CBA Forum meeting on Environment sectors

Focus – topics of discussion in water sector

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Brussels, 12 May 2017

Regulation 2015/207

Compliance with the full-cost recovery principle includes that:

(1) tariffs should aim as far as possible to recover the capital cost, the operating and maintenance cost, including environmental and resource costs;

(2) the tariff structure maximises the project's revenues before public subsidies, while taking affordability into account.

Limitations of the polluter-pays and full-cost recovery principles in user charges and fees should:

(1) not jeopardize the financial sustainability of the project;

(2) as a general rule, be seen as temporary restrictions and maintained only as long as the issue of affordability of users exists.

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Water sector - issues and constraints

Typical projects

- Construction of new infrastructure for water supply, wastewater discharge and treatment.
- Modernisation and optimisation of water supply and wastewater networks / treatment processes.

The overall objective of water sector projects financed under ESIF is compliance, but subject to sustainability and affordability

Constraints and conflicts at project level

Sustainability vs Affordability

Sustainable Tariff Policy vs Desire for high pro-rata application of the discounted net revenue

Sustainability and Compliance

Compliance

- *Major focus of projects is compliance because of passing deadlines depending on the agreed transition periods with Member States.*
- *Investments needed to achieve compliance are often significant.*
- *Full compliance needs have to be considered in projects and translated into operation, maintenance, capital and resource costs.*

Sustainability

- *Long-term full cost recovery, including gradual – as soon as the affordability analysis allows – recovery of capital cost.*
- *Compliance investments are likely to induce a co-financing need, e.g. equity or debt.*
- *Further tariff increases are expected to comply with the polluter pays and the full cost recovery principles*

Sustainability and Affordability

Sustainability

- *Influenced by the size of the investment, converted into operation, maintenance, capital and financing costs.*
- *Tariff policy, influenced by the (gradual) full cost recovery policy.*
- *Realistic useful life of assets, converted into depreciations, timing and value of replacements.*
- *Affected by the debt capacity of owner / operator and the corresponding financing costs.*
- *Efficiency of operations, including economies of scale.*

Affordability

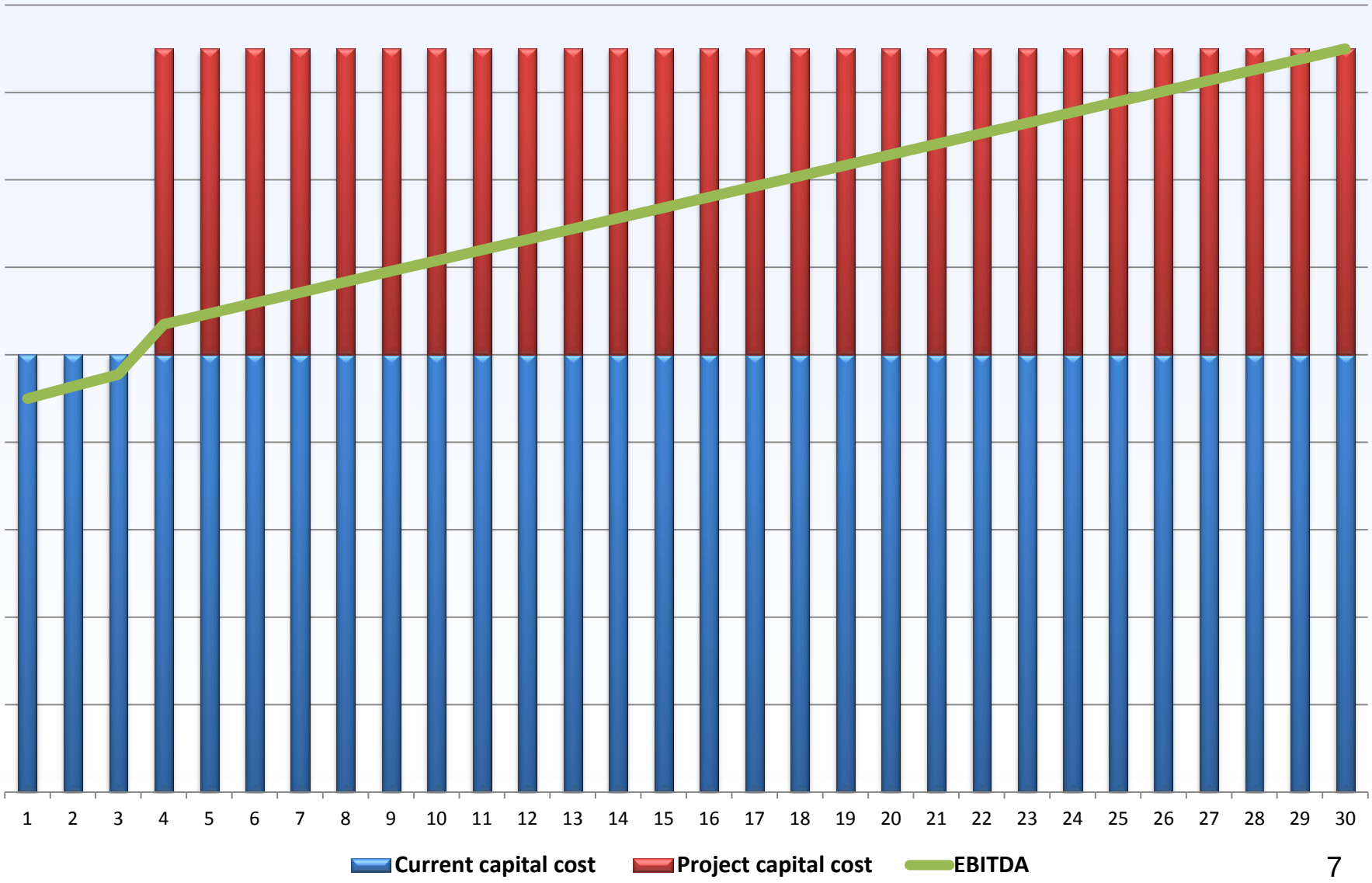
- *Household income at regional (local) level.*
- *Existing affordability requirements, hence possible maximum tariffs.*
- *Policy for full cost recovery, including recovery of capital costs.*

