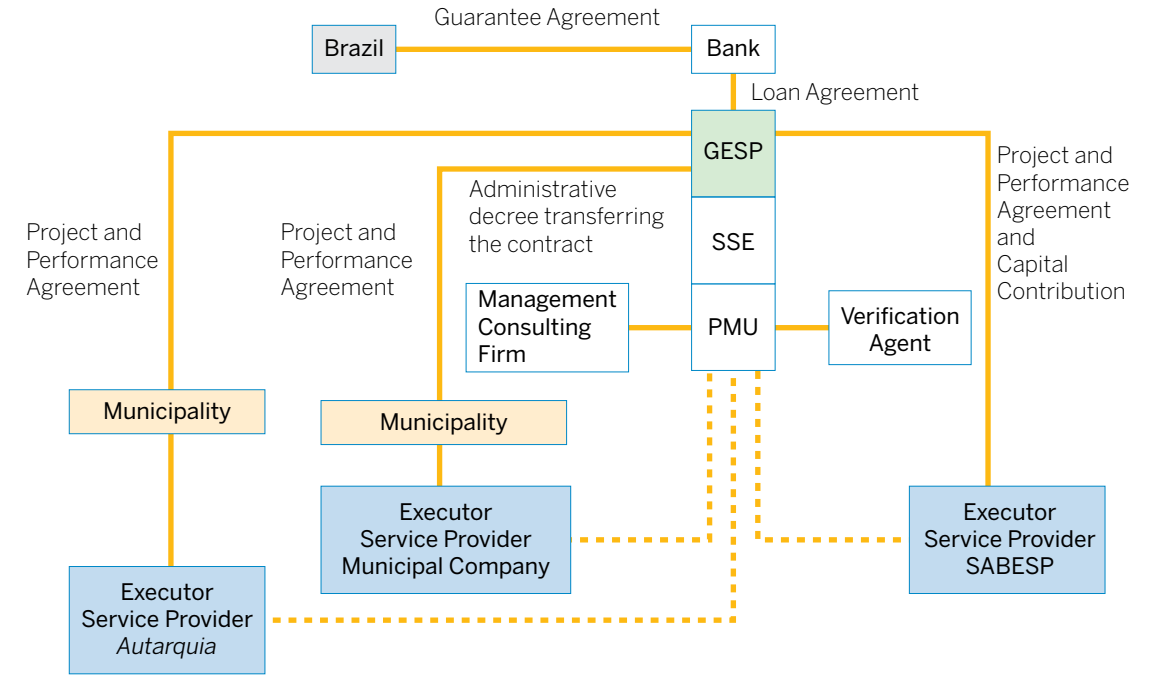
Additional Information about this Case: The World Bank (2010); Velez & Tierney (2010).

Case 2. Increasing Household Sewage Connections in Uruguay (OBD Approach)

Project Name: Uruguay APL-2 Obras Sanitarias del Estado (OSE) Modernization & Systems Rehabilitation Project (P101432), (2007–12)

Problems/Issues: i) The share of households with access to improved sanitation is fairly high

Figure 6: Institutional Arrangements for the REAGUA Project in São Paulo



Source: The World Bank (2010).

(94%), but only 48% of households are actually connected to the sewerage network; ii) In addition to the need to increase treated water pumping capacity, it was imperative to reduce Unaccounted for Water (UfW), which at the time accounted for 56% of supply and one of the key reasons for low operational efficiency; and iii) OSE needed to improve its governance and administrative management, as well as establish clear and explicit incentives for economic efficiency.

Background: The project is a continuation of prior investments that began in 1988 and continued with the first Adaptable Program Loan (APL) signed in 2000. The APL-2 project was designed to span five years (2007–12) with the following key objectives: to continue to support the modernization of OSE; to improve the efficiency of the utility; and to ensure that the population receives better and secure access to water and sanitation services.

Contextually, a constitutional prohibition of privatization in the water sector passed in 2004[7] excluded opportunities for modern performance based contracts and thereby constrained competitiveness for achieving efficiency gains with risk of political unbalances. Thus APL-2 aimed at exploring opportunities of further enhancing OSE's internal competitiveness through performance incentives for OSE.

Object of the RBF Incentive: Specifically, via the OBD portion of the loan ($ 1 million), the project finances small in-house plumbing works for connection of households to the sewage network. With the OBD fund, the World Bank can reimburse OSE for 60% of the predefined

[7] The 2004 constitutional amendment precluded private sector participation (PSP), and thus outlawed the concession in Maldonado, the small concession in Laguna del Sauce, and 14 smaller private operators and cooperatives.

unit cost, based on the number of households effectively connected to the sewerage system (estimated at 3,600 households).

Risk Allocation: Reimbursement will be made based on the number of connections and evidence of three months of consecutive billing. Households will be responsible for procuring the necessary works services and might organize in communities for gains of scale.

Enabling Environment for Adopting RBF –Strengths (+) and/or Weaknesses (–) Encountered:

(+) *Enabling regulation* in place
(+) *Adequate financial management arrangements* for OSE, as well as skilled and capable staff that can carry out their fiduciary responsibilities
(+) *Monitoring capacity* provided by the State Secretariat for Water Supply, Sanitation and Energy (SSE) and the independent verification agent (IVA)
(–) *Delays* due to complex output-based financing mechanisms as yet untested in some sectors
(–) *Cooperation and coordination difficulties* between municipalities and sector operators
(–) *Lack of institutional and technical capacity* in some municipalities and service providers

Definition of the RBF Incentive: An OBD component was piloted to help overcome traditionally low household connection rates to sewerage networks. It reduced the overall transactions costs for OSE of financing individual connections, while simultaneously enhancing the focus on results. Households wishing to connect to the network and requiring in-house plumbing reconfiguration works are eligible to finance these works through a low-interest rate loan repayable over 36 months, and are exempt from paying the variable cost component of their sewerage bill for up to 36 months. Households will be responsible for procuring the necessary works, and might organize in communities to gain economies of scale.

Definition of Outputs Linked to Disbursement: Number of connections and evidence of three months of consecutive billing (an indicator of sustainability in the services).

Triggers for RBF Payment: Supporting documentation for the reimbursement will be: presentation of an output report; certification of the connections verified and approved by OSE; and evidence of three months of consecutive sewerage bills.

As for the definition of the payment amount, assessing the unit cost is key for OBD to be acceptable under the World Bank conditions. Therefore, the reference unit cost for three types of works was defined based on three different sources: market prices; contractors' appraisals; and experts' opinion. The unit cost, calculated for three types of in-house works, varies from $235 to $877 per household (depending on the size of the works).

Sources of Funds Used in the RBF Case: Around 3,600 households are estimated to need in-house works, which corresponds to a total cost of about $ 1.7 million. The World Bank will allocate $ 1 million as an OBD fund, and will pay 60% of the standard unit costs of in-house works. Through this financing mechanism, OSE will, in effect, be providing an implicit connection subsidy corresponding to approximately 24% of the connection costs.[8]

[8] The implicit connection subsidy is based on the assumption of interest rates remaining 2 points below market rates, on average, and a 36-month waiver for the variable sanitation tariff.

Verification Process: Specific annual OBD financing targets are indicated in the results framework. OSE need to periodically report the total number of in-house works carried out during specified periods per type of works. All works need to be certified by OSE.

Financial statements of the project are subject to an annual financial audit under the terms of reference and by an auditor acceptable to the World Bank. The audit scope, in addition to standard financial audit requirements, shall include a sample audit of the outputs delivered and the unit cost methodology used in the project. To ensure the functionality of the new sewerage connections, disbursements will be made only with evidence of three months of consecutive sewerage bill payments. Through supervision visits, the World Bank Task Team will periodically verify that outputs reported for disbursement purposes have been physically delivered and are of requisite quality and standards.

Observed Results: OBD allows OSE to readily provide an attractive financial package to individual households requiring in-house plumbing works, thereby providing incentives for more households to connect. Transaction costs for OSE will remain low.

Additional Information about this Case: The World Bank (2007).

Highlights of the Case Study

Due to regulatory changes passed in 2004 in Uruguay, private operators were precluded from the provision of water and sanitation services. Therefore, there was a need for different ways (other than private competition) to stimulate the performance, efficiency, and transparency of the OSE in a context of a quasi-monopoly in service delivery. OBD was adopted as part of an alternative strategy to strengthen intergovernmental accountability, define objects and obligations, and establish a compelling internal performance benchmarking system.

Case 3. Improving Access to Water Services for Poor Households in Metro Manila (OBA Approach)

Project Name: Output-Based Aid in the Philippines: Improved Access to Water Services for Poor Households in Metro Manila Project (2009–2013)

Problems/Issues: Many low-income households in the east zone of metro Manila could not access piped water because of the excessive cost of the connection and, in the case of informal settlers, the requirements for proof of land ownership. As a result, many residents must buy water in jerry cans from street vendors (sometimes at a very high per unit cost) or walk long distances to fetch water from deep wells. Illegal tapping from the network is also an impending problem.

As for the intended beneficiaries, a capacity and willingness to pay study determined that there was a gap between the price to access the service as a regular customer (the connection fee) and the potential beneficiaries' capacity to pay.

Background: The delivery of water supply and sewerage services in the east Metro Manila region is provided by Manila Water Company Inc. (MWC), a concessionaire that has a 25-year contract and has been successful in improving the water coverage and quality throughout the city. MWC had also launched a "Water for the Community" program to speed up rollout of connections to poor households. However, the solution proposed to low-income areas, consisting of a bulk or community meter with shared connections after the meter and shared billing, created problems due to collection issues. Some customers were not making payments to the community collectors, while the company was demanding full payment for the entire invoice.

The tariff and connection fees are set by an independent regulator, so the company could not modify the fee conditions on its own. The company did offer installment plans for

customers to pay the $167 connection fee. However, the lowest-income households could not afford to pay to get a connection to the network. In sum, there is a capable service provider with a commercial interest in reaching 100 percent of its customer base, and a regulator that oversees compliance with the contract.

Object of the RBF Incentive: The OBA grant recipient was MWC, which agreed to connect all identified poor households using individual service connections using its internally generated cash flow to finance the project until receiving payment once the results had been verified. The beneficiaries were offered a 36-month installment plan to pay their portion of the connection fee.

Risk Allocation: The pilot was exposed to demand risk given its target of serving the poor, which in turn, implied the possibility of failing to recoup its infrastructure investment (the extension of tertiary mainlines). Similarly, MWC bears the risk for the collection of fees from its direct customers (individuals, groups, or communities). Flexible payment solutions, paired with the OBA connection subsidy, mitigated these risks for the operator. To mitigate the risk of cost inflation, it was agreed that the unit subsidy would be indexed on an annual basis in line with the consumer price index (CPI)—just like the connection fee under the terms of the concession contract.

Enabling Environment for Adopting RBF –Strengths (+) and/or Weaknesses (–) Encountered:

(+) *Good financial situation*: The utility (MWC) enjoys a strong financial situation. It had successfully negotiated several international loans and was generating positive cash flows. Its shares were being traded in the Philippines Stock Exchange.

(+) *Credible targeting of poor customers*: Given that the low-income households were located in compact pockets within the city, it was easy to use geographical targeting to make sure that resources were being used to benefit those that could not afford to pay the full connection fee.

(+) *Availability of independent verification agent*: Several reputable agencies were available to perform this task, including the National Engineering Center of the University of the Philippines, which was selected to provide this service.

Definition of the RBF Incentive: Output-based aid (OBA) grant. Local government agencies and the MWC estimate that almost all households within the project's target communities would not be able to afford the connection fees (estimated to be $167), but could afford to pay for the required meter and guarantee deposits (approximately $36) if this could be paid in installments. GPOBA therefore agreed to fully subsidize the connection fee for eligible households. The OBA subsidy, at 2007 prices, was set at PHP 5,911.73 (US$131) per unit (Table 4).[9]

Triggers for RBF Payment: MWC advanced the share of the individual household's connection fee and received reimbursement from GPOBA once connection and satisfactory service provision was verified by the third-party auditor. The GPOBA subsidy were paid directly to MWC as a single payment, conditional on the independent verification of three months' satisfactory service delivery.

Sources of Funds used in the RBF Case: The total cost of providing access to clean water to

[9] In September 2008 the share of the connection fee required to be paid by low-income households was reduced by the regulator tor to PhP 2,625 (US$58) and therefore the subsidy provided by the project to PhP 2,025 (US$44). The user contribution was reduced to PhP 600 (US$13), the cost of the guarantee deposit.

Table 4: Connection Costs for the Water Services Project In Manila, the Philippines

	PHP	US$
Meter deposit	1,020.00	23
Guarantee deposit	600.00	13
Connection fee	5,911.73	131

Source: Menzies & Suardi (2009).

the over 20,000 poor households amounted at US$10.7 million, of which: MWC invested US$8.2 million, GPOBA provided subsidies for a total amount of US$2.07 million, and the user contributions amounted at US$0.43 million.

