Sustainable Water Integrated Management (SWIM)

Expert Facility Activity No EFS-LB-2

Procurement of PPP in the Water/Wastewater Sector

Day 2 – Session 2.3:
The DB(X) Options – Key Elements

by
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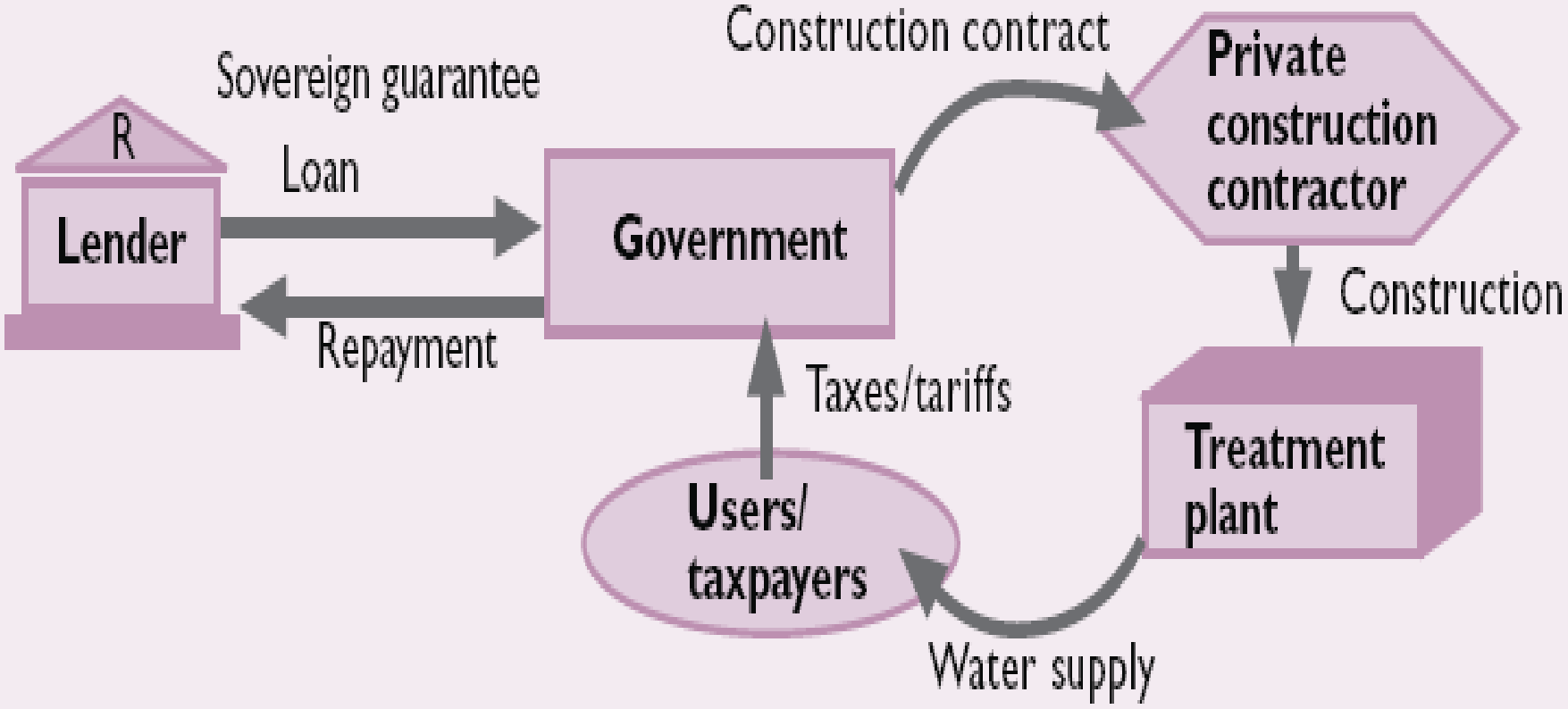
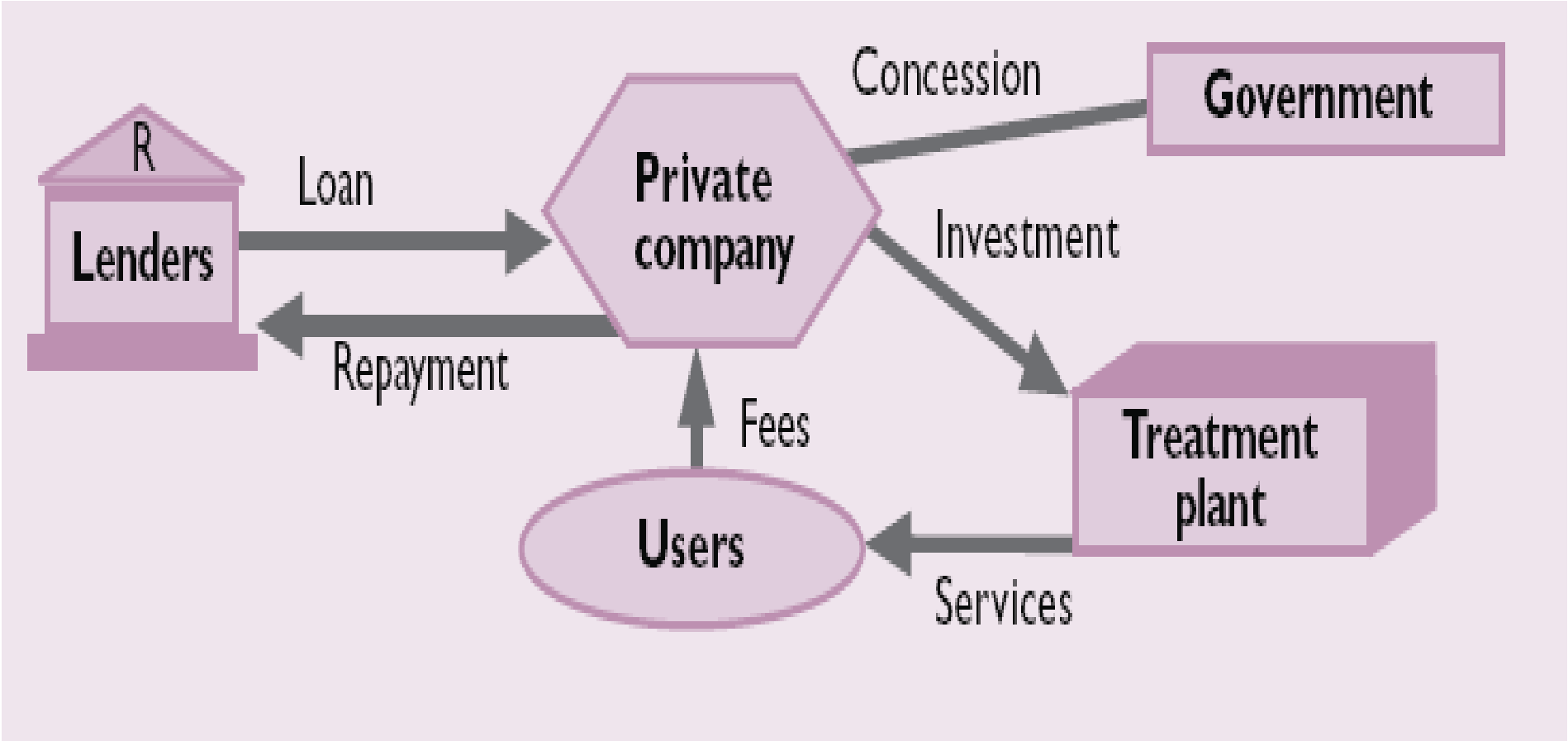
24 - 26 April 2018, Beirut (Lebanon)