Sequence of the analysis

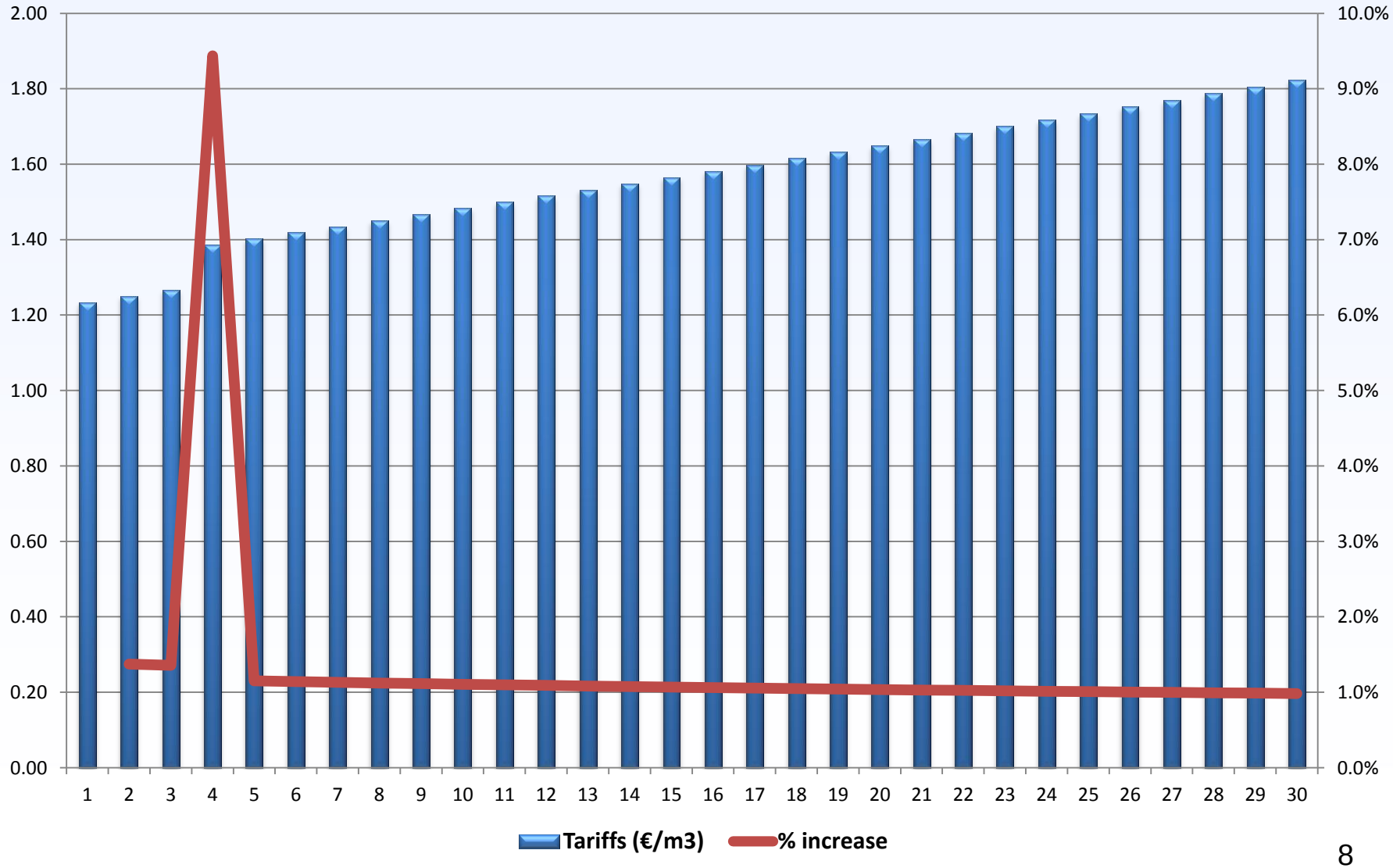
Procedure for complying with the requirements for compliance, sustainability and affordability