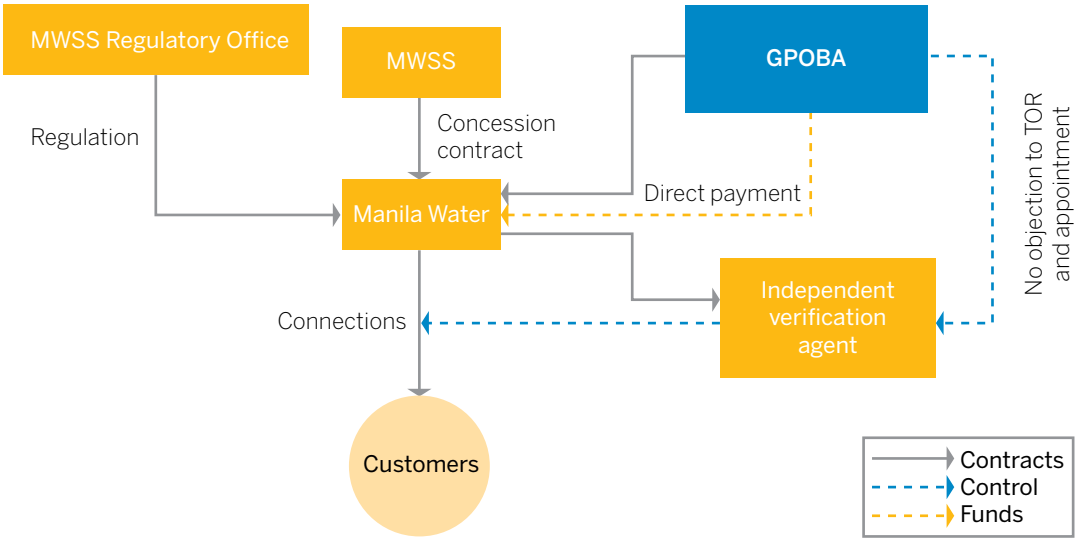
Under the terms of the concession agreement, the connection fee is indexed on an annual basis in line with consumer price index (CPI) data produced by the Regulatory Office. To mitigate the risk of cost inflation, it was agreed that the unit subsidy would be similarly indexed.

Verification Process: To ensure that MWC delivered these outputs, the independent verification agent (IVA), appointed by MWC, had to confirm the following four outputs on a representative sample of beneficiary households: i) installed water meter; ii) 24-hour water supply (beneficiary confirmation); iii) water pressure of at least 5 psi (pounds per square inch) (from MWC operational records); and iv) water bill delivered, demonstrating consumption/ service delivery (confirmed by beneficiary and MWC billing records). GPOBA disbursed the corresponding share of the subsidy to MWC upon receiving an invoice accompanied by the verification report.

Institutional Arrangements: These are displayed in Figure 7.

Observed Results: A cumulative total of 28,562 connections were delivered to households and verified in over 76 communities. A beneficiaries' assessment study was carried out after project completion and as part of the main outcomes the project completion report highlights the improved hygiene and reduced incidence of water borne diseases resulting from increased consumption

Figure 7: Institutional Arrangements for the Water Services Project in Manila, the Philippines



Source: Menzies & Suardi (2009).

Highlights of the Case Study

This case illustrates ways to address the lack of access to water services related to the inability of disadvantaged residents of poor urban areas to pay for connections. This issue justified subsidies to bridge the affordability gap, under the assumption that the affordability problem could be solved with a one-time subsidy payment. A financially sound and motivated utility was already committed to reach universal access to water and sanitation for its customers, as demonstrated by the prior program, "Tubig para sa Barangay Project" (Water for the Community). In this context, OBA seems to be the RBF instrument of choice to complement a concession in addressing affordability of water supply for the poor.

levels by beneficiary households and reduction in household expenditure on water by target households.[10] GPOBA and MWC are continuing to cooperate in developing comprehensive solutions to incorporate wastewater management. There are plans to scale up this project and prepare a National OBA Facility for any service provider in the country to apply for funds.

Additional Information about this Case: Menzies & Suardi (2009); GPOBA (2007)

Case 4. Improving Access to Water and Sanitation Services for the Urban Poor in Morocco (OBA approach)

Project Name: Morocco Improved Access to Water and Sanitation Services Project (P102527), 2007–11

Problems/Issues: Approximately 11,300 low-income households in disadvantaged peri-urban and rural neighbourhoods in Casablanca, Tangiers, and Meknès lacked water and sanitation services. The most vulnerable were residents of illegal settlements, where operators must overcome legal and technical hurdles to service households. While slum settlements were previously excluded from urban planning, such areas have become eligible for allocation of funds and expansion of services with the launch of the National Initiative for Human Development (INDH).

Nonetheless, utilities have had weak financial incentives to connect marginalized households due to unfavourable tariff structures. Retail tariffs are designed as increasing block tariffs, with monthly consumption below 8 cubic meters typically below O&M costs and commonly even below bulk water purchase costs. Therefore, new users typically cause financial losses to utilities. Losses are even greater for public utilities, which (unlike private concessions) have not been allowed to increase average tariff levels to reflect the inclusion of lower-consumption households in their customer base or to pass through increases in input costs.

Background: In the past decade, the government has launched programs to fight poverty by improving the dire living conditions in the urban and peri-urban slums. This provided a strong drive for municipalities and utilities to explore mechanisms to expand access to basic infrastructure. Nonetheless, national and local governments were reticent to fund subsidy programs that lacked accountability or guarantees for results.

The grant provided by GPOBA (signed on January 30, 2007) was intended to help overcome traditional impediments of service expansion programs in marginal neighborhoods, such as households' inability to afford connection costs; operators' unsustainable financing for programs to expand service to poor areas; and complex technical and administrative obstacles to infrastructure development in poor, informal areas.

[10] Improved Access to Water Services in the East Zone of Metro Manila Project Implementation Completion Report, November 2013.

Purpose of the RBF Incentive: The OBA pilot was coordinated and administered by the Ministry of Interior, and implemented by the three incumbent providers of water supply and sewerage services in the three selected urban centers: Casablanca, Tangiers, and Meknès. Once the utilities had connected households in the selected *quartiers* (neighborhoods), and had provided evidence of a functional and used connection, they would be reimbursed a pre-agreed amount.

Risk Allocation: In terms of demand risk, beneficiaries' participation in the OBA pilot was voluntary; this prompted the operators to promote the program through educational campaigns. As for cost variation risk, exchange rate fluctuations of the Moroccan dirham caused unanticipated increases in commodity prices during the project implementation period and thus reduced the real value of the grant subsidy. Consequently, at project closing, the number of connections financed by the grant was slightly reduced for all operators.

Enabling Environment for Adopting RBF –Strengths (+) and/or Weaknesses (–) Encountered:

(+) *Solid financial status and extensive knowledge in implementation of social programs in informal settlements by all utilities.* Two of the utilities (LYDEC in Casablanca and AMENDIS in Tangiers) are subsidiaries of financially sound international water companies. The third (RADEM in Meknès) is a publicly owned utility. All three utilities had demonstrated experience in servicing informal settlements.

Definition of the RBF Incentive: Output-based aid (OBA). At appraisal, the total GPOBA subsidy requirement was intended to cover 28% of total adjusted capital expenditures in Casablanca; 23% in Tangiers; and 53% in urban areas and 74% in rural areas in Meknès. The subsidy amount, specifically defined with each operator, was paid in local currency and in two steps: 60% upon verification of a working water and sewerage connection to an eligible household; and 40% percent upon verification of at least six months' sustained service. The government also granted specific arrangements in poor urban and peri-urban areas to lower household contributions for connections to water supply and/or sanitation services.

Targeting Mechanism: Targeting was mostly done on a geographic basis. The socioeconomic conditions of the target beneficiaries can be extremely heterogeneous because of differences in the areas, operators, and the like. Thus targeting relied on geographic criteria, but also used surveys and discussions with the operators to identify and reach out to the intended beneficiaries.

Triggers for RBF Payment: The Ministry of Interior had primary responsibility for monitoring and certifying outputs; it contracted out these tasks to an independent verification firm. All participating utilities had to submit requests for disbursement for endorsement by the Ministry of Interior. GPOBA made direct payments to the participating distribution utilities.

Sources of Funds used in the RBF Case: The three pilots are funded through a $7 million grant from GPOBA to connect 11,300 households to piped water and sanitation service in poor urban neighborhoods of three cities, plus some rural areas of Meknès.

Verification Process: The Ministry of Interior had the ultimate responsibility for monitoring and verification. It contracted an independent audit firm to conduct annual ex post reviews of the completeness, accuracy, and authenticity of documentation from utilities, as well as to undertake ex post physical spot checks for a

Highlights of the Case Study

This project addressed an access constraint related to supply-side financial disincentives in a context of lack of infrastructure (especially sanitation) for vulnerable urban populations. The one-time subsidy is justified by the additional costs due to extending access to water and sanitation services to marginal urban areas. Targeting allowed the adequate levels of subsidies to be identified. This level of subsidy took into consideration customers' ability to pay.

The experience in Meknès revealed that the public sector can also bear the performance risk, and that a public utility can successfully adopt the OBA methodology to ensure the provision of basic services to neglected segments of the population.

Organization of awareness and information campaigns was crucial to guaranteeing the populations' buy-in in the social program. Post-completion evaluations stressed the importance for operators to be present throughout the implementation of works and to ensure the involvement of the potential beneficiary households in the social program.

The operators' role (extending service provision to the poor) required the active involvement of the local authorities (specifically to address land titling issues in the informal settlements).

Monitoring and evaluation are key to achieving a rigorous framework to measure, report, and revise the project, and especially to ensure successful replication of the pilot.

Notably, the role of the IVA went beyond the scope and the responsibilities originally defined in the operating manual, as the IVA helped build the operators' technical capacity and enhance their organizational structures through a set of recommendations that were immediately followed by the three utilities.

meaningful and random sample of connections. A reputable external auditor was appointed as independent verification agent (IVA) to validate the correct selection of beneficiaries and compliance with the set service standards.

Institutional Arrangements: These are displayed in Figure 8.

Observed Results: The pilot project ensured the provision of subsidized access to water supply to 10,504 households (around 52,500 people) and sanitation services to 9,036 households (around 45,200 people) living in the peri-urban settlements in Casablanca, Tangiers, and Meknès.

Surveys confirmed the high satisfaction of beneficiary households with the service provided and the overall adequacy of the subsidized connection fee compared to the targeted households' willingness to pay (WTP). This is confirmed by collection rates, which were equal to or higher than the average in each operator's service area.

Additional Information about this Case:
GPOBA (2008); The World Bank (2012).

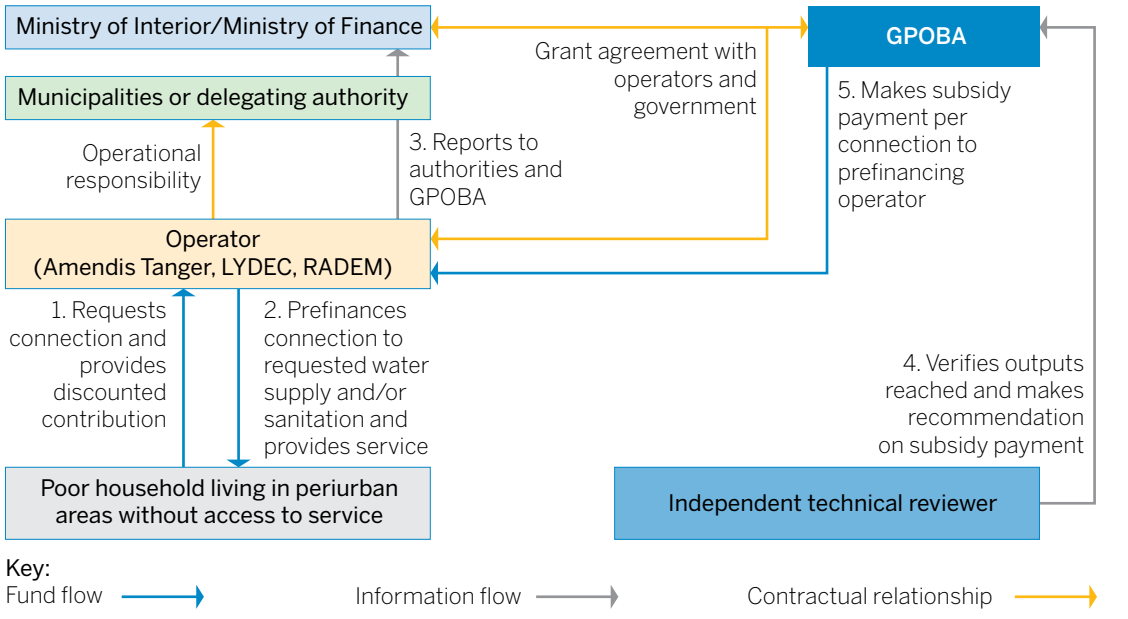
Case 5. Improving Irrigation in the North China Plain (performance improvements)

Project Name: Management Reform and Performance Changes in Two Irrigation Districts in the North China Plain (Nanyao and Bayi)

Problems/Issues: In the 1980s, the transition from heavily subsidized irrigation managed by Peoples' Communes[11] to operational and financially autonomous Irrigation Districts (IDs) imposed new challenges: i) the irrigated area had declined,

[11] Consisting of 10 to 15 brigades made of 10 to 20 households each.

Figure 8: Institutional Arrangements for the Water and Sewage Services Project in Morocco



Source: GPOBA (2008).

ii) water infrastructure was deteriorating, iii) there were inefficient irrigation management practices, iv) there was a lack of measure to ensure efficiency of the systems and practices, and v) the operation and maintenance costs of irrigation were not covered and collection rates were low.

Background: The economic reforms that started in 1978 transformed the rural collective system into a "Production Responsibility System." The dismantling of Peoples' Communes (1983) and the decline of government subsidies and construction investment left the irrigation distribution system in chaos, resulting in worsening service quality for farmers.