Public Finance Structure



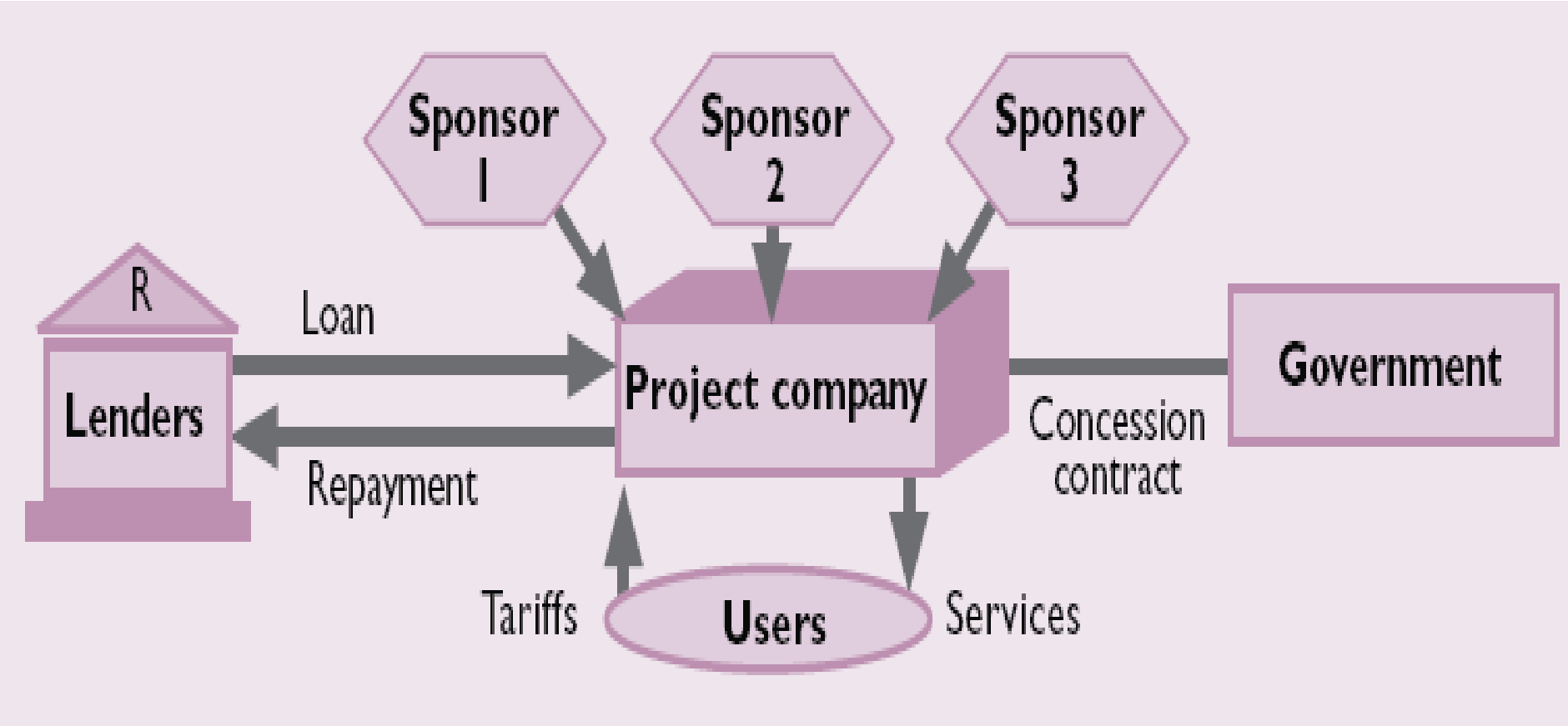
Source: Project Finance Manual, National Treasury South Africa 2001

Corporate Finance Structure



Source: Project Finance Manual, National Treasury South Africa 2001

Project Finance Structure



Source: Project Finance Manual, National Treasury South Africa 2001

Design – Build – Operate

DBO

The DBO Scheme

- BOT's differ from Design, Build and Operate (DBO) contracts in that financing and asset carrying is provided.

- DBO's aim at guaranteeing BOT advantages with limited risk and complexity,
  no private finance

- Successful cases include North America, China, India

DBO contracts main features

- Example of performance requirements:
  - **Output quality** – Discharge water quality compliant with set standards
  - **Output quantity**
    - A minimum production rate of XX m^3/day as an average across the year, and of a minimum of YY m^3/day as an average during peak demand period
    - Guaranteed Maximum Sludge quantity production (in kg of sludge dry solids contents per kg of COD at WWTP inlet)
    - Etc.

  - **Output efficiency / Inputs control**
    - Guaranteed Maximum Energy Consumption Rate (in kWh/m^3 of water produced by the WTP, in kWh per kg of COD at the WWTP inlet, etc.)
    - Guaranteed Maximum Chemicals Consumption Rate (in kg/m^3 of water produced by the WTP, in kg per kg of COD at the WWTP inlet, etc.)
    - Guaranteed Minimum Sludge Dry Solids contents (in percentage)
    - Etc.