- Estimate investment costs needed for achieving compliance on the basis of justified unit costs;
- Estimate operation and maintenance costs;
- Evaluate replacement costs;
- Estimate capital costs (depreciations);
- Determine cost recovery tariffs on the basis of above and cap them with the existing affordability or tariff constraints (if applicable and needed);
- Determine co-financing and further debt needs (debt service costs);
- Provide project and operator sustainability calculations;
- If project and/or operator are not sustainable, reconsider investment costs or an alternative financing.
- Repeat until all requirements are satisfied.

Cost recovery example



Change in tariffs



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Demand projections

Basic considerations

Demand analysis needs to identify:

- Raw water production requirements
- Potable water consumption per category of consumer
- Discharge of wastewater by consumers
- Volume of wastewater to be treated

The methodology needs to take account of:

- The type of consumers to reflect potential differences in tariffs and to correctly assign benefits
- Need for pre-treatment of industrial wastewater
- Spatial considerations where water distribution and wastewater systems are not integrated

Demand projections

Basis of demand projections (water)

Domestic demand

- Population forecast and connection rate
- Per capita consumption
- Income and price elasticity (needs reality check at lower volumes)

Industrial and commercial demand

- Economic development (growth) and Price elasticity

Budgetary / Institutional demand

- Per capita consumption
- Development plans and Price elasticity

Technical losses

- *Leakage from the distribution system*
- *Losses as part of the abstraction and treatment process*

Non-technical losses

- *Non-billed water use (authorized or unauthorized)*

Demand projections

Conversion of water consumption to wastewater discharges

Account needs to be taken of:

- Differences in connection rates including those with water supply connection and no connection to the sewer system and those with an independent water supply where the water is discharged to the sewer system;

Conversion of wastewater discharges to volume to be treated

Account has to be taken of:

- Sewered areas that are not connected to a wastewater treatment plant and discharge untreated sewage to local water courses;
- Net Infiltration;
- Direct discharges at the treatment plant.

Option analysis

Examples

- **Water supply options**

- Example of options: centralised vs decentralised, different water intakes, type of surface intake;
- Criteria for MCA: financial, climatic, environmental, buildability, permitting, availability of land.

- **Wastewater discharge and treatment options**

- Example of options: centralised vs decentralised, extending sewers vs using IAS, treatment technology, location of plants, construction methods (traditional vs trenchless), pipe size (technical / economic), treatment technology, land based vs thermally based outlets for sludge.
- Criteria for MCA: financial, technical, operational, environmental, cost-efficiency, land availability (can be left open for the tendering process in case of yellow book contracts), sludge dewatering and treatment (technical advantages and disadvantages, cost comparison)

Option analysis

Examples

- Examples for MCA criteria: environmental (number of PE treated without tertiary treatment; climate change (evaluation of climate change risk; increase/ decrease of production of CO2); location (existing systems, site preparation, proximity to population), cost-efficiency (m/connections, EUR/additional connected inhabitant)
- Climate change adaptation or mitigation costs need to be included at the option analysis stage as they might influence the decision for the preferred option.

Errors:

- Comparison on operation and maintenance costs alone without including investments and residual value.
- Comparison of options just on CAPEX without OPEX
- Working backwards from a selected option to justify it in any case.
- Different reference period, cost assumptions and discount rates as compared to the full CBA.

Key issues- financial and economic

Connection to Service and Tariff Collection Rates

- 100% connection to service to new infrastructureis to be assumed for the cash flow projections. Gradual connection over a couple of years is possible.

Economic Analysis

- Less “pertinent” where investments are compliance driven – CBA Guide potentially allows cost effectiveness analysis.
- Approach is the same as 2007-2013. Same benefits and methodology – values have been indexed.

Consistency between “with” and “without project” scenarios

- The assumptions used in both project scenarios need to be comparable, e.g. not inflating tariffs in the “without project”

Interface of Technical vs Financial

- CBA assumptions must be harmonised with the technical outcome of the FS
- CBA may invoke technical discussions – it is pointless developing technical solutions for which affordable tariffs can not sustain adequate maintenance and replacement.