As a response, additional reforms were launched to encourage Irrigation Districts to stimulate local financial and managerial autonomy. Village Irrigation Management Groups (VIMG) were created and given independent governance. While Irrigation Districts manage the two top levels of canals, VIMGs handle the third and lower levels, clean and maintain canal sections, distribute water among farmers, collect water charges, maintain and organize schedules for water delivery, and protect field-level irrigation facilities.

Object of the RBF Incentive: The result-based incentive is active at three different levels to improve the efficiency of operations management and the collection performance: the Irrigation District as a whole (in Nanyao, the ID has a staff of 30 and oversees 40 VIMG); the divisions within the ID; and the individual staff of the ID.

Risk Allocation: With the reforms, the payment risk (the collection of water fees and consequent ability to cover irrigation O&M costs) was shifted onto the IDs; previously, central or commune funds could cover routine O&M costs.

Enabling Environment for Adopting RBF–Strengths (+) and/or Weaknesses (–) Encountered:

(+) *An improved regulatory framework*: In 1985, two important regulations were introduced. The *Regulation on Water Fees* stipulated that revenues for O&M for Irrigation Districts should primarily be covered from fees collected from water users (locally determined, although with maximum fee ceilings) and the *Regulation on Diversified Sideline Enterprises* encouraged the creation of enterprises in such areas as fisheries, recreation, and food processing to create additional revenue sources to cross-subsidize irrigation.

(+) *A stronger implementation system*. Irrigation Districts were given more authority, and Village Irrigation Management Groups (VIMG) were created.

(+) *Better fees and pricing*. A mix of fixed and volumetric fees was applied for water use, to make pricing more transparent.

(–) *Measurement problems*: However, at the lower levels, measurement of volume was not feasible; this undermined the transparency of the link between water received and payment.

Definition of the RBF Incentive: The ID receives provincial funds based on the performance against pre-agreed goals to build and rehabilitate irrigation infrastructure. In turn, the ID adopts performance–based incentives (in the form of salary bonuses and penalties) to incentivize individual employees' performance.

Triggers for RBF Payment: Under the "Production Responsibility System", annual assessments are made of the performance of the ID as a whole, as well as of individual staff. Performance is measured and rated based on: i) collection rates and timeliness of collection, ii) water distribution, and iii) quality of maintenance work. A rating is provided based on the percentage achievement against preset performance standards (see Table 5). Interestingly, the performance of the higher-level administrative unit reflects the performance of the lower-level administrative units. For example, the district office's performance rating reflects the performance of its various divisions.

Examples of Performance Ratings on Nanyao ID:

Salary bonus at the individual level:

- If staff rating < 79%, no annual bonus is given and salary is reduced one grade.
- If staff rating > 79%, the bonus increases in proportion to the performance score. The budget bonus is based on collection timeliness at the VIMG level:
  - If VIMG collects 100% of the fee by the end of March, it retains 5% of it.
  - If VIMG collects 100% by the end of April, it retains only 3%.
  - If VIMG collects less than 100% by May, it must pay a fine of 3% of the remaining amount uncollected.

Sources of Funds used in the RBF Case: During the era of the Communes, central and provincial-level funds subsidized routine irrigation costs. Following the reforms, they now share costs only for construction and rehabilitation work; thus the Irrigation Districts are completely responsible for routine O&M costs. In 1992, the majority of the annual income for both the Bayi and Nanyao IDs stemmed from collection of water fees (93% and 96%, respectively), thus making a 100% collection rate a prerequisite for sustainability. In two-thirds of the villages of Nanyao ID, the VIMG collects water fees from individual farmers. In the remainder, villages produce enough off-farm collective income to pay all the water fees from the village committee.

Table 5: Excerpt from the Annual Performance Assessment for the Nanyao Irrigation District, China, 1993

Item	Planned	Actual	Potential points	Points awarded
Water Delivery				
Total discharge (m^3)	45 million	56 million	4	4
Irrigation water (m^3)	20 million	21.5 million	5	5
Delivery to Yingang canal (m^3)	15 million	34.5 million	3	3
Water delivery days	300	307	3	3
Total points			15	15
Maintenance				
Lined canals (km)	10	10	6	4
Silt clearance (km/number)	271/62	271/62	4.5	4.5
Structure maintained (number)	35	35	4.5	4.5
Total points			15	13

Source: Johnson and others (1996).

Verification Process: The performance assessment of the Irrigation District is done at various levels: by individual staff, section offices, division office, and district office. However, there is no information on enforcement rules.

Observed Results: RBF in this case was one element of a complex set of rural reforms that significantly changed water resource management and irrigation. Performance impacts cannot be assessed for RBF alone, but the case study suggests that it contributed to creating financial incentives and an accountability system that enhanced water use efficiency, water delivery, and financial transparency. It also demonstrates that performance measures in public institutions can be implemented effectively.

Additional Information about the Case: Johnson and others (1996).

Highlights of the Case Study

Albeit set in the past and in a particular political setting—China in transition from a communist to a more market-based system—this case is the only documented example in irrigation (according to the authors' literature review) that adopted performance–based incentives for staff. Such performance-based approaches are widely documented in the health and education fields.

Case 6. Slowing Deforestation in Costa Rica (Payments for Environmental Services, PES)

Project Name: Costa Rica ECOMARKETS (P052009), 2000–2006

Problems/Issues: Costa Rica has experienced one of the highest rates of deforestation worldwide, driven by the rapid expansion of transportation corridors and by inappropriate policies, including cheap credit for cattle and land titling laws that rewarded deforestation.

Background: In past decades, perverse policy incentives encouraged further deforestation. Since the 1990s, such policies have been removed, and Costa Rica is now a global leader in environmentally sustainable development.

Costa Rica pioneered the use of the payments for environmental services (PES) approach in developing countries by establishing a formal, country-wide program of payments, the Pago por Servicios Ambientales (PSA in Spanish).

Object of the RBF Incentive: The principal recipients of the RBF incentives are landowners, who receive a payment to adopt uses of their land that increase the restoration and conservation of forests. Forest preservation and restoration can improve the quality of water (forests in watersheds produce higher-quality water, reducing downstream water treatment costs) and generate carbon sequestration benefits (driven primarily by avoided deforestation).

Risk Allocation: The payment for conserving forest is $64 per hectare (ha) per year (as of 2006). There was a much higher demand from landowners than the financial resources could meet—suggesting that the PES actually supports land use that otherwise would be too costly to adopt.

Enabling Environment for RBF Adoption–Strengths (+) and/or Weaknesses (–) Encountered:

(+) *A strong legal and financial framework*: In 1996, Costa Rica adopted its Forestry Law No. 7575, which explicitly recognized four environmental services provided by forest ecosystems: mitigation of greenhouse gas emissions; hydrological services, including provision of water for human consumption, irrigation, and energy production; biodiversity conservation; and provision of scenic beauty for recreation and ecotourism. Notably, it changed the justification for payments from support for the timber industry to the provision of environmental services. Second, it changed the source of financing from the government budget to an earmarked tax and payments from beneficiaries.

(+) *Sound institutions to back the financing scheme*: The National Forestry Financing Fund (FONAFIFO) is a strong institution that is capable of effectively and efficiently managing a complex system of payments for environmental services.

(+) *Strong legal framework and wide political support* for the PSA program through three successive administrations.

(+) *Nationwide support* from civil society, particularly small- and medium-size landowners, as well as local and regional organizations (NGOs, cooperatives).

Definition of RBF Approach: revenue-capture mechanisms to internalize the value of the environmental services through explicit payment schemes, with emphasis on complementary services to biodiversity in forest conservation areas (that is, hydrological services and scenic beauty).

Sources of Funds Used in the RBF Case: The ECOMARKETS program followed a five- year initial program funded by the government. The program (2000–06) was funded by: i) $8.6 million per year from the Government of Costa Rica (GOCR), primarily by allocating 3.5% of the national fuel tax to FONAFIFO, ii) $32.6 million loan from the World Bank and iii) an $8.0 million grant from the Global Environment Facility (GEF). Although the state was at the center of the mechanism, the funding was not provided through the country's budget, but by means of a tax designed for this purpose.

Triggers for RBF Payment: The PES linked the payment to agreed behaviors that encouraged the conservation of existing forest. The initial payment could be requested at the time the contract was signed, but subsequent annual

Highlights of the Case Study and PES Approach

The case is one of internalizing externalities: land users usually do not receive any compensation for environmental services (such as planting trees which help regulate water flows in a watershed and reduce the risk of catastrophic flooding or landslides). As a result, they usually ignore environmental services in making their land use decisions. In a PES scheme, land users can be compensated for the environmental services they generate. Those who benefit from environmental services pay for their provision: that is, the user pays. However, to sustain benefits, the financial stream needs to be continuous.

Although the PES approach is intuitively appealing, putting it into practice is far from simple. The key challenge is in understanding the scientific aspects of the environmental service at hand (whether biodiversity conservation, carbon sequestration, hydrological protection, etc.) and assigning them an economic value that is appropriate to incentivize the suppliers.

payments were made after compliance had been verified, based on independent auditing.

Institutional Arrangement: Implementing agency: The ECOMARKETS Project was implemented by *FONAFIFO, a semi-autonomous agency with independent legal status* and covering four modalities: forest protection; reforestation; forest management (suspended in 2003); and agroforestry (begun in 2003). To manage payment, FONAFIFO developed a certificate instrument (Certificados de Servicios Ambientales, or CSA) which are standardized instruments that pay for the conservation of one hectare of forest in a specified area.

Demand side: On the demand side, FONAFIFO secured *agreements with many water users* to pay for watershed conservation. Water users are hydropower companies (like Energía Global, and the state power producer, Compañia Nacional de Fuerza y Luz). Other agreements include bottlers, municipal water supply systems, irrigation water users, and hotels.

Supply side: Landowners must present a sustainable *forest management plan* prepared by a licensed forester (*regente*). These plans describe the proposed land use, and include information on land tenure and physical access; topography, soils, climate, drainage, actual land use, and carrying capacity with respect to land use; plans for preventing forest fires, illegal hunting, and illegal harvesting; and monitoring schedules.

Verification Process: FONAFIFO established eight regional offices to receive applications, sign contracts, and monitor implementation. Once the proposed plans are approved, landowners begin adopting the specified practices, and receive payments. The initial payment can be requested at contract signing, but subsequent annual payments are made after verification of compliance (by the *regentes*).

Monitoring is undertaken primarily by the agencies responsible for contracting with farmers, including the Sistema Nacional de Areas de Conservación (SINAC), Fundación para el Desarrollo de la Cordillera Central (FUNDECOR), and the *regentes*, with regular audits to verify the accuracy of monitoring. With the financial support of the ECOMARKETS Project, FONAFIFO has established a state-of-the-art database to track compliance. Noncomplying participants forfeit further payments. *Regentes* who incorrectly certify compliance can lose their license.

Observed Results: ECOMARKETS has made payments to nearly 2,400 landowners spanning approximately 212,000 ha of privately owned forests, distributed as follows: i) protection = 200,798 ha, ii) reforestation = 7,551 ha, iii) forest management = 3,394 ha, and iv) agroforestry (begun in 2003 and not significant).

Financial Sustainability: The World Bank launched a new Mainstreaming Market Based

Instruments for Environmental Management (MMBIEM), and continued supporting the program. In 2005, Costa Rica expanded the use of water payments by revising its water tariff (which previously charged water users near-zero nominal fees) and introducing a conservation fee earmarked for watershed conservation. Once fully implemented, this fee will generate an estimated $19 million annually, of which 25 percent (about $5 million) would be channeled through the PSA program.

Additional Information about this Case:
www.worldbank.org/environmentaleconomics
Pagiola (2006).

Potential Future Applications

Experience with tools other than output-based aid (OBA) and output-based disbursement (OBD) is fairly limited, and so is evidence of RBF extending to applications beyond water supply and sanitation, such as water for environment, energy, irrigation, and climate change or flood management.

On the basis of the analytical framework and the case studies presented, can new applications of RBF be envisioned in the broader water sector? That is the question addressed in this section, which presents a few hypothetical RBF schemes to illustrate potential examples that could be implemented. This section is based on extensive consultation with experts from different sectors and financial fields.

Hypothetical Case 1. Implementing Subsidies for Irrigation Technology and Weather Microinsurance for Small-Scale Farmers

Project: Subsidies for irrigation technology and weather microinsurance for small-scale farmers

Problems/Issues: Small-scale famers using rain-fed agricultural techniques are facing decreasing crop yields as a result of adverse weather (such as drought) and depleting soil conditions. Access to funds to improve infrastructure and adopt new irrigation or farming technologies is limited, especially for poor, rural smallholders.

Background: *Lack of government support for small-scale irrigation*: The irrigation sector is not regulated, and government has tended to make large irrigation schemes a priority. Small farmers may remain excluded from reliable irrigation services. There is some limited support from local governments in terms of providing access to infrastructure (local roads and market places).

Access to finance: Farmers rely on credit for agricultural inputs by local traders, which basically is determined every harvesting season against crops produced. Apart from that, there is limited access to (long-term) finance, although some banks operate branches in nearby towns.

Beneficiaries' situation: Farmers are organized in small cooperatives, mainly to help market their produce and reach agreements with local traders on prices for agricultural inputs. Individual farmers lack the financial capacity to make long-term investments, and existing cooperatives are not used to pool resources to (partly) fund shared infrastructure or use improved farming techniques.