Performance requirements can be translated into
Key Performance Indicators (KPI)
Ease for monitoring and application of performance damages

Typical Risks in DBO contracting

Project Name:
Updated on :

DBO - Greenfield Project Risk Matrix - FIDIC Gold Book based

Risk reference			Risk details			Risk assessment			Risk mitigation
No.	Risk Category	Risk name	Risk description	Potential cause(s)	Risk impact	Probability (2)	Impact (3)	Risk Score (4)	Mitigation measure(s)
1	Cross-cutting	Contractor's Insolvency	Contractor becomes insolvent and enters into liquidation during the DBO contract life	Various	Impossibility for the Employer to recover outstanding debt / Contract terminated as uncompleted, additional costs incurred in completion the project	TBD	TBD	TBD	Pre or post-qualification based on financial strength List of on-going disputes & amounts at stake, so as to assess what would be the impact on the Contractor's net worth if all disputes are rules against the Contractor Annual checks of the DBO Contractor financial net worth / Termination if negative Parent Company Guarantee Collateral Warranties ?
2	Cross-cutting	Legal risk	The Contract drafting introduces ambiguities and discrepancies	Drafter skills	Contract interpretation difficulties	TBD	TBD	TBD	Contract to be legally reviewed, by a Law firm or an individual Lawyer who is familiar with both the FIDIC Gold Book conditions and the provisions of the governing law (this can be met by a team of 2 laywers if necessary), before the bidding document is finalized and the bidding process starts
3	Cross-cutting	Legal risk	The Contract drafting does not reflect mandatory provisions of the Governing law	Drafter not aware of the governing law	Illegal provisions in contract	TBD	TBD	TBD	
4	Cross-cutting	Dispute risk	Disputes in between the Parties occur during the DBO contract life	Contract ambiguities / Posturing of the Parties / Etc.	Cost and delays / Project jeopardized if disputes are piling up	TBD	TBD	TBD	Earmark a project budget - to be reflected in a Provisional Sum - for a Dispute Adjudication Board (DAB) mobilization from the outset of the contract - see JICA Dispute Board Manual Monitor that the DAB is actually set-up under the project / Possibility of linking ADB Loan disbursement tranche to proof of mobilisation?
5	Cross-cutting	Injury, death & physical damage or loss	Personal injury / Physical damage caused to the Works or third party property	Defective design, bad workmanship or defective materials used by the Contractor	Injuries / Deaths / Damages / Losses	TBD	TBD	TBD	Pre or post-qualification based on Contractor's skills and experience Health & Safety at work procedures Contractor's insurances
				Employer's acts or omissions					Health & Safety at work procedures Contractor's insurances
				Exceptional Events (eq. Force majeure)					Check insurances applicability
6	Cross-cutting	Contract misadministration	Employer fails to administer the Contract properly	Lack of sufficient skilled & experienced resources	Project cost and time overruns	TBD	TBD	TBD	Mobilize a skilled & experienced Consulting Firm to act as Employer's Representative under the DBO Contract Training to the Employer and the Consultant regarding DBO contract specificities
7	Cross-cutting	Changes in Laws and Regulations	Changes affect the DBO Contract	New taxation regime, water discharge standards, etc.	Project cost and time overruns	TBD	TBD	TBD	Postpone bidding process and contract start if change is imminent (for instance: a new bill being discussed in Parliament)

Typical DBO Contracts Risk Matrix

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Updated on :

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8	Cross-cutting	Contractor's non-excusable delays	Contractor is late in executing its obligations	Defective design, bad workmanship, defective materials used by the Contractor, defective management	Project cost and time overruns	Pre or post-qualification based on Contractor's skills and experience Delay liquidated damages Breaking down the project delivery schedule into individual intermediary progress milestones, allowing easier progress monitoring / with LD's attached to each main milestone Detailed Programme Requirements to be complied with by the Contractor (critical path programme, number of levels, tasks per level, logic links, etc.) Employer's capacity to administer the Contract properly, and use its relevant provisions in such delay situations (see GCC SC 9.3, 9.5, 10.6, 15.1, 15.2)
9	Cross-cutting	Permits & authorizations	Permits & authorizations are not timely obtained	Parties unaware of their legal & regulatory obligations	Project cost and time overruns	Clear identification of permits & authorization requirements in the Employer's Requirements, and allocation of responsibilities in between the Parties Early involvement of relevant local Authorities in the project (Advisory/Stakeholders committee?)
10	Cross-cutting	Insurances	Insurance gaps	Lack of knowledge and awareness as to the insurance applicable regime	Cost overruns	Carry out a full project insurance check before the project implementation / Liaise with insurance brokers / If necessary mobilize Insurance specialists (individual, firms)
11	Procurement	Rushed procurement process	Hasted procurement process which does not allow a competent Contractor to reasonably price his bid	Political pressure / Will to catch-up with project delays	Increase of Contractor's "No Go", or risks premium	ADB Project officer and Consultants to advise against such practices SBD to stress this risk

Typical DBO Contracts Risk Matrix

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12	Procurement	Capacity of the evaluation team	The evaluation team is not skilful and experience enough	Lack of sufficient skilled & experienced resources	Missing Bid's shortcomings or added value/benefits	Mobilize skilled & experienced Consultants under a time-based consultancy services contract
13	Design Build	Input data & site conditions	Errors or omissions as to the site conditions or input data (raw water for a WTP, incoming wastewater loads & flows for a WWTP)	No or not enough surveys & investigations done during project preparation	Contractor's claims for time and money	Perform site investigations and surveys (flow & loads measurement campaign on a wastewater network, geotechnical surveys, topographical surveys, etc.) - extent defined based on a cost-benefit analysis (cost of surveys vs. costs of Contractor's claims) Possible option to transfer the residual unforeseeable physical conditions risk to the Contractor for a discrete/limited footprint Site such as WTP/WWTP
14	Build	Weather risk	Inclement weather conditions	Exceptionally adverse climatic conditions	Project time overruns	Define precisely what means "exceptionally adverse climatic conditions", typically through the Employer's Requirements. As much as possible use reliable and objectively verifiable measures (meteorological station for instance, if locally found reliable)
15	Build	Land clearance for access to the Site	Contractor is prevented to have access to and/or possession of the Site	Uncompleted Resettlement Action Plan / Disputes with local landlords	Contractor's claims for time and money	Land clearance and RAP completed before contract start If not possible, define Sections of the Works (having each a specific time for access - see GCC SC 2.1 - and a specific Time for Completion) with first Sections being those where access is cleared

Typical DBO Contracts Risk Matrix

Project Name:
Updated on :

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Risk reference			Risk details			Risk mitigation
No.	Risk Category	Risk name	Risk description	Potential cause(s)	Risk impact	Mitigation measure(s)
16	Operation	Under-performing facility	Performance standards are not met (water quality, energy consumption, chemicals consumption, etc)	Defective design, bad workmanship, defective materials used by the Contractor, defective management	Complaints from users Fines from Authorities Cost overrun over the residual life of the facility after DBO contract completion	Pre or post-qualification based on Contractor's skills and experience Key Performance Indicators and associated performance damages Option of Performance incentives Employer's capacity to administer the Contract properly and to take the necessary actions under the Gold Book when this situation is encountered
17	Operation	Availability & suitability of inputs from the Employer (raw water, wastewater, personnel, power, etc)	Incoming wastewater of actual flows & loads differing from values defined in Contract	Discrepancy in between foreseen and actual input conditions	Facility not meetings its performance standards Contractor's claims for time and money	Perform site investigations and surveys (flow & loads measurement campaign on a wastewater network, etc.) - extent defined based on a cost-benefit analysis (cost of surveys vs. costs of Contractor's claims)
18	Operation	Asset replacement	Assets are to be replaced earlier than expected while the DBO contract has ended	Defective assets Operation service period ends before the expiry of the design life span of most	Cost overrun over the residual life of the facility after DBO contract completion	Have operation periods which are greater than the life span of majority of the assets Claim founded in contract if cause of action accrues before the end of the statutory limitation period