Tariffs

Estimation of tariffs

- Tariffs need to cover in full operation and maintenance costs from the first year of operations;
- Aim at full cost recovery but because of the affordability limitations in some member states to assure compliance, gradual increase of capital cost coverage is possible over the reference period (unless faster recovery is required explicitly by national legislation)
- The usual procedure is to increase tariffs up to the affordability threshold (if applicable) and check if cost recovery is achieved.

Domestic vs non-domestic tariffs

- National rules apply as regards tariff differentiation but subject to the principle below;
- Affordability limits, generally, apply to tariffs paid by residential users and not by companies (industrial and commercial users) or institutional consumers, unless there is a good justification for it.

Financial sustainability

Definition

- Financial sustainability: cumulative positive cash flow for each year over the projection period. This shall be valid when performing the analysis at project and operator level.

Project and operator sustainability

- Project sustainability – it is expected that the project needs to be sustainable on its own right following the application of the cost recovery principles;
- Funding of replacements for short/medium life assets needs to be taken into account and can often be a significant factor in consideration of early year tariff rises needed to meet sustainability criteria.
- Operator sustainability. If the project falls within an already existing infrastructure, the overall sustainability of the infrastructure operator should be checked.

Evaluation of externalities

Minimum requirements for externalities:

- GHG emissions from sludge digesters, based on a quantification of gas production and related CO_2 portion.
- GHG emissions from sludge transport to disposal sites, based on quantification of dehydrated sludge and other waste from the WWTPs (screenings, grid) to be transported to the use a sanitary landfill and to surrounding agricultural fields.
- Equivalent GHG emissions from use of electricity of the new assets, this is especially important, where membrane treatment systems are used.
- Methane gas emissions from reservoirs need to be considered.

Risk analysis

Risks (Regulation 2015/207) relevant to water and sanitation projects

Demand risks

- Water consumption lower than predicted
- Connection rate to public sewage system slower than predicted

Design risks:

- Inadequate surveys and investigation
- Inadequate design cost estimates

Land acquisition risks:

- Procedural delays
- Land cost higher than predicted

Administrative and procurement risks:

- Procedural delays
- Building or other permits
- Utility approval
- Legal proceedings

Risk analysis

Risks (Regulation 2015/207) relevant to water and sanitation projects

Construction risks:

- Project cost overruns and delays in construction
- Contractor related (bankruptcy, lack of resources)

Operational risks:

- Reliability of identified water sources (quantity/quality)
- Maintenance and repair costs higher than predicted, accumulation of technical breakdowns

Financial risks:

- Tariff increases slower than predicted
- Tariff collection lower than predicted

Regulatory risks

- Unexpected political or regulatory factors affecting the water price

Other risks:

- Pubic opposition

Flood management CBA

Flood benefits

- Avoided direct (tangible) damages: direct flood damages refer to physical damages to residential and non residential properties, technical infrastructure (roads, railways, etc.), crops, etc. The most important categories are usually buildings and inventories, as well as fixed and movable equipment.
- Avoided indirect (tangible) damages: indirect flood damages are the losses resulting from the flood disrupting physical communication (roads and railways), loss of production for companies based in the flooded area, as well as induced economic losses to their supplier and customers and costs related to temporary unemployment.

Steps in preparing the CBA

- Modelling the potential flood events at different frequencies (e.g. 5 year, 10 year, 25 year, 50 year, 100 year, 200 year events).
- At least 4 are needed for accurate results

Flood management CBA

Steps in preparing the CBA (contd.)

- Establish depth / probability relations for the modelled frequencies and properties affected, i.e. what is what depth will be reached in the above modelled events for the properties analysed.
- Determine depth / damage relations for the properties affected, i.e. what damage will a flood of certain frequency will cause to the property.
- The above needs to be done for both before and after protection measures.
- Combine the depth / probability function with the depth / damage function to establish property damages functions
- Perform the loss-probability calculation and discount over the life of the scheme (e.g. 50 years) to establish annual average damages and the present value of damages.
- Calculate the benefit/cost ratio of the proposed investment.

Coastal erosion CBA

Coastal erosion benefits

- Present value of properties after the protection measures
- Avoided damages to infrastructure
- Avoided damages to agricultural land
- Recreational gains and losses
- Avoided environmental damages

Steps in preparing the CBA

- Estimate erosion contours using 5-year intervals for the useful life of the protection works, i.e. what part of the cost will be lost every 5 years if no measures are implemented.
- Overlap land use maps and the established erosion contours.

Coastal erosion CBA

Steps in preparing the CBA

- Estimate and provide tables with properties lost, areas of land and infrastructure affected for each 5-year erosion period.
- Estimate value of infrastructure, properties and land
- Estimate recreational gains (contingent valuation / WTP)
- Estimate environmental benefits (value transfer)
- Calculate benefit : cost ratio




Thank you!

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