Increasingly frequent weather shocks: These adverse events can also limit the willingness of farmers to invest in measures that might increase their productivity and improve their economic situation.

Object of the RBF Incentive: *Need for funding to deliver results*: To improve agricultural yields, investment is needed in affordable irrigation technologies in order to make famers less reliant on changing rainfall patterns. Furthermore, innovation is needed and market knowledge on

diversifying current crops in order to improve soil productivity needs to be developed and shared.

Enabling Environment for RBF Adoption–Strengths (+) and/or Weaknesses (–) Encountered:

(+) *Favorable geography*. Farmers are living in a defined, limited geographical area and relatively close to exploitable water sources. The area is well-suited to a targeted improvement in infrastructure.

(+) *Fitting weather conditions*. The area is semi-arid. The index-based insurance model might be suitable to reduce drought-induced vulnerability; a single parameter (realized amount of rainfall) is sufficient.[12]

(+) *Support from government/donors, which* are willing to support and invest in weather data and agricultural statistics.

(+) *Presence of a trustworthy insurer*, willing to issue the policy, accept some risk, and play an administrative role, and perhaps even participate in technical education on the design of weather index-based microinsurance (WII) products.

(–) High *cost* related to product distribution channels.

Proposed Solution: A two-phased approach can consist of:

- *A*. Provide a credit scheme via local banks, backed with an *interest rate subsidy and/or a (partial) guarantee,* which can be used by individual farmers to invest in affordable irrigation techniques. The pay-back period would be less than 36 months, to limit the risk profile. Credit can be extended only for a set of preapproved technologies (certified by the national agricultural institute). *Credit should be triggered upon demonstration of new technology installed*. Ideally, the scheme can rely on existing cooperatives to share knowledge about proven and affordable irrigation techniques.
- *B*. Small farmers are encouraged to enroll in weather index-based microinsurance (WII)[13] which could reduce their vulnerability to risks such as recurrent droughts.

Experience has shown that demand from poor shareholders is limited for WII as a stand-alone product because of a perception of excessive cost. WII can be more appealing when linked to an existing development program or other market opportunities, such as seasonal credit or investment credit.[14]

One practical option to bundle this scheme is the "interlinked credit-insurance arrangement," under which "farmers borrow money at a higher interest rate that includes a weather insurance premium. If a natural disaster occurs, then the farmers repay only a fraction of the loan, while the rest is paid by the insurer to the bank. This model reduces the risk of weather-driven default for borrowers and thus helps

[12] By contrast, flood-index insurance requires a composite index. This involves identifying the correlation between multiple attributes of a weather parameter (duration, level of inundation, timing) with crop damage in a manner that allows individual as well as simultaneous variations of these parameters to be mapped to an indemnity payout schedule. For example, a flood-index trigger level could be determined for flood depth of more than 50 cm, with flood duration of more than five days, during a certain period of a crop calendar.

[13] The difference (and key advantage) of index-based insurance schemes is that indemnities are based on measurements of a specific weather parameter, such as rainfall or temperature, instead of actual damage. Therefore, the scheme does not require any damage assessment. It offers a specific amount of payout if, for example, rainfall at a local station falls below a threshold level. Index insurance mitigates moral hazard and adverse selection problems associated with traditional yield-based insurance schemes.

[14] See WFP and IFAD (2011) for an extensive discussion of these schemes.

induce agricultural productivity as farmers are able to use credit to switch to a higher-risk, higher-yield farming technology" (Akter, 2012, p. 11). Alternatively, "the interlinkage between credit and insurance can also be established through ex-post premium payment as a state contingent loan: in the good state of nature the clients pay back the loan, the premium payment on the insurance and the interest on both, but in the bad state of nature the clients owe nothing" (Akter, 2012, p. 11).

Sources of Funds: Funding for the subsidy could come from either government or international donors interested in promoting water efficiency in agriculture and adaptation to climate change for poor farmers. In the case of existing government resource mobilization for disaster relief expenses, one option could be to allocate to these result-based subsidies some share of the expenses that are used to finance post disaster relief and rehabilitation assistance. While this remains debatable in terms of welfare distribution (if the marginalized poor in risk areas remain without relief funds), such option is worth exploring. It would entail a shift of government funds from post disaster assistance to the support of measures that enhance preparedness for climate change providing necessary incentives to build resilience of sectors and the vulnerable.

Triggers for RBF Payment: The subsidy component would be triggered by demonstrated adoption or installation of the new irrigation technology/equipment (previously certified as acceptable).

Institutional Arrangement: The identification of the intermediary and delivery channel for the "subsidy + insurance" scheme (a rural bank, insurer, farmer cooperative, or microfinance institution) would depend on the existing institutional context. Donors would engage directly with the local intermediary to extend (subsidized) credit. Verification services are contracted and funded directly by the government/donor, to ensure independency. Technical assistance would be provided by the donor with the supporting existing cooperatives through public awareness campaigns promoting the range of affordable irrigation techniques.

Verification Process: There is a national agricultural institute with branches in provinces, which can be used as a knowledge center and independent verification agent. Upon verification by the independent agent, the credit subsidy would be provided directly by the donor to local banks.

Observed Results: The rationale behind such a scheme is ultimately to move from traditional government-funded crop subsidy to targeted subsidies linked to technology and efficiency improvements. In the meantime, the promotion of risk management services such as WII could encourage access to credit—by transferring risk away from the borrower or lender—and/or the development of savings services.

Additional Information about this Case: Akter (2012); WFP, IFAD (2011).

Hypothetical Case 2. Minimizing the Negative External Effects of a Hydropower Plant

Project: 100-megawatt (MW) hydropower project

Problem/Issue: The development of the 100-MW hydropower project in Country X involves the creation of an artificial lake and the flooding of five mountain villages. The costs of running the compensation program and resettling the 3,800 inhabitants of the area have made the project financially unattractive to private sector investors.

Background: The 100-MW hydropower project appeared to be the cheapest solution to reduce Country X's energy dependency, which remains one of the critical bottlenecks to its economic development. The local government had a satisfactory legal and regulatory framework in place to implement the project as a BOT scheme, with an Independent Power Producer (IPP) and national utility EDC (Energy Distribution Company) acting as the single off-taker. Interest for the project was strong among international power plant operators; however none of them was willing to assume the cost of the compensation and resettlement program, which involves the construction of three new villages on the shores of the artificial lake in which inhabitants of the flooded villages would be relocated. Those additional costs made the project financially nonviable in spite of its strategic importance for the country.

Object of the RBF Incentive: The Ministry of Energy is implementing a combined compensation and resettlement scheme aiming at relocating inhabitants of the area to allow the hydropower project to reach operational phase.

The central government will compensate inhabitants signing up for the compensation program as and when they move out of their current dwelling, and also pay a fixed amount to the BOT operator per person moving out. As part of the resettlement program, it will also compensate the BOT operator for the portion of the costs of the new housing estates not directly covered by the resettled households (end-beneficiaries).

Risk Allocation: The BOT operator selected through an international tender process assumes full responsibility for the communication and implementation of the compensation and resettlement programs, as well as the construction of the new housing compounds according to pre-agreed detailed specifications. The risk of inhabitants being unwilling to relocate ultimately remains the responsibility of the government.

Definition of RBF Approach: An OBD mechanism. As part of the compensation program inhabitants are offered the choice of either: i) receiving compensation from the government according to the value of their current property when they effectively move to a new home away from the project's location; or ii) signing up for the subsidized resettlement scheme and receiving a lesser amount, to be reinvested in one of the residential areas to be built by the BOT operator around the new lake. In the latter case, they have a choice between different apartment and house models to be built in the new residential areas, but receive only 50% of the price. The BOT operator receives a fixed fee per person signing up for the program and moving out of the villages to be flooded, plus a grant amounting to 50% of the costs of the new housing to be built.

Sources of Funds: The compensation program is funded entirely by the central government, which is in effect buying up all private properties in the area to be flooded in order to make it available to the BOT operator. Fifty percent of the costs of the resettlement program are funded by inhabitants relocated in the new residential areas, using the compensation they have received from government for their seized properties. The remaining 50% is financed by a special resettlement fund provisioned by the central government (30%) and EDC (20%).

Triggers for RBF Payment: Payments for the compensation scheme are made to the operator on a quarterly basis as follows: i) 20% of the fixed fee times the number of inhabitants having signed up for the compensation program during the period considered; and ii) 80% of the fixed fee times the number of inhabitants having effectively moved out during the period considered.

Compensation for seized properties is paid to inhabitants in one installment upon effective moving from their current dwelling. Payments for the resettlement scheme are made according to the following schedule: a) 40% of the cost of the new accommodation are paid by the resettlement fund to the BOT operator upon compliance of a household with the requirements and arrangements of the resettlement program; b) 50% of the cost of the new accommodation are paid by households themselves to the BOT operator upon delivery of the new accommodation; and c) 10% of the cost of the new accommodation is paid by the resettlement fund to the BOT operator upon satisfactory inspection of the facilities two years after delivery.

Institutional Arrangement: Implementing agency is the Ministry of Energy.

Verification Process: An independent verification agent has been hired to audit the program and its implementation on behalf of the Ministry of Energy. The agent is in charge of checking that the promotion of the compensation and resettlement program is carried out in a respectful and transparent manner, and that compliance with the program is done on a voluntary basis. Later in the program, the IVA will be in charge of assessing the living conditions in the new accommodations, which will trigger the final payment to the operator.

Financial Sustainability: The combined approach to the compensation and resettlement programs can make the scheme financially viable, as beneficiaries are incentivized to directly reinvest the compensation money toward the new real estate scheme. Expected financial revenues and economic benefits from the power plant will largely outweigh the initial costs borne by the government and EDC to finance the compensation program and provision the resettlement fund.

Hypothetical Case 3. Preventing the Negative Effects of Flooding

Project Name: River Flood Prevention Project

Problem/Issue: In the spring, rain and melting snow trickling down from the mountains located in the north of Country F regularly caused the three main rivers crossing the central plains to overflow, causing considerable damage to agricultural land and nearby villages.

Background: Country F's Ministry of Water and Environment (MWE) launched an extensive flood prevention initiative to tackle this problem. The implementation of the initiative was devolved to local water management agencies in every flood-prone zone of the country. The river flood prevention project included two components: an infrastructure component; and an emergency preparedness plan component.

The Central Plains Water Agency (CPWA), which is in charge of supervising the safety of waterways in the most problematic areas of the country, was awarded a grant from an international development agency to develop, finance, and implement the program, for which an innovative RBF mechanism was set up.

Object of the RBF Incentive: The RBF mechanism aims at providing a financial incentive for CPWA to develop and implement both components of the project. The *infrastructure component* includes reinforcement of river banks, construction of floodwalls, installation of pump stations, and digging of detention basins. The *emergency preparedness plan component* includes inventory (selection of products to stock, decision on inventory levels, and procurement of products), storage (decision on optimal storage locations, construction of storage facilities), planning (establishment of plans and procedures for dispatching resources in flood situations and evacuating inhabitants) and training

(selection and training of people with necessary skills, training residents of flood-threatened areas on evacuation procedures).

Risk Allocation: CPWA does not generate revenues and is funded via an annual budgetary allocation from MWE. In that sense, MWE will bear the financial consequences of CPWA not achieving the program's objectives and will be absorbing all risks.

Definition of RBF Approach: CPWA is in charge of developing and implementing the river flood prevention program in its assigned zone. For that purpose, it may draw on its own internal resources, or procure and/or outsource part of the tasks to be carried out, based on the national procurement laws and regulations.

Designing a satisfactory measuring tool or indicator for the flood prevention program is somewhat difficult, as the effectiveness of the infrastructure works and the Emergency Preparedness Plan to provide efficient protection against floods can only be really tested in the case of severe natural disasters, which occur at irregular intervals. Therefore, the RBF scheme is based on pre-agreed objectives pertaining to both components of the program being delivered and maintained up to certain performance standards.

Sources of Funds: CPWA pre-finances all project costs via a special investment budget allocation from MWE, and gets partly refunded for the costs by the international donor agency if and when RBF objectives are reached in due time. Alternatively, a grant can be earmarked to CPWA to assist with pre-financing. To shorten the payment process, as we discussed, instead of paying the implementing agency upon completion of entire major infrastructure, they can be paid when they complete each unit works (a functional unit of the major infrastructure, such as a sluice gate in a barrage).

Triggers for RBF payment: Payments could be made according to the following schedule:

- A fixed lump-sum amount corresponding to 95% of the estimated costs of the infrastructure upon completion of the works,
- A fixed lump-sum amount corresponding to the estimated costs of the Emergency Preparedness Plan upon presentation and independent validation thereof,
- A fixed lump-sum amount corresponding to 5% of the estimated costs of the infrastructure in five annual payments for maintaining pumping capacity and other elements of the infrastructure component operational at the prescribed level.

Verification Process: An independent verification agent can be hired by the international donor agency to audit the program and its implementation. In particular, the IVA would be in charge of monitoring progress made by CPWA and ascertaining that conditions for payments are met.

Observed Results: Such a program can provide strong incentives for the government to quickly improve its flood prevention infrastructure as well as its response to flood disasters. The scheme is designed in such a way that payments are linked to specific objectives and can therefore be cancelled if objectives are not met within the agreed timeframe.

A thorough preparation to identify the most effective way to reduce the frequency and impacts of flood events, including hydrological modeling of alternatives, assessing the feasibility of the proposed infrastructure works, and explicitly describing outputs to serve as grant installments is essential to design the proper instrument.

