EU Strategy for the Danube Region (EUSDR)

Second Stakeholder Seminar of the
Water Quality (PA4) and the Environmental Risks (PA5) Priority Areas

"*EUROPEAN FUNDING OPPORTUNITIES IN THE WATER SECTOR*"

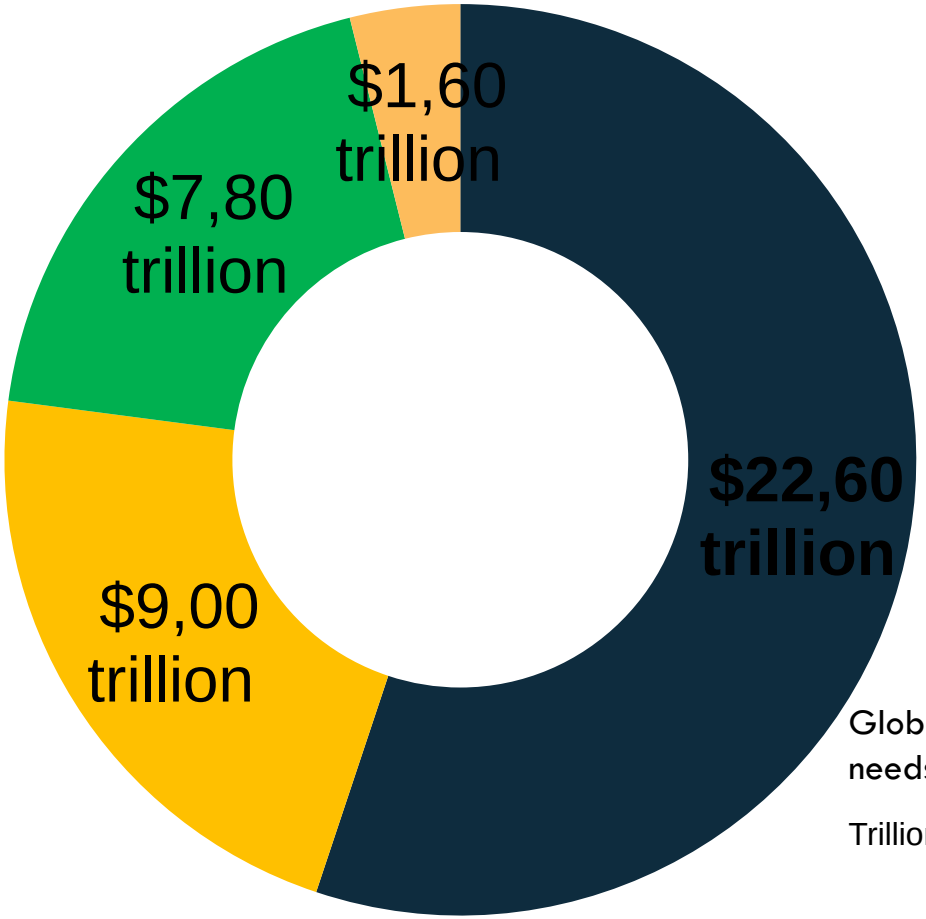
Cost-efficient infrastructure development based on life cycle cost analysis

Károly Kovács

president of European Water Association

EUROPEAN WATER ASSOCIATION

Urban infrastructure investment needs during the next 25 years



$41 trillion in total

- Water
- Power
- Road and rail
- Air and sea ports