Payment regime

Lump sum amount for the Design-Build of the Works

Fee for Operation Service

Asset Replacement Fund

Payment regime - Operation

- Electricity payment principles

Electricity market price = Employer's risk	Electricity consumption = Contractor's risk

- Monthly payment process – Employer pays the amount of electricity bill paid by the Contractor to the local power supplier, **up to the level corresponding to the Guaranteed Maximum Energy Consumption**

Guaranteed Maximum Energy Consumption =
Guaranteed Maximum Energy Consumption Rate (kWh/m^3)
(*from Contractor's Schedule of Performance Guarantees*)
X
Monthly production (m^3)

Payment regime - Operation

- Electricity payment principles

- What if actual consumption is lower than Guaranteed Maximum Energy Consumption ? Annual performance review, and savings equally shared in between the Parties => Incentive for the Contractor to do better than committed

Savings
=
Price which would have been paid for Guaranteed Maximum Energy Consumption
-

Similar principles can be used, as deemed relevant, for chemicals…

Build – Operate – Transfer

BOT / DBOF

Build-Own-Operate-Transfer (BOT)

✓ Long term contract with Client

- for finance and construction of facility and connection to (single) off-taker (new build – green field)
- for delivery of service

Characteristics of a BOT

- ✓ Typical PPP solution for bulk services such as a water or wastewater treatment plant

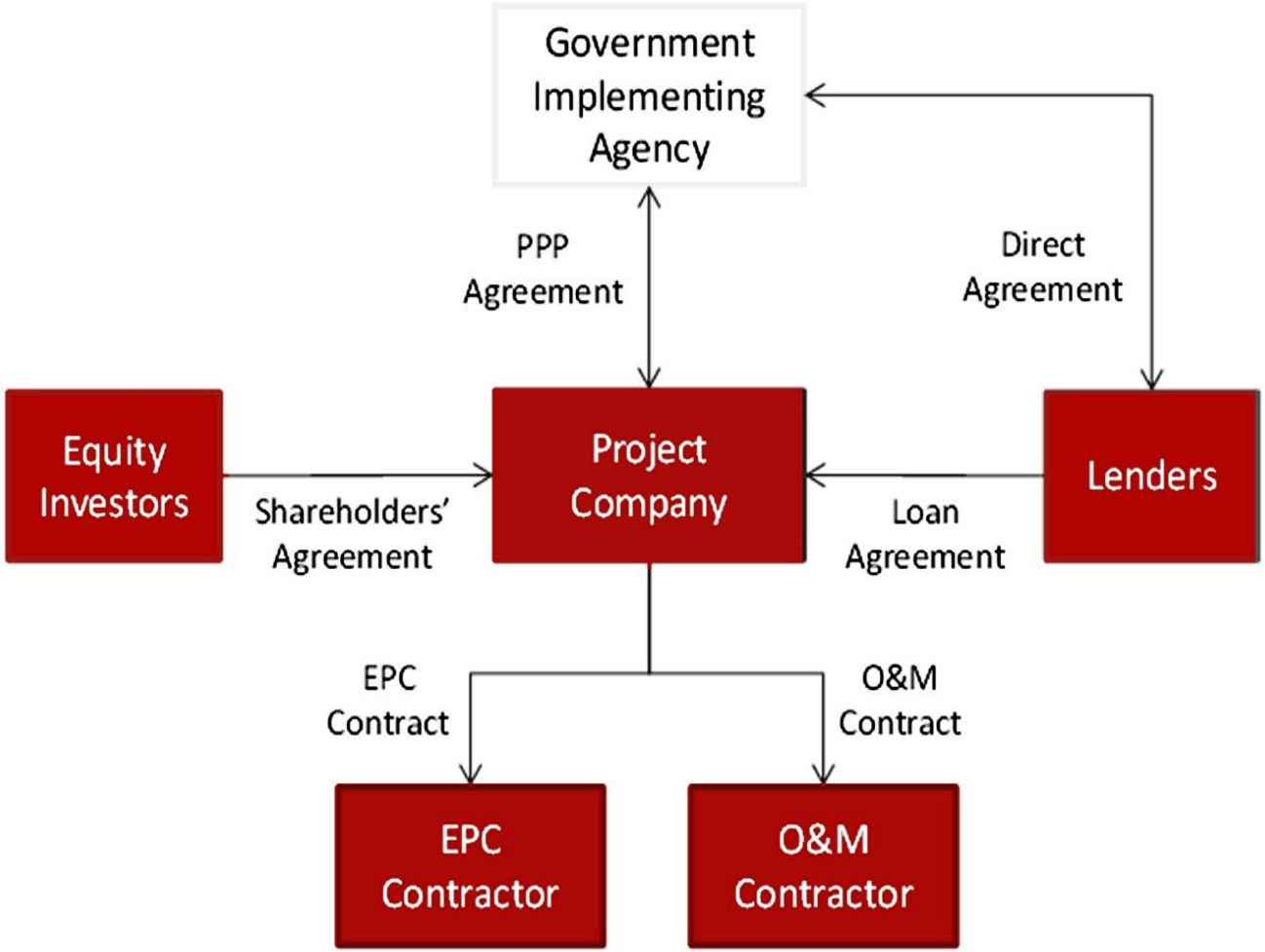
- ✓ Private partner Designs, Builds and Operates and Finances (DBOF) facility for a certain period and at the end of the contract returns it to the Client (payment for investment & operation over contract life).
  - The client is paying for cubic of water and not for a plant
  - The client is committed to buy a minimum quantity of water at an agreed price (take or pay concept)
  - Contract duration must be long enough to permit amortization (15-25 years)
  - Contract of results - Performance specification
  - Construction and operation risks transferred to private operator

Typical scenario for a BOT for water production capacity augmentation

- ✓ Bulk water supply can not meet demand, new capacity is needed
- ✓ Distribution system is functioning well, low Non-Revenue Water (NRW) (ILI below 10)
- ✓ Tariffs allow full cost recovery or can be raised to do so
- ✓ Sector conducive to private sector participation, with political support