The Constraint of Risk Transfer in Flood Prevention

The possibilities for a results-based approach to flood prevention are mainly restricted by the extent to which an agent will be able and willing to accept additional risks. Ultimately, the relevant risks are not very manageable, particularly the risk of the occurrence of a flood event. However, one option is to incentivize the implementation of measures that can reduce the impact of such an event.

Examples include developing and implementing Emergency Preparedness Plans or Asset Management Plans, as illustrated in the case study. Other innovative ideas could be to incentivize:

- governments to set and enforce policy/permits promoting construction according to flood resilient standards and that could include flood prevention facilities such as temporary water storage,
- the prevention of blocking of drainage canals (for example, pay NGOs or the waste management service provider to prevent dumping of waste in drainage canals),
- dredging to keep drainage canals open up to certain standards during certain times that are more prone to flooding,
- governments to implement measures to flood-proof key/vital infrastructure such as hospitals,
- governments or NGOs to set up and test early warning systems (the performance criteria could be the percentage of people reached out of the total population during testing),
- governments to plan and establish exit roads with sufficient capacity.

Chapter 4

Main Findings and Conclusions

Using RBF to Address Certain Categories of Problems

When considering the water sector as a whole, the spectrum of possible issues to be resolved is enormous, but categorizing the main recurring issues can help narrow the selection of which RBF tools may be most suitable for each specific context and situation. The discussion that follows considers recurrent issues encountered in water-related development projects and suggests RBF approaches that could (in principle) be implemented effectively.

Table 6 presents a set of market failures and challenges and certain RBF tools that could be used to address them. The final selection and structuring of the program or project should be refined through further questioning various aspects of the specific situation, such as the ones discussed in the analytical framework presented in Chapter 2.

Behavioral Issues

When the intervention is at the household or individual level, the intended beneficiaries must adopt a specific behavior or change a habit. Some examples could be starting to wash hands, modifying garbage disposal practices (to prevent obstruction of drainage canals and creeks), or adopting new irrigation equipment.

Often, if people receive adequate information (and training, if necessary), they become conscious of the benefits of changing their behavior and may do so without requiring any incentive. However, a very common challenge is to sustain behavioral changes over time, especially when beneficiaries do not immediately appreciate the benefits of the new behavior, or when this demands more effort than they are accustomed to (Box 6).

However, because of the risks of rent-seeking or aid-dependency, it is preferable to limit the length of time over which the behavior-related incentive is offered. Ideally, this should be limited to a period of time that is enough to ensure that an educational message can be understood and retained and that the beneficiaries perceive the benefits of the new behavior and have fully adopted it. The optimal duration of the incentive will be determined depending on the tradeoff between its cost and the number of repetitions (of the incentive) necessary to make the new behavior attractive to the beneficiaries.

This type of behavior-based incentive is typically found in CCTs; however, it not necessarily directed to the beneficiaries of a program or the entities in charge of mobilizing their behavior change (through such means as information, communication and education (ICE) campaigns, training, or promotion). For instance, in the irrigation reform case-study in the North China districts discussed

Table 6: Kinds of Issues in Water Projects and Related RBF Tools

Issue/Market failure	Description of issue	Possible RBF tool
Behavior/Bounded rationality	A stakeholder group should change habits (hygiene), improve practices (garbage collection), or adopt new technologies	Incentive/reward to sustain users' new behavior, such as conditional cash transfers (CCT). Subsidy to make new infrastructure/ equipment affordable, such as output-based aid (OBA).
Access constraints	Low-income population lacks access to certain products or services due to supply issues (uncertain revenues from disadvantaged areas) or demand issues (affordability)	Advanced market commitment (AMC) can support suppliers' investment when demand is uncertain. Take-or-Pay (ToP) offers a guaranteed prices and quantities for a specified period. OBA subsidy can close the affordability gap for poor customers.
Externalities	External costs or benefits are generated by an activity/service that affects members of society who are not involved in the market transaction	Payments for Environmental Services (PES) introduce payment for preservation/restoration of ecosystems. Carbon finance (CF) allows pricing and trading of GHG emissions.
Unsatisfied demand/ Uncertain future revenues/Market power	Demand is not met because the required investment is too risky or the future demand volume is too uncertain. A dominant/monopolistic position causes suboptimal quantity, quality, allocation or pricing of a good/service.	Output-based disbursement (OBD) schemes can redistribute the investment responsibility among different levels of government. ToP agreements can offer guarantees to the supplier so that the optimal quantity of product/service is reached. OBA subsidies can help buy down the capital cost of the investments required.
Infrastructure investment programs/ Budget execution	Large investments are needed to build infrastructure. Government needs to improve the execution of an investment plan (because of low capacity, rent-seeking behaviors, etc.).	Cash-on-delivery (COD) is a hands-off approach that rewards governments for long-term results. OBD schemes can improve budget execution for large investments (lower government levels are responsible for agreed outputs).
Poor service delivery or operation & maintenance	A vicious cycle (often seen in irrigation) of inadequate service supply or administrative failures, together with incorrect pricing of goods and resources prevent the sustainable provision of water services.	Various RBF alternatives could be appropriate, including high-level COD, OBD agreements, more output-specific OBA, or performance-based contracts (PBC) (well-tested in health).

Box 6: Changing Habits in the Area of Waste Management

Residents of low-income areas in a city may be used to disposing of solid waste in creeks or drainage canals; this practice can produce flooding because the garbage obstructs the flow in the drainage system. It may also cause environmental damage and can have health implications on the population. Such behavior is likely due to a combination of a lack of education and a lack of alternatives because of poor infrastructure. To tackle this issue, a cash payment could be justified, conditional on residents disposing of solid waste in a specific designated area.

The agent working with the community to induce the behavioral change could be paid, periodically, after verification that the new practice is being followed by the population. These payments could be made using the number of households adopting and maintaining the new behavior, defining a certain threshold beyond which an agreed amount is paid, or by checking the condition of the creek or canal and paying if it is free of garbage.

However, the scheme could use one or two payments depending on the adoption of the new behavior or technology. A first payment could be made when the equipment (if needed) to start with the new behavior is acquired or installed (it is preferable to pay upon installation). A second payment could be made once that hardware is being used in a consistent manner.

More information on RBF in solid waste management can be found in: World Bank (Forthcoming).

in Chapter 3, behavioral incentives were used (along with other measures) to improve the performance of employees of irrigation districts in collecting water fees. Linking employees' performance to salary bonuses and penalties proved particularly effective at a time when irrigation districts were progressively receiving fewer subsidies to cover irrigation costs and needed to rely on local cost recovery mechanisms for funding (see Box 7).

Constrained Demand

As the case studies in Chapter 3 illustrated, some RBF mechanisms can help overcome the impediments constraining access of low-income populations to water-related services (potable water, sanitation, and irrigation services). Sometimes, uncertainty regarding the level of demand for certain services (like on-site sanitation) keeps providers from investing to satisfy this demand. A commitment to procure

Box 7: Inducing New Behavior in Hygiene

To promote and maintain more hygienic practices among low-income households, while improving sanitation conditions, a payment could be made to those households that purchase and install the required hardware (concrete slab, rings, or similar elements) to set up their own latrine with hand washing facilities (if not already available), once it is verified that the facilities are working properly.

This payment could be considered a rebate or subsidy that covers the gap between what customers can afford to pay and the cost of the hardware once installed. The households may borrow the amount to cover the gap from microcredit institutions, family members, or other schemes, and pay it back once they receive the RBF payment. This way of structuring a scheme is typical of OBA projects, where a subsidy covers the gap to facilitate access to a service.

A portion of the rebate or subsidy could be withheld until the IVA verifies that the facilities are used and household members are washing their hands after doing so. A portion of an OBA subsidy is used to induce and fix a desired behavior.

For more information on this topic please refer to: Tremolet (2011).

a given level of service could lead to investments needed to develop and bring to the market affordable solutions.

This approach emulates the advanced market commitment (AMC) mechanism used to develop vaccines for developing countries (see Appendix A for a detailed explanation of AMC) and intervenes on the supply side of the market, ensuring the provision of affordable solutions. In certain cases addressing both the demand and supply sides will be required. Along with weak supply-side incentives, demand for a new service can be uncertain because of affordability issues (an entry or access barrier). An RBF scheme, in the form of a direct subsidy to the households to pay for the portion of the connection cost that they cannot afford can be structured and implemented. This was the instrument implemented in the case of Manila Water illustrated in Chapter 3. The payment is made to the service provider "on behalf" of the households. This solves two problems: the service provider is certain that if it performs the agreed service it will recover the costs, and the households pay what they can afford and enjoy access to water.

In other circumstances, if households can afford the full amount—if convenient financing were available and the service provider, a commercial bank, or a credit union would agree to a financing arrangement involving loans to those households at a subsidized interest rate—the RBF mechanism could still be used to design a program and/or project. This could be done by paying the party providing the financing to the households the present value of the interest that will not be paid by the households because of the reduced interest rate. The payment can be done upfront, once the service is provided according to the set standards and has been independently verified.

The two options described above, which are based on the use of subsidies, are built along the lines of an OBA mechanism. However, the funds for the subsidy scheme may come from a grant provided by a development agency or contributed by the government (in the form of a social RBF fund or similar arrangement) or from loans or credits from development agencies to a national or state/provincial government that is on-granted downstream to be used as subsidies. In the latter case, the loans or credits could also be designed using an RBF structure. If the option is an RBF instrument, then that higher-level scheme could take the form of an OBD, COD, or other RBF mechanism that follows the principles outlined in Chapter 2.

Externalities

Externalities, defined as costs or benefits resulting from an activity or transaction which affect a third party (uninvolved), are present in some capacity in water-related projects and programs. These positive and negative externalities are typically related to the non-exclusivity and non-rivalry characteristics of natural public goods (such as shared water resources, forests, and biodiversity). The distortions generated by externalities can be corrected in various ways, including: regulatory instruments, economic instruments based upon a coercive approach ("polluter pays" principle), or economic instruments based on the producer's voluntary approach, without any coercive action. The latter category includes PES systems,[15] which have become increasingly popular in recent years in both developed and developing countries. As illustrated in the Costa Rica case study (Chapter 3), PES is one mechanism that falls under the broad umbrella of RBF and is specifically intended to tackle externalities. It could be combined with carbon finance (CF), as was done in a biogas project in Nepal that combines an OBA scheme for alternative energy with a CF scheme associated with the reduction in firewood consumption

[15] See Laurans et al. (2012) for a detailed discussion of PES.

Box 8: RBF for Flood Prevention

A local government governs a town or city traversed by a river downstream from a forested area. If the owners of the land upstream of the town choose to develop that forested land, the vegetation cover would disappear and the land would become more impervious, reducing the concentration time in the catchment and increasing the peak flow through the city. This would put the city at higher risk of flood damage and significant capital investments would be required to prevent those damages.

An agreement could be reached where the local government would use part of the revenues that otherwise would be used to build the flood protection infrastructure to pay landowners upstream from the city that agree not to develop the land or to develop it preserving, to the extent agreed, its beneficial effect on the river flow during rainfall. Depending on the information available, the transaction could consider payments related to the level of preservation of the vegetation cover, relative permeability of the land, the run-off coefficient, or a combination of these or other parameters.

The local government could combine the implementation of certain infrastructure works with an agreement along the lines described above. An optimization study could be used to define the extent of the benefits of such a scheme. One objective could be to maximize the relation between the reduction of potential flood damage and the charge to be imposed on the population to implement the plan. Furthermore, the analysis could include additional revenues from changes in the allowed land uses as a consequence of the implementation of the plan, such as increased opportunities for recreation or ecotourism.

that was damaging the forests surrounding the project area (see Box 8 for an example).

Limited Supply-Uncertain Future Revenues-Market Power

When the level of investment required to provide a service is high, there might be a shortage of service providers willing to take on the risk of building the necessary infrastructure. This may be the case in investments for the production of clean water, storage of water for irrigation, and wastewater treatment facilities. Another common issue in water is that of a natural monopoly, preventing competition and limiting access to potential markets. RBF instruments can be design to encourage the entrance of new service providers to the market.

Although conceptually similar to AMC, a Take-or-Pay (ToP) agreement—in which there is a commitment from the principal to buy certain quantities regardless of whether the goods or services are taken or not (see detailed explanation in Appendix A)—could be used to ensure certainty of a minimum revenue stream to the potential agent. Such arrangement could balance the risk to a point between the input-based financing approach (in which the principal bears most of the risk) and a pure commercial approach where cost recovery would depend only on the quantities actually sold at the prevailing price (and the agent bears most of the risk).

Another mechanism entails linking an RBF incentive to the creation of an operational facility (once it has been finished, tested, and is operating as planned) as in a sort of turnkey project. However, this implies that the plans for the operation, maintenance, and management of the facility are already in place. Box 9 illustrates a relevant example in which the insufficient supply of sanitation infrastructure is overcome through a "creative" PPP arrangement.

Subpar Implementation of Infrastructure Programs or Budget Execution

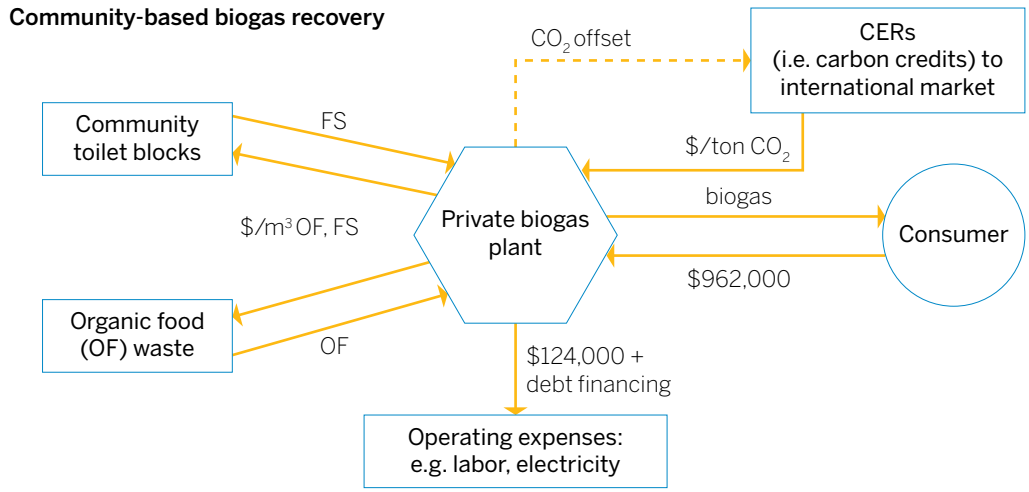
RBF incentives can be used to assist government agencies at different levels (national, state, local) to improve the execution of infrastructure investment plans in certain areas or sectors. Understanding the underlying causes of poor

Box 9: Overcoming Supply Constraints in the Provision of Sanitation Infrastructure

Due to the low probability of full cost recovery, private investment is not attractive for sanitation infrastructure. Private suppliers are constrained to serving communities/households that have the ability to pay for the full cost of those services. Nonetheless, there are untapped opportunities for creative public–private partnerships (PPPs) that hinge on resource recovery from human waste. Murray et al. (2011) illustrates an example of a community-based biogas recovery and (co)-compost production project. In this model, a private entrepreneur builds a biogas plant for receiving faecal sludge (FS) from multiple community/public toilets. This model enables the sustainable maintenance and timely extraction of FS from toilet blocks. A "reverse tipping fee" is financed through revenues from sales of the gas. Based on local market demand for natural gas products, end uses could include bagging the fuel in transportable biogas pillows for use as a cooking fuel; conversion to electricity using a biogas-fed generator; or purification and compression for use as a transport fuel (see figure below).

The initial capital investment required for biogas recovery and upgrading for sales is likely to be a major barrier to entry for small- and medium-scale entrepreneurs. As the authors suggest, microfinance or other lending institutions could be engaged to gain their confidence in such business ventures and to use them to identify and recruit new entrepreneurs to the sector. If the biogas plant is of sufficient scale, the sale of carbon credits on the international market could be another financing option.

Institutional Arrangement of the Biogas Structure



Source: Murray et al. (2011, pp. 505–521).

execution in investments will provide guidance on how best to structure the RBF scheme and selected appropriate instrument(s). Among the possible causes, there might be low capacity at the agency or subnational government level, and the national government may be interested in improving the situation through a capacity building program. The risk to implement the capacity building program could be taken by the national government, with a commitment from a development institution to provide a certain amount of financial resources if such program leads to improvements in the performance of the subnational governments. This would be an RBF agreement along the lines of COD. In certain cases, a combination of two or more instruments could be used in complementary ways. Investments in specific projects could be financed through OBD agreements, for instance, and a COD scheme could be used to reward the effective contribution of such project to the overall improvement measured by specific indicators.

Another option could be to trigger better financing conditions (reductions of the interest rate, extension of the maturity or the grace period) if the selected indicators improve beyond a certain threshold. This would be equivalent to using the proceeds of the COD payment and applying them to cover the difference in the financing cost derived from the changes in the loan conditions, instead of leaving it up to the government to decide how to use those proceeds.

Several examples exist as to how to use OBD to improve the implementation of investment programs or budget execution, notably the São Paulo Water Recovery Project (REAGUA) in Brazil (see Chapter 3) and the Local Government and Decentralization Project (DAK Reimbursement) project in Indonesia.

Poor Service Delivery and Operation and Maintenance

When addressing issues of poor service delivery or lack of maintenance, it is necessary to assess the underlying reasons for the poor performance, so that any incentive can be better aligned to the improvement in the proper areas. Incentives could be offered at a high governance level, such as COD agreement, where the payment is linked to improvements in indicators reflecting the progress achieved in the problematic areas. Alternatively, an RBF incentive could be effective at a lower governance level, where payments are linked to the completion of a specific project agreed to in advance, possibly using an OBD agreement.

Combining the two approaches is advisable in situations where the link between the ultimate objective and the results under the agent's control is uncertain (as in conveyance or distribution efficiency projects), so an agent would not accept assuming the full risk of investing in upgrading the network and thus fail to achieve the agreed results, loosing part of the incentive payment. In such situations, and depending on how much risk the agent is willing to assume, the first OBD payment linked to the completed project could cover only a portion of the costs, leaving the remainder (plus a reward, if deemed convenient or necessary) to be paid once the improvement in performance can be verified or the improvement is sustained.

Six Principles for Tailoring RBF Mechanisms to a Particular Case

Designing and implementing an RBF instrument requires detailed customization and in some circumstances, creativity to adapt to a particular situation and context, given the variety and complexity of issues; the sources of funds available; the capacity of principals and agents; the strength and capacity of supply and demand sectors, as well as other stakeholders (e.g. local financial sector and regulatory authorities); and plausible verification options. There is, however, a series of principles that should be observed when structuring any RBF mechanism and that will assist in ensuring the design of viable and implementable instruments.

Principle 1. The Incentive Should Focus on the Outcome

The development of an RBF instrument requires a strong focus on outcomes or outputs, rather than on inputs and (procurement) processes that are needed to achieve these results. The inherent risk of schemes that place such a great focus on the input side of the results chain (for example, on hiring and training staff or capacity building, the construction of a plant, etc.) is obviously the weak influence and accountability of the input on the ultimate intended results. On the other hand, when the existing inputs/ conditions are too frail—as in the case of underqualified or

insufficient staff—it may become unrealistic to incentivize output and outcomes because the enabling capacity is simply not there.

When structuring the RBF instrument and defining the trigger indicators the challenge is to remain as close to the ultimate outcome as realistically possible. The indicators must be designed with the outcome in mind. Hence, it is imperative to devote adequate time during the project design and appraisal to analyze the objective- result-indicator paradigm (as was discussed in section 2.1 and is explained in detail in Appendix B) to find the most suitable strategic option. This leads to the second general principle.

Principle 2. Ensure That Indicators are Measurable

As commonly accepted as good practice in management for results, the indicators should be SMART:

- **S**pecific: Closely linked to the a specific area of improvement
- **M**easurable: Able to capture a quantifiable progress
- **A**chievable: Achievable within the life of the project and thus suitable to trigger payments
- **R**elevant: Reflect information that is important and helpful in tracking progress toward the intended objective
- **T**ime bound. Progress can be tracked at a desired frequency for a set period of time

Principle 3. Use a Long-Term Perspective Rather Than a Short-Term One

In financing mechanisms, there is a natural tendency to emphasize the investment that is needed to generate results. This is only logical: the investment directly causes the need for a financial intervention. However, although the investment often is a precondition for reaching the ultimate objective, completing the investment (whether a hydropower station or an irrigation system) or meeting certain targets, (such as water supply or sanitation coverage) is certainly no guarantee that long-term results will be delivered. Even the fairly straightforward OBA schemes have been subject to the criticism that subsidizing a one-time connection effort is no guarantee of long-term sustained services to the poor.

On many occasions, the infrastructure, once finished, has not been used as intended or maintained appropriately; it may even have been sold or abandoned. For example, meeting quality standards for water supply service (water pressure, number of hours per day that service is available) is a more sustainable performance indicator than the number of connections. Accordingly, when structuring an RBF mechanism, it is crucial to encourage a shift of focus to the long-term objective (rather than the immediate financing gap).

Principle 4. Create a Market-Like or Market-Based System, to the Extent Possible

On a macro level, given the shrinking resources available from traditional donors and multilateral development banks, the trend is toward utilizing the limited lending and aid resources available as catalysts to leverage additional financing from diverse sources (The World Bank, 2013). Innovative financing approaches such as RBF can play this catalytic role to enhance the impact of resources from multilateral development institutions and bilateral donors by supporting improvements in the business and investment climate that can facilitate access to private sources of finance. Examples include climate finance and partial risk and partial credit guarantees.

On a practical level, financial incentives work best in a commercial or market-based system, and not so well in the public or semi-public sector.

Financial incentives ultimately do not influence decision making in political governance structures as much as they can influence a privately owned company with shareholders that seek to maximize the value of their investments. Often market failures (asymmetric information, externalities or other barriers) are the reason behind the reluctance of the private sector to invest in the water sector in developing countries. RBF mechanisms can help overcome such market failures and create well-functioning demand and supply sides: for example, by creating market appetite and building the capacity of operators. In structuring a market-based system, a helpful perspective is to focus on the business case of a project or program and determine what aspects need to function properly.

Principle 5. Ensure a Feasible Allocation of Risk

RBF implies that more risk will be transferred to the agent than in a conventional approach. This risk transfer creates, on the one hand, an incentive for the agent to deliver the agreed results and, on the other hand, an expectation of additional remuneration for the agent. That agent should be in a position to assume the risk; otherwise, using an RBF instrument will not be possible. Incentivizing the government or operator on the basis of performance indicators that are close to project objectives/outcomes implies an aggressive risk transfer. This is often not possible because reaching the project objective is dependent on a range of issues that cannot be controlled by the government or operator: it may be the case that the risk allocation is inefficient and ineffective. In other words, whereas RBF is based on a larger risk transfer to the agent, the risk allocation should still comply with the principle that each risk is borne by the party best suited to manage it. Therefore, the move toward RBF demands a thorough analysis of risk allocation and risk mitigation measures.

Principle 6. Be Aware of and Avoid Potential Unintended Incentives

Any financial arrangement intended to solve market failures can result in unintended effects or behavior. For example, a subsidy to induce poor farmers to acquire irrigation equipment can lead to a flourishing resale market for irrigation equipment instead of well-functioning irrigation systems. Therefore, in structuring an RBF mechanism, it is valuable to check for unintended incentives from the perspective of the recipient.

Concluding Remarks

Financing for development after the 2015 threshold is expected to become increasingly constrained and exposed to changing needs within a context of protracted crises that involve traditional donors and recipients of development aid alike. Given the tighter aid budgets of many donor agencies, "the transformative development agenda requires that available resources be used more effectively and strategically catalyze additional financing from official and private sectors."[16] On the other hand, the increasing emphasis on linking development funding to results will require greater country ownership, transparency, and focus on results. In this context, new financing sources and tools are being explored, by both researchers and implementing agencies, with increasing attention to results-based forms of assistance and funding.

This guide aims to contribute to a better understanding of RBF instruments and the conditions for success or failure of such approaches in the water sector. The angle chosen in writing this user's guide is to take the position of a task manager (or other involved stakeholder) when,

[16] The World Bank (2013, p. 3)

at the design stage of a development project, he or she is looking for a nonconventional solution to specific problems and recurrent policy issue(s) or market failure(s) in the respective water subsector. Thus, the guide discusses the process of categorizing the type of issue as a first step in identifying a potentially suitable RBF scheme.

Through the detailed discussion of various case studies (both real and hypothetical) spanning diverse contexts and sectors, concrete examples are provided to illustrate cases where an RBF scheme has been or could be adopted. The case studies clearly document how there is no generalized rule or arrangement to implement an RBF scheme; rather, a careful assessment of the coexisting contextual factors can point to which specific RBF could be feasible. Such factors (extensively discussed in the analytical framework) include the willingness of stakeholders to work with RBF; risk transfer; access to finance options; various determinants of an "enabling environment"; and the existing capacity and competences of involved agents.

For example, a reliable ex ante definition of output unit costs is fundamental for OBD schemes. When Uruguay's regulatory changes, passed in 2004, precluded private operators from water and sanitation supply services, OBD became an alternative strategy to strengthen intergovernmental accountability and establish a compelling internal performance benchmarking system. In the case of lack of access to water among pockets of poor urban households in the Philippines, a one-time OBA subsidy payment justified subsidies to bridge the affordability gap, given the demonstrated commitment of the supplier to reach these disadvantaged customers. In similar water or sanitation provision cases, various OBA pilot projects implemented have shown how result-based subsidies can guarantee better targeting (by virtue of the verification requirement) and, as such, are more easily acceptable considering the logic of welfare equilibrium.

Hopefully, the analytical framework used in this guide, combined with the case studies, will provide some useful insights for practitioners who are dealing with RBF or are exploring the potential use of RBF. Ideally, the ever-growing potential of data collection, such as remote sensing and other geographic information systems (GIS), can trigger even more exploration of innovative ways to include goals to adapt to climate change in the RBF incentive schemes.

Developing this user's guide and interviewing numerous Task Team Leaders (TTLs) of the World Bank and RBF experts has provided some useful suggestions with respect to the potential for application of RBF schemes in water subsectors, including those linked to climate change. The main ones can be summarized here:

- RBF schemes should focus on longer-term results, instead of "just" connections for water supply projects.
- The output-based aid (OBA) approach seems promising not only for water supply, but also for applications in the sanitation and irrigation sectors.
- For large-scale irrigation projects, the RBF mechanism seems most promising if reflected in a public-private partnership (PPP) structure with a private operator, because financial incentives on larger schemes work better in a commercial environment.
- For small-scale irrigation projects, there is room to explore the potential replication of an experience such as the "Lighting Africa" program to foster the creation of an enabling environment offering the financial and institutional conditions for adopting innovative irrigation techniques.
- In hydropower, RBF mechanisms offering incentives to effectively deal with eliminating 'externalities' are within reach and promising.