Typical PPP structure in Project Finance - 1

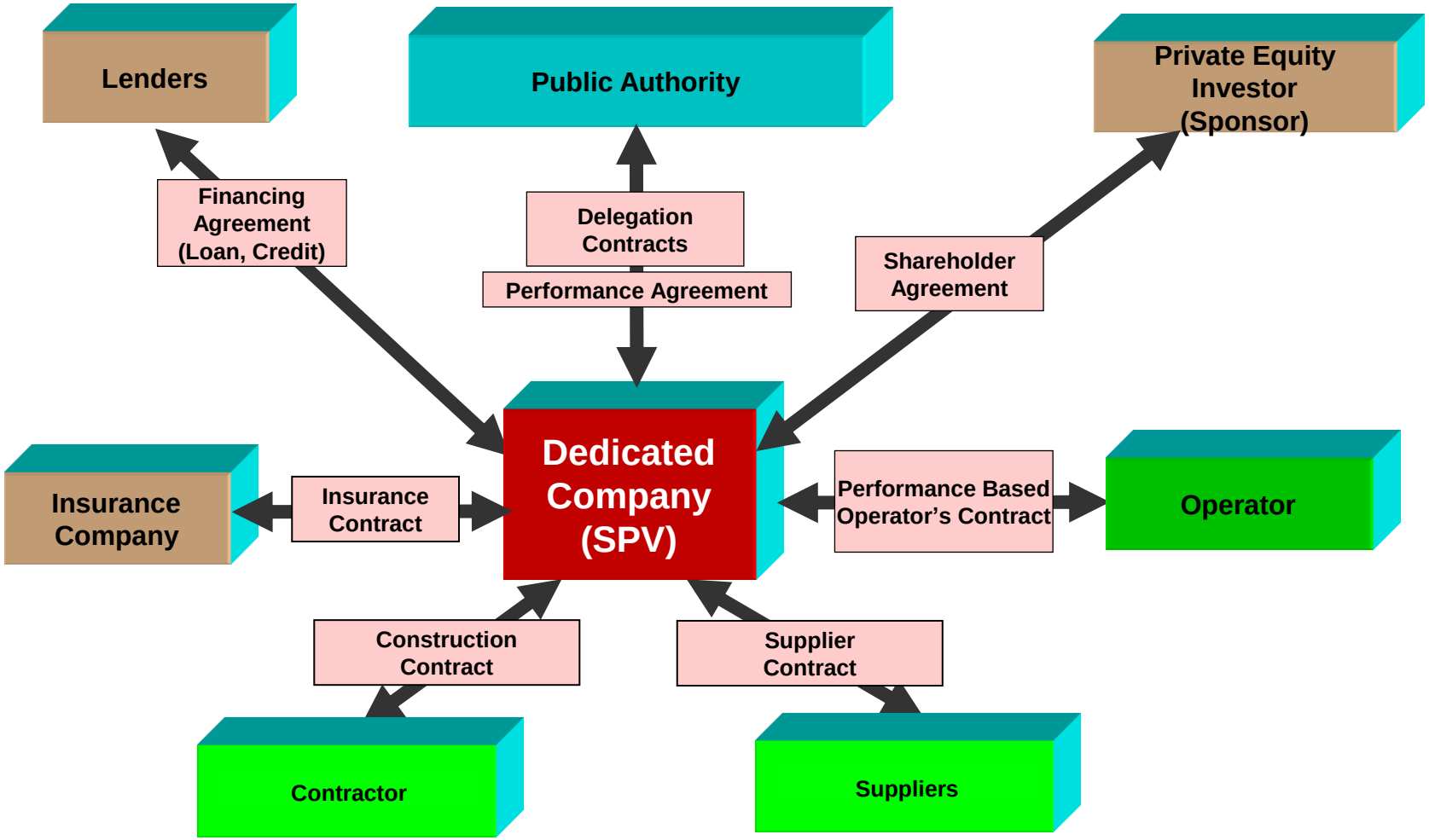
A repartition of risks



Source: WBI - PPIAF (2012): PPP Reference Guide

Structuring of PPP in Project Finance - 2

A repartition of risks



Source: Sarah Botton (CEFEB), 2011

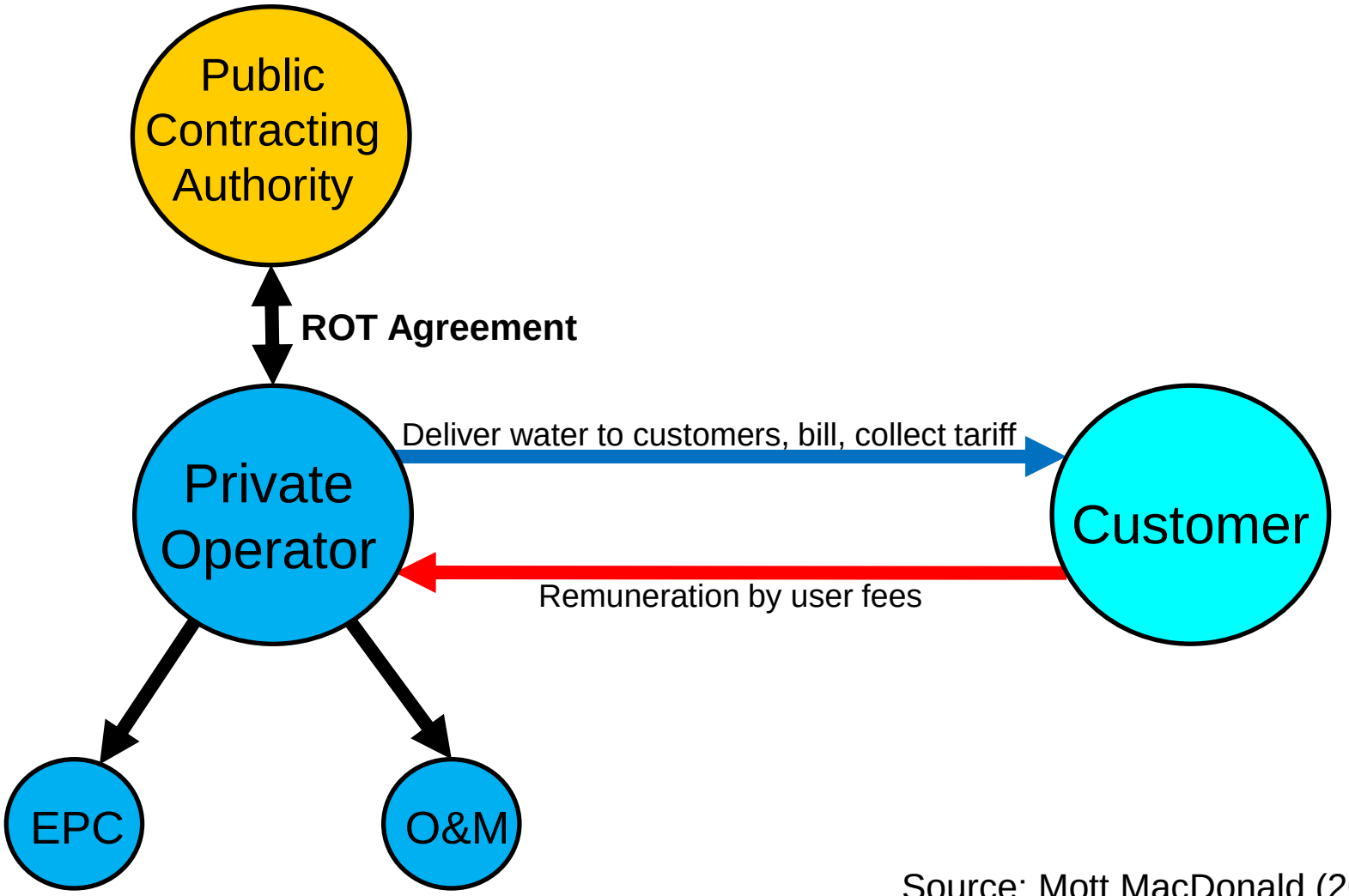
Payment mechanisms

- **Simple Take-or-Pay**
  Pay for specified minimum quantity regardless of whether off-taker takes it or not

- **Hybrid Take-or-Pay** / two-part charge
  - Availability or capacity charge: This could be broken down into capital charge and fixed-O&M charge
  - Variable or volumetric charge: Per cubic meter (electricity for pumping and chemicals for treatment)

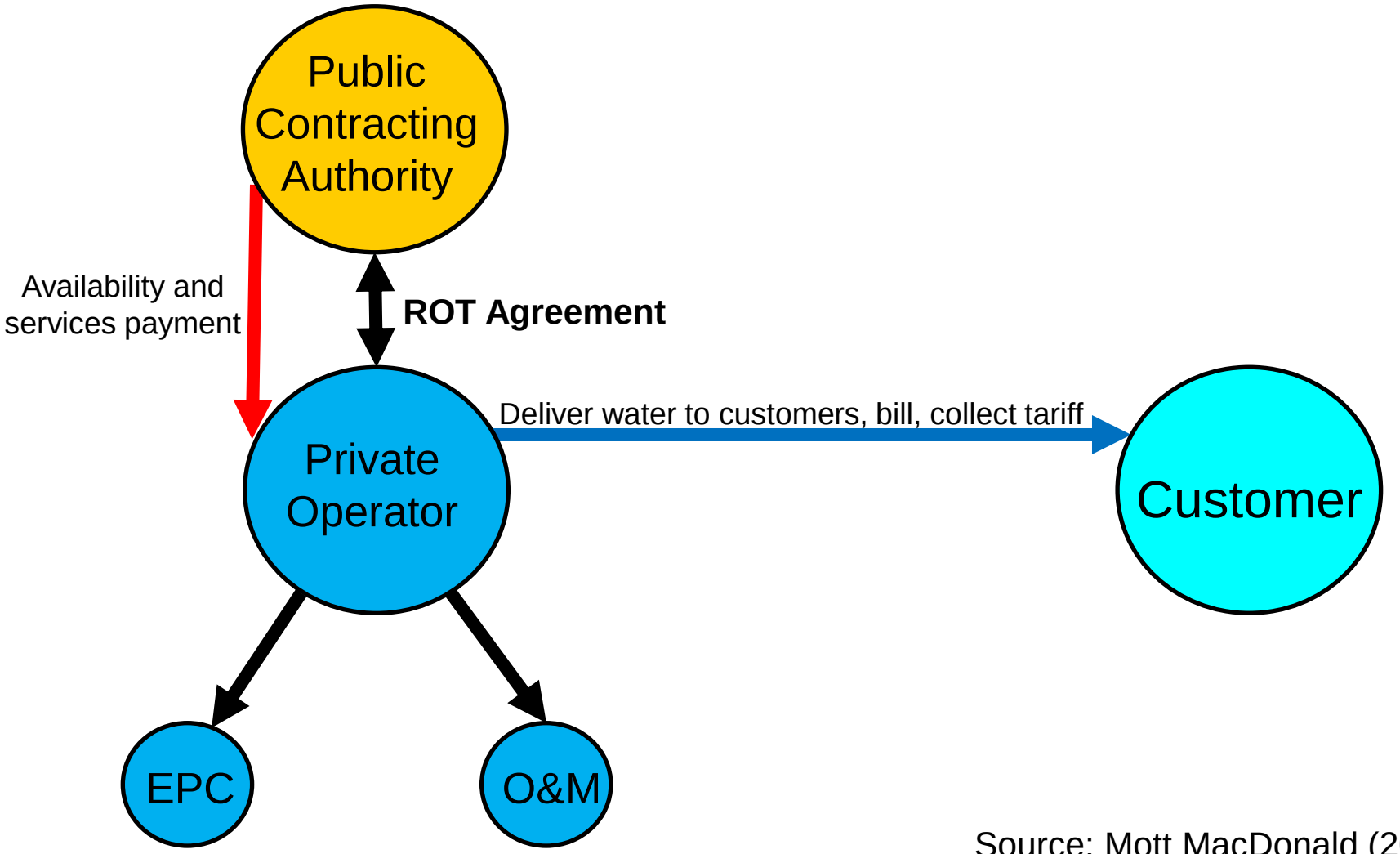
Important impact either way if off-taker does not take the available water – increases the effective unit price, then who pays?