- In the area of flood prevention, the move to a completely output-based approach will not be achievable, but there are many opportunities to make small steps in that direction.
- It is advisable to create opportunities to make loan schemes (instead of grants) more results based, along the lines described in this user's guide.

Although this guide focuses on RBF and the concept seems very promising in terms of broadening future applications to water-related issues, it is important to place RBF in its proper perspective. The RBF approach is not a goal in itself but rather a means to creating more effective and results- oriented financing schemes. Ultimately, RBF will not replace traditional ways of funding development projects; rather, it will complement them.

Appendix A

Glossary of RBF-Related Concepts and Instruments

Basic Concepts

This section explains some concepts that may apply to the financing arrangements or tools described and analyzed throughout this document. The explanation starts with a definition from a dictionary (in italics), and is followed by a definition that is tailored to the context of the subject under analysis.

Incentive: *Something that motivates or encourages someone to do something.*
An incentive is the promise of a reward (or the fear of a punishment) that encourages certain behaviors and discourages others. Every society has institutions that provide such incentives to individuals in different parts of their lives, including rules for hiring workers and remunerating them, obeying traffic and tax laws, participating in community activities, or fulfilling family obligations. These institutions and associated rules also create an environment of incentives for businesses, corporations, government officials, agencies, and other organizations. Development programs enter these contexts bringing their own complexities, and introduce new incentives that may work with or against some of the prevailing incentives (Savedoff, 2011).

Input: *What is put in, taken in, or operated on by any process or system.*
Inputs are the financial, human, and other resources mobilized to support activities undertaken by a project. Examples would include loan/credit funds and staff (OPCS Results Secretariat – World Bank, 2007).

Outcome: *The way a thing turns out; a consequence.*
A **project outcome** is the uptake, adoption, or use of project outputs by the project beneficiaries (OPCS Results Secretariat – World Bank, 2007).

Output: *The amount of something produced by a person, machine, or industry; the action or process of producing something; the power, energy, or other results supplied by a device or system.*
The supply-side deliverables, including the events, products, capital goods, or services that result from a development intervention (such as the construction of a school).
The key distinction between an output (a specific good or service) and an outcome is that an output typically is a change in the supply of goods and services (supply side), while an outcome reflects changes in the utilization of goods and services (demand side) (OPCS Results Secretariat – World Bank, 2007).

Result: *A thing that is caused or produced by something else; a consequence or outcome.*

Results are the outputs, outcomes, or impacts (intended or unintended, positive or negative) of a development intervention. The World Bank encourages results that support sustainable improvements in country outcomes: that is, evident changes in people's lives or the behaviors of targeted households, firms, or institutions (OPCS Results Secretariat – World Bank, 2007).

Subsidy: *A sum of money granted by the state or a public body to help an industry or business keep the price of a commodity or service low; a sum of money granted to support an undertaking held to be in the public interest; a grant or contribution of money.*

Public funding used to fill the gap between the total cost of providing a service to a user and the user fees charged for that service. The use of subsidies may be justified by policy concerns such as improving basic living conditions for the poor or reducing disease (Mumssen, Johannes, & Kumar, 2010).

The financial value of a subsidy is equal to the money that the utility loses by providing the subsidy. Specifically, it is the difference between the cost of providing the service and the payment made by the household to receive that service (Komives, Foster, Halpern, & Wodon, 2005) (pages 53 and 116).

From a demand-side (consumer) approach, which relies on household survey data—including data about consumption of water and the price paid for it—the subsidy amount is computed as the difference between what the consumer actually paid and the price that "should have been paid," given observed consumption and a "normal" price" (Le Blanc, 2008).

From a supply-side (utility) approach, where the point of view is that of the government and the unit of observation is the utility, subsidies to consumers are calculated as the difference between transfers from the government to the utility, minus all the losses incurred by the utility due to inefficiencies. The government provides a transfer to the utility to help it cope with current expenditure requirements (either to break even or to achieve a profit). The proportion of this amount that goes to end-consumers is reduced by any loss of efficiency occurring from production, distribution, billing, or collection of payments. The problem is then to measure these losses. The latter two types of losses can be measured directly; the former two can be estimated by benchmarking (Le Blanc, 2008).

A distinguishing feature of water and sanitation subsidies is whether they seek to reduce the cost of consumption or the cost of connecting to the network.

Consumption subsidies help make service less expensive to existing utility customers on a continuing basis. Consumption subsidies may operate through the tariff structure (as a reduction in the price faced by all or some households), may appear as a percentage discount applied to customer bills, or may take the form of a cash transfer to reimburse households for utility expenditures.

Connection subsidies are one-time subsidies that reduce or eliminate the price that customers pay to connect to the system. (Komives, Foster, Halpern, & Wodon, 2005) (pages 8–10).

Concepts Specific to Results-Based Financing

Advance market commitment (AMC): A contract in which donors make a legally binding pledge to pay for a service, such as a new vaccine, if and when one is developed (Advance Market Commitment Working Group, 2005). Advance market commitments for vaccines aim to encourage the development and production of affordable vaccines tailored to the needs of developing countries. Through a forward-looking binding contract from donors and international agencies guaranteeing a viable market for target vaccines, AMCs encourage vaccine makers to develop or build manufacturing capacity for urgently needed vaccines. The binding contract guarantees a pre-agreed price for the first doses of vaccines sold to developing countries, so that companies can recoup their investment costs. In exchange, participating companies must guarantee to supply vaccines for the long term at a pre-agreed sustainably low price that developing countries can afford (GAVI Alliance Secretariat, 2010).

Carbon finance (CF): Resources provided to projects generating (or expected to generate) reductions in greenhouse gas (or carbon) emission in the form of the purchase of such emission reductions (World Bank Carbon Finance Unit).

Greenhouse gases (GHGs): Gases released by human activity that are responsible for climate change and global warming. The six gases listed in Annex A of the Kyoto Protocol are carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N20), as well as hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF6).

Emission reductions (ERs): The measurable reduction of release of greenhouse gases into the atmosphere from a specified activity or over a specified area, and a specified period of time.

Emission Reductions Purchase Agreement (ERPA): An agreement that governs the purchase and sale of emission reductions.

Certified Emission Reductions (CERs): A unit of greenhouse gas emission reductions issued pursuant to the Clean Development Mechanism of the Kyoto Protocol, and measured in metric tons of carbon dioxide equivalent.

Carbon credit: A certificate showing that a government or company has paid to have a certain amount of carbon dioxide removed from the environment (Collins English Dictionary).

Cash-on-delivery aid (COD): A financing arrangement through which donors offer to pay recipient governments a fixed amount for each additional unit of progress toward a commonly agreed goal: for example, $200 for each additional child who takes a standardized test at the end of primary school. That is, the donors pay "cash" only upon "delivery" of the agreed outcome. There are five key features of this proposal: (1) the donor pays only for outcomes, not for inputs; (2) the recipient has full responsibility for and discretion in using funds; (3) the outcome measure is verified by an independent agent; (4) the contract, outcomes, and other information must be disseminated publicly to assure transparency; and (5) this approach is complementary to other aid programs. (Birdsall, Savedoff, & Mahgoub, 2010).

Conditional cash transfers (CCTs): Programs that transfer cash, generally to poor households, on the condition that those households make pre-specified investments in the human capital (health, education, and welfare) of their children (Fiszbein, et al., 2009).

Feed-in tariff (FIT): An energy supply policy focused on supporting the development of new renewable energy (RE) projects by offering

long-term purchase agreements for the sale of RE electricity. These purchase agreements are typically offered within contracts ranging from 10 to 25 years and are extended for every kilowatt-hour of electricity produced. To better reflect actual project costs, the payment levels offered for each kilowatt-hour can be differentiated by technology type, project size, resource quality, and project location. Policy designers can also adjust the payment levels to decline for installations in subsequent years, which will both track and encourage technological change. In an alternative approach, FIT payments can be offered as a premium, or bonus, above the prevailing market price. Successful feed-in tariff policies typically include three key provisions: (1) guaranteed access to the grid; (2) stable, long-term purchase agreements (typically, 15–20 years); and (3) payment levels based on the costs of RE generation (Couture, Cory, Kreycik, & Williams, 2010).

Output-based aid (OBA): A mechanism to support the delivery of basic infrastructure and social services where policy concerns justify the use of explicit, performance-based subsidies. These policy concerns could include; positive externalities (a merit good such as health, sanitation, or education); or the inability of certain segments of society to pay for a service essential to maintaining basic human dignity (such as consumption of a minimum level of safe and clean water or energy) and achieving the Millennium Development Goals. At the core of the OBA approach is the contracting out of service provision to a third party—usually a private operator, but also possibly a publicly owned one or a nongovernment organization (Sustainable Development Network, 2006).

OBA ties the disbursement of public funding in the form of subsidies to the achievement of clearly specified results that directly support improved access to basic services (Mumssen, Johannes, & Kumar, 2010).

OBA draws on the experience and tools of public sector performance contracting and private infrastructure schemes. Service delivery is delegated to third-party providers under contracts designed to provide incentives for efficient, well-targeted service delivery, in part by tying a significant part of the compensation to delivery of specified outputs or results. Public funds from external donors or domestic tax revenues may complement user fees. (Brook & Petry, 2001).

Output-based disbursement (OBD): A mechanism for disbursements between federal governments and their regional/provincial governments that involve loans to federal governments, which in turn make disbursements to regional/provincial governments for the delivery of clearly specified outputs (Sustainable Development Network, 2006).

Output-based disbursement (OBD) mechanisms utilize a similar but distinct approach (to output-based aid (OBA). OBD specifically applies to government or public entities that do not operate on a commercial basis: to be precise, they do not meet the definition in Paragraph 1.8 (c) of the World Bank Procurement Guidelines. In this case, World Bank loans to the government are disbursed upon the achievement of clearly specified outputs (Global Partnership on Output Based Aid (GPOBA) and Procurement Policy and Services Department (OPCPR), 2008).

Payment for Environmental Services (PES). A voluntary transaction where a well-defined environmental service (ES) (or a land use likely to secure that service) is being "bought" by at least one ES buyer from at least one ES provider—if and only if the ES provider secures provision of the ES (conditionality). The five most common types of ES are listed below, along with examples:

1. Carbon sequestration and storage (an electricity company from a developed country

pays farmers in the tropics to plant and maintain additional trees)
2. Biodiversity protection (conservation donors pay local people to set aside or naturally restore areas to create a biological corridor)
3. Watershed protection (downstream water users pay upstream farmers to adopt land uses that limit deforestation, soil erosion, and flooding risks)
4. Landscape beauty (a tourism operator pays a local community not to hunt in a forest where tourists come to view wildlife) (Wunder, 2005).
5. Forest conservation (where, as in Costa Rica, new tree plantations, the development of related activities, and sustainable felling and the like are remunerated).

PES has been developed as a response to the failure of previous responses to environmental degradation as remediation or regulation. PES also be defined as a system (in which land users are paid for the environmental services they generate by those who receive the services.

Ecosystems can provide a wide variety of services. The environmental services derived from forest ecosystems, for example, typically include (but are not limited to):

- *Hydrological benefits: C*ontrolling the timing and volume of water flows and protecting water quality
- *Reduced sedimentation: A*voiding damage to downstream reservoirs and waterways and so safeguarding uses such as hydroelectric power generation, irrigation, recreation, fisheries, and domestic water supplies
- *Disaster prevention: P*reventing floods and landslides
- *Biodiversity conservation*
- *Carbon sequestration* (Pagiola & Platais, 2002).

The following definition adds another dimension: the impact on the market. Payment for Ecosystem Services (PES) is a market-conforming, innovative mechanism for allocating funds from the beneficiaries of ecosystem services to the providers of these services. PES mechanisms may be considered as a pragmatic response to a certain number of problems faced by traditional environmental policies, as discussed in the introduction: inadequate action with regard to land occupancy, low government budgets, complex instruments that are not in proximity with actors and territories, and the multiplication of regulatory and normative instruments (Laurans, Leménager, & Aoubid, 2012).

PES schemes require the valuation of selected ecosystem services, the identification of beneficiaries and providers of the services, and the set-up of a payment scheme that regulates the transfer of payments from beneficiaries to providers in return for maintaining the supply of the ecosystem service (Wageningen, 2006).

Results-based financing (RBF): Any program that rewards the delivery of one or more outputs or outcomes by one or more incentives, financial or otherwise, upon verification that the agreed-upon result has actually been delivered. Incentives may be directed to service providers (supply side), program beneficiaries (demand side), or both. Payments or other rewards are not made unless and until results or performance are satisfactory; and they are not used simply to buy recurrent inputs—although the service providers who receive the payments may use the funds to purchase inputs. In many cases, RBF payments are additional to the traditional or current sources of financing for inputs, as when providers continue to receive salaries and are also eligible for results-based bonuses. To further enhance capacity or quality, supplemental investment financing may be made available for some inputs, such as training and equipment.