The ROT option, proposed for Mombasa / Option 1



Source: Mott MacDonald (2017)

The ROT option, proposed for Mombasa / Option 2



Source: Mott MacDonald (2017)

The Bulk Water Function: Issues to be addressed

- ✓ Contractual arrangements between bulk and retail supplier
- ✓ Water resource management, groundwater - desalination
- ✓ Bulk water tariff regulation: cost recovery by design?
- ✓ Financial viability and creditworthiness of the bulk supplier: facilitating access to private sector finance (DB[X])
- ✓ Risk analysis and mitigation, including risk of non-payment by off-taker (retail supplier)
- ✓ The issue of retail supply along transmission lines can be a '*deal breaker*' …

The bulk water tariff

- **The bulk water tariff is a powerful instrument to reduce NRW in retail supply.**
- Double bulk metering is required at points of delivery of bulk to retail supply. Double bulk metering with well-defined procedures in the purchase agreement is a way to address eventual disputes.
- Unbundling can enable a better understanding of costs per function.
- A surcharge to the bulk water tariff would provide a mechanism to subsidize access to the distribution network for low-income communities.
- **The bulk water tariff should be assessed based on a financial model.**

BOT Major Risks

- **Construction risks**
  - ***Delay, costs overruns, penalties***
  - ***Non-acceptance of the plant by the Client***
- **Operation risks**
  - ***Non-performance of the plant,***
  - ***Penalties, costs overruns***
- **Financial risks**
  - ***Non-achieved equity returns expectations,***
  - ***Financial support to the Lenders in case of SPC default***

Risks on which the Project Company has little leverage

- *Revenue - Demand Curves = Revenue sufficient to cover costs*
- *Exchange - Revenue in Local Currency - Costs in Foreign Currency*
- *Interest Rate - Variations impact costs*
- *Financing - Availability of Finance when needed*
- *Floods, Earthquakes etc.*
- *Political - Changes in laws etc.*
- *Regulatory – tariffs or standards*

Currency Issues

- Availability
- Convertibility
- Transferability
- Exchange rates, devaluation and currency mismatch

Political Stability

- Change of law risk
- Change of tax risk
- Political intervention / interference
- Consumer resistance
- Nationalization and expropriation
  - Creeping expropriation
  - Breach of obligations

The As Samra BOT, Jordan

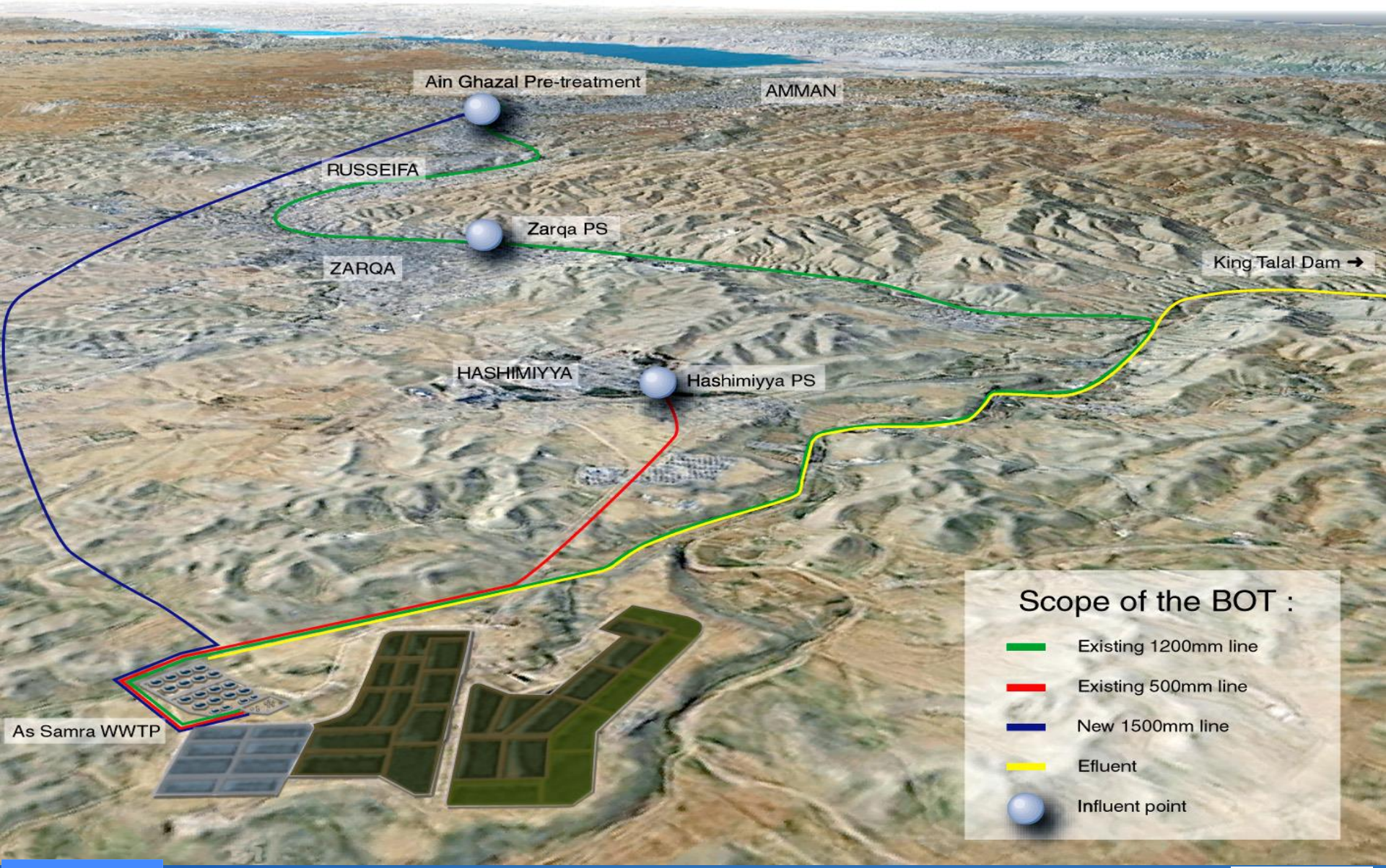
Case: As Samra, Jordan

- ✓ Brownfield BOT waste water treatment
  - Design, build and finance a wastewater treatment plant at As Samra and the extension of the pre-treatment plant of Ain-Ghazal, capacity of 267,000 m^3/day (Increase capacity of existing plant from 68,000 m3/day to 268,000 m3/day)
  - US$169.5 million construction cost, financial close in December 2003
  - A concession of 25 years was given to the SPC with a 3 year construction period (2004-2007)
  - Population served: 2.2 million people (80% of Jordan's waste water)
- ✓ Challenges
  - First water sector BOT project in Jordan
  - Need for government and donor financing
- ✓ Lessons learned
  - The first project is tough, it took 18 months to reach financial close
  - Need to create consensus in government and with external funders
  - Legal reform process in parallel, key to bringing in private investment

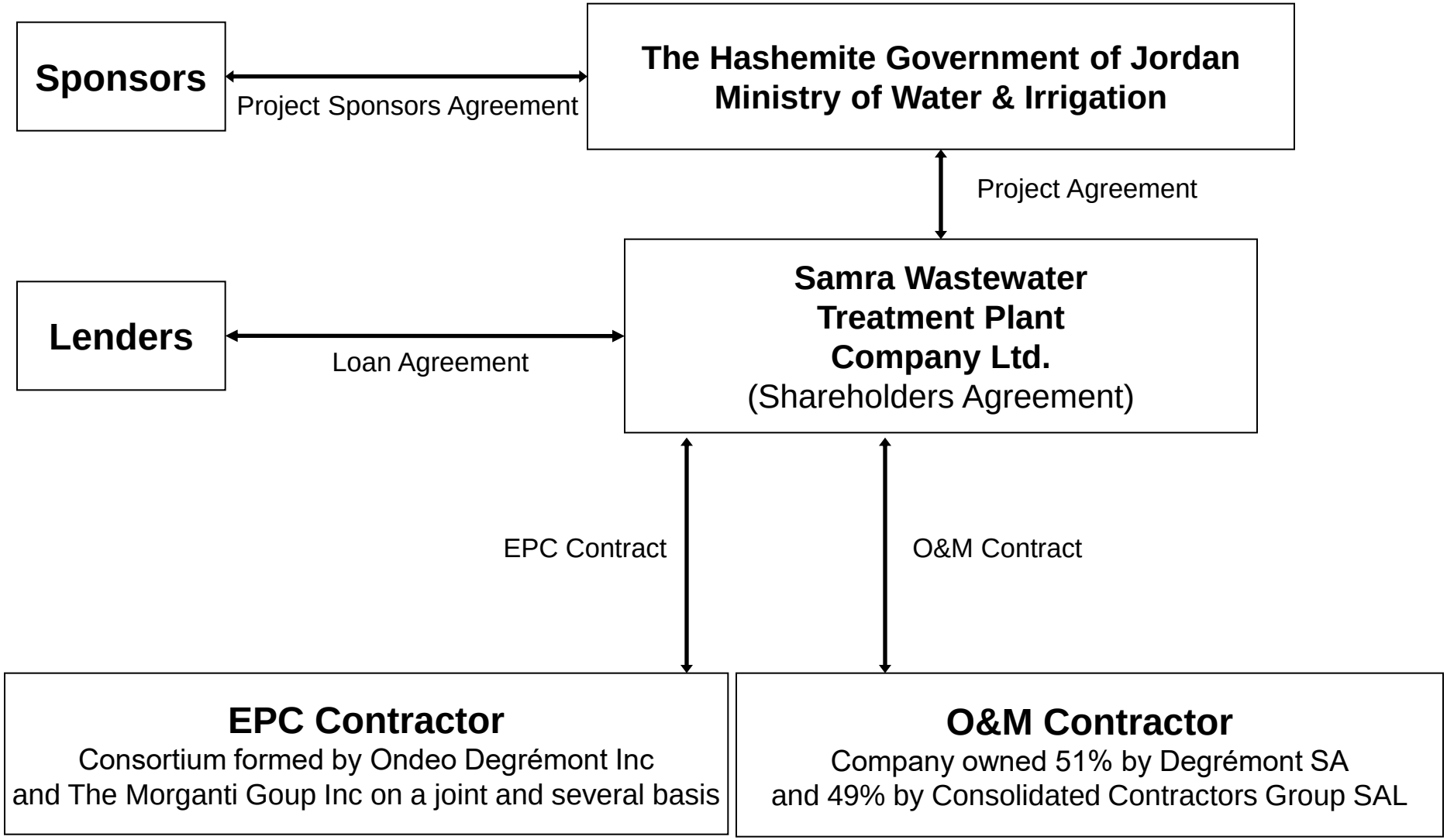
A necessity and an environmentally friendly project

- The As-Samra wastewater ponds are overloaded and cannot treat wastewater efficiently
- The new system will notably improve effluent quality and air quality, reduce groundwater pollution
- A sustainable approach (effluent suitable to irrigation, production of compost, green electricity production).
- The environmental and social benefits are further evidenced by the support from the United States Agency for International Development

Situation


Ain Ghazal Pre-treatment
AMMAN
RUSSEIFA
Zarqa PS
ZARQA
King Talal Dam ➜
HASHIMIYYA
Hashimiyya PS
As Samra WWTP
Scope of the BOT :
Existing 1200mm line
Existing 500mm line
New 1500mm line
Efluent
Influent point

Contractual Framework



Project Development

- ✓ 21 different financial scenarios were analyzed (corporate finance, private finance and mixed financing with and without grants at different levels)
- ✓ Best case feasible and attractive PPP scenario was selected with the following assumptions:
  - an estimated required 18% ERR.
  - 50% Grant Funds
  - 20% Private Sector Equity
  - 30% Private Sector Commercial Loans
  - Fixed currency exchange rate (JOD vs USD)
  - Inflation rate 3%
- ✓ On February 2000: USAID issued Implementation Letter to MWI for $75M commitment for the project. (Increased later to USD 92M due to increased scope)

Success Factors

- ✓ Maximum leverage obtained though USAID involvement (USD 92 Million contribution)
- ✓ Strong & Competent Project Management (High level support, Legal, Technical & Financial advisors, and USAID involvement)
- ✓ Bankability (12% tariff increase, USAID financial contribution & Securities)
- ✓ Risk Sharing
- ✓ Clear & transparent procurement procedures
- ✓ Experienced advisers to the Government
- ✓ The first project is tough, it took 18 months to reach financial close
- ✓ Legal reform process in parallel, key to bringing in private investment

Risk of over-estimating demand in a BOT

Problem of overestimation of demand in a BOT project

Case: the Izmit (Turkey) water supply BOT (build-operate-transfer)

Izmit (Turkey) water supply BOT

- Largest bulk water BOT in the world at that time, and first in Turkey: Greater Izmit Municipality
  - Rapid pop. growth; hence need for water
    1990: 583,000; 2000: 723,000
  - Also, ecological degradation of natural lake being overdrawn for industrial water supply

- Started out as public sector project; but not enough financing available

- Originally planned largely for City of Istanbul
  Istanbul decided against this; cost of water would be too high

Izmit (Turkey) water supply BOT

- Negotiated deal
- Three-year construction period
- Thames Water was promoter with majority stake
- 15 year duration after commissioning
- Contract signed 1995; effective in April 1996
  - SPV (i.e. PPP company): Izmit Water Company
  - Investments costs: about US$900 million
  - Operation and purchase contract
  - Take-or-pay minimum payment; guaranteed by Treasury

Izmit (Turkey) water supply BOT: *problems*

- ✓ High leakage of water in some areas, up to about 70% NRW (leaks and illegal connections)
- ✓ Water price high
- ✓ Couldn't sell the water to Istanbul water company
- ✓ Treasury had to pay US$390m to company in 1999 and 2000. Payments have continued (at some level)
- ✓ In 2002, Turkish Court of Accounts said plant cost too much, BOT model unsuitable, and **expected offtakers failed to materialise since the water was too expensive**
- ✓ Reported that former and present Turkish Treasury officials were investigated for possible misconduct in approving the government guarantee

Thank you