Verification that results were actually obtained is an essential feature. The ideal is perhaps for verification to be undertaken by a neutral third party, even if the principal pays the corresponding costs, but many arrangements are possible. Ex ante verification (before payment) can be complemented by ex post assessment. The definitions of results or objectives and rewards are embodied in contracts between one or more principals who provide the incentives and one or more agents who contract to deliver the specified results, outputs, or outcomes. The contract may also specify varying degrees of collaboration between principal and agent, supervision of the agency by the principal, or other aspects of how the results are produced, such as protocols to be followed or targets to be met.

RBF is an umbrella term because the definition is general and characterizes various programs in many countries. Different labels exist for essentially the same concept or are associated with different incentives and payment arrangements (Musgrove, 2011).

Results-based financing for health (PBFH): A cash payment or nonmonetary transfer made to a national or subnational government, manager, provider, payer, or consumer of health services after predefined results have been attained and verified. Payment is conditional on the undertaking of measurable actions (Musgrove, 2011).

Take-or-pay: Under a take-or-pay provision, a buyer is obliged to either take delivery of (and pay for) a specified minimum quantity of goods over a specified period of time (such as X amount per year), or pay for the contract value of that minimum amount. The phrase "take-or-pay" is therefore slightly misleading, as the core concept is that the buyer "pays regardless of whether it takes." Such clauses are often used in circumstances where the supplier of goods or services requires certainty on the minimum income stream it will receive.

Take-or-pay clauses have been widely used in the energy industry, particularly in long-term gas or liquefied natural gas (LNG) supply or throughput agreements and gas transportation agreements, as well as in some power purchase agreements. They are often required by lenders to project-financed projects to ensure that the project company has confidence that it can service its debt obligations from project revenues (Ashurst LLP, 2012).

Appendix B

Objective–Result–Indicator Chains

Table B.1: Water Supply			
Demand Creation			
Objective	**Indicator(s) triggering payment**	**Provider**	**RBF tool that is potentially suitable**
People understand the benefits of using clean water	Households adopting the use of clean water. Households connecting to the water network.	Nongovernmental organizations (NGOs) Community-based Organizations (CBOs) Government agencies (GAs)	OBD CCT
Have effective Water Users Associations (WUA)	WUA established. WUA participates in decision making (determination of water charges, periodic discussions on subjects like operation and maintenance activities, service standards, etc.).	NGOs CBOs GAs	OBD
Abstraction			
Build and operate abstraction infrastructure	Infrastructure built according to standards (individual pumps, intakes, deep wells, etc.). Infrastructure properly operated and maintained according to standards.	Users Utilities	OBD Tariff structure/tariff regime
Reduce volume abstracted	Volume abstracted reaches an agreed figure. Volume abstracted is maintained at the agreed level.	Users Utilities	OBD Tariff structure/tariff regime Performance-based incentives/payments

(continued on next page)

Table B.1: Water Supply *(continued)*

Objective	Indicator(s) triggering payment	Provider	RBF tool that is potentially suitable
Transport and Distribution			
Build and operate transport and distribution systems	Conveyance system built according to standards. Conveyance system properly operated and maintained according to standards.	Utilities	OBD Performance-based incentives/payments
Reduce conveyance losses	Losses in the conveyance system reach a certain agreed level. Losses in the conveyance system are kept at or below the agreed level.	Utilities	Performance-based incentives/payments
Reliability of the conveyance system	Percentage compliance with the agreed service standards (service interruptions, quality standards).	Utilities	Performance-based incentives/penalties
Service Connection			
Facilitating access to piped water service	Number of water service connections to eligible households.	Utilities	OBA OBD
Facilitating access to communal water service	Number of standpipes, water points, etc.	Utilities NGOs	OBA OBD
Other			
Improving collection of water supply fees	Percentage collected out of total billing.	Utilities	OBD Performance-based incentives

Table B.2: Sanitation

Objective	Indicator(s) triggering payment	Provider	RBF tool that is potentially suitable
Demand Creation			
Increase the number of households seeking to improve sanitation conditions in their homes	Number of households with adequate latrines being used by its members	NGOs CBOs GAs	OBD CCT
Increase the number of villages or/communities achieving Open Defecation Free (ODF) status and maintaining it	Village or community is ODF. Village or community remains ODF.	GAs NGOs	CODA OBD
Improve hygienic behavior of households	Number of people adopting hygienic practices (washing their hands with soap after using latrines)	GAs	CODA

(continued on next page)

Table B.2: Sanitation *(continued)*

Objective	Indicator(s) triggering payment	Provider	RBF tool that is potentially suitable
Collection/access			
Facilitate access to on-site sanitation	Number of households with new adequate latrines (and septic tanks)	Users NGOs CBOs GAs Vendors	OBD OBA
Adequate servicing of on-site sanitation facilities	Number of latrines/septic tanks emptied for eligible households. Volume of waste removed.	Users NGOs CBOs GAs Vendors	OBD OBA
Facilitate access to sewerage services	Number of new sewer connections to eligible households providing adequate service	Utilities	OBA OBD
Facilitate access of communities to adequate sanitation services	Number of community toilets built. Number of community toilets properly operated and maintained. Number of eligible users.	NGOs CBOs Utilities Vendors	OBA OBD
Transport			
Ensure that waste is transported to adequate treatment facilities or discharge point	Number of latrines emptied for eligible households. Volume of waste transported to approved location. Number of transfer stations built and in adequate operation after a given period. Volume of septage collected at transfer stations. Length of new or rehabilitated sewerage systems.	Utilities Vendors	OBD OBA
Treatment			
Build, maintain, and operate decentralized wastewater treatment facilities	Volume of waste collected at plant and treated to required standard	Utilities	OBD Performance-based incentives/penalties
Build, maintain, and operate principal wastewater treatment plants	Volume of waste collected at the plant and treated to required standard	Utilities	OBD Performance-based incentives/penalties

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Table B.2: Sanitation *(continued)*

Safe Disposal/Reuse

Objective	Indicator(s) triggering payment	Provider	RBF tool that is potentially suitable
Build and maintain ecological toilets or biogas facilities	Number of ecological/biogas toilets installed/used. Volume of productive agricultural inputs generated. Energy generated.	NGOs CBOs Vendors	OBA OBD
Treat waste to standards required for reuse and deliver it to locations as required	Volume (or percent) of waste reused	Utilities	OBD Performance-based incentives
Other			
Objective	Indicator(s) triggering payment	Provider	RBF tool potentially suitable
Region obtaining ODF status and maintaining it	Number of communities/villages obtaining ODF status. Number of communities/villages retaining ODF status.	GAs	CODA
Improve financial viability of service providers	Increased collection of sanitation fees measured in percentage points of the total billing	Utilities	OBD

Source: Tables adapted from Tremolet (2011).

Irrigation

Following the value chain and the associated services, the potential objectives and associate indicators listed below can be identified, before moving on to selecting one or more as the one(s) that will trigger payments.

Many of these objectives could be an end objective or become an intermediate objective to achieving another one further down or up the chain. For instance, getting the farmers to adopt a new technology could be an objective that could lead to different higher objectives, such as reducing abstraction from certain aquifers or freeing water to extend the irrigated area (or both).

This reasoning is linked to the idea that, whenever possible, the beneficiaries should decide which way to achieve the ultimate objective—provided that an adequate decision making framework is in place. In this case, if the ultimate objective is the extension of the irrigated area, a certain amount could be paid for each hectare added to the irrigated system, provided that the aquifer is protected (either by keeping the abstraction volume fixed or setting the adequate abstraction rate if currently underexploited, and verifying the situation from time to time); then farmers, Water Users Associations (WUAs), government agencies, and other stakeholders will decide how to achieve the objective. In so doing, they may set a specific way to assign resources and make disbursements.

They may adopt, for instance, a results-based approach within the framework of the initial, higher level agreement described above. Potential ways to achieve the higher level objective could be:

- Increasing abstraction of an underexploited aquifer;
- Lining canals, thus reducing conveyance losses and rising domain;
- Adopting less water-intensive crops; adopting more efficient irrigation technologies; or
- A combination of the above.

The stakeholders could decide to set objectives and indicators for the way selected and set a payment system based on them. However, stakeholders might lack the capacity to select the preferred option and would prefer the full system be designed and embedded in the financing agreement with the lending institution. In such case, the design of the lending project could follow the same outline indicated above, only disbursements from the financing institution (the World Bank or others), would take place when each of the objectives is fulfilled.

Table B.3: Irrigation Demand Creation

Objective	Indicator(s) triggering payment	Provider	RBF tool potentially suitable
Farmers understand the benefits of irrigation and drainage (other topics could be added like selection of most valuable crops, use of adequate fertilizers in the right quantities, etc.)	Farmers adopt crops irrigation (and other associated elements). Farmers maintain adequate irrigation and farming practices.	NGOs CBOs Gas	OBD CCT
Have effective Water Users Associations (WUA)	WUA established. WUA participates in decision making (determination of irrigation charges, supervision of operation and maintenance activities, priorities for training of farmers, etc.).	NGOs CBOs Gas	OBD
Farmers adopt new technologies or irrigation practices (new, more efficient (solar) pumps, drip irrigation, etc.)	New technology or irrigation practice is in place. Equipment is properly used and maintained and/or new practices are continued	NGOs CBOs Gas	OBD CCT

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Table B.3: Irrigation *(continued)*

Objective	Indicator(s) triggering payment	Provider	RBF tool potentially suitable
Abstraction/storage			
Build and operate irrigation dams	Dam built according to standards. Dam properly operated and maintained according to standards.	Irrigation companies/ authorities	OBD Tariff structure/tariff regime
Build and operate individual irrigation systems	System built (pump installed, internal piping or canals built)	Users Vendors	OBA
Reduce volume abstracted	Volume abstracted reaches an agreed figure. Volume abstracted is maintained at the agreed level.	Users Irrigation companies / authorities	OBD Tariff structure/tariff regime Performance-based incentives/payments
Maintaining the storage capacity of irrigation dams	Dam capacity measured periodically remains at the agreed level. Dam capacity remains above certain minimum level and below a maximum level. Amounts paid depend on the actual capacity between those two levels.	Irrigation companies/ authorities	OBD Performance-based incentives/payments
Reliability of abstraction system	Daily volume of water available at the intake of the conveyance system meets the agreed figure	Irrigation companies/ authorities	OBD Performance-based incentives / payments
Transport and Distribution			
Build and operate transport and distribution systems	Conveyance system built according to standards. Conveyance system properly operated and maintained according to standards.	Irrigation companies/ authorities	OBD Performance-based incentives/payments
Reduce conveyance losses	Losses in the conveyance system reach certain agreed level. Losses in the conveyance system are kept at or below the agreed level.	Irrigation companies/ authorities	OBD Performance-based incentives/payments
Reliability of the conveyance system	Number of farmers receiving irrigation water as agreed	Irrigation companies/ authorities	OBD Performance-based incentives/payments

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Table B.3: Irrigation *(continued)*

Farm Intake/internal Irrigation System

Objective	Indicator(s) triggering payment	Provider	RBF tool potentially suitable
Connecting farmers to the irrigation system	Number of farmers connected to the irrigation system	Irrigation companies/ authorities	OBA
Farmers adopt new technologies or irrigation practices (new, more efficient (solar) pumps, drip irrigation, etc.)	New technology or irrigation practice is in place. Equipment is properly used and maintained and/or new practices are continued.	WUAs NGOs CBOs Gas Irrigation companies/ authorities	OBD CCT
Reduce water consumption	Volume of irrigation water used reaches a certain agreed level. Volume of irrigation water used remains at a certain agreed level.	Users Irrigation companies/ authorities	OBD Tariff structure/tariff regime Performance-based incentives/payments
Water reuse	Volume of water reused	Users Irrigation companies/ Authorities	OBD CCT
Avoid salinization of the soil	Level of salts in soil is kept at a certain level	Users	OBD
Have a proper drainage system	Drainage system built Drainage system maintained	Users Irrigation companies/ authorities	OBD OBA
Other			
Objective	Indicator(s) triggering payment	Provider	RBF tool potentially suitable
Improving collection of irrigation fees	Percentage collected out of total billing	Irrigation companies/ authorities	OBD
Provision of extension services			OBD

Table B.4: Hydropower

Objective	Indicator(s) triggering payment	Provider	RBF tool potentially suitable
Minimize negative environmental impact	Environmental protection plan in place. Completion of environmental compensation measures. Completion of development activities according to environmental protection plan.	Authorities Developers Utilities	OBA PES
Smooth resettlement	Number of inhabitants having signed up for the compensation program during the period considered. Number of inhabitants having effectively moved out during the period considered.	Developer agency / utility	OBD
Completion resettlement	Number of completed new accommodations. Satisfactory inspection of the new accommodations two years after delivery.	Developer Agency/ utility	OBD

Table B.5: Flood Protection/Prevention

Objective	Indicator(s) triggering payment	Provider	RBF tool potentially suitable
Reduce chances of occurrence of a flooding event	Policy/permits stimulating building according to flood resilient standards in place and enforced. Policy/permits stimulating building that include some flood prevention facilities in place and enforced. Percentage of kilometers drainage canals open up to certain standard during certain time.	Authorities Developers Utilities	OBA PES
Reduce the impact of a flooding event	Measures to flood-proof key/vital infrastructure (hospitals, etc.) in place. Set-up and tested early warning systems. Percentage of people reached out of total during testing. Emergency preparedness plans in place. Percentage of available capacity exit roads in place out of capacity exit roads required.	Authorities	OBA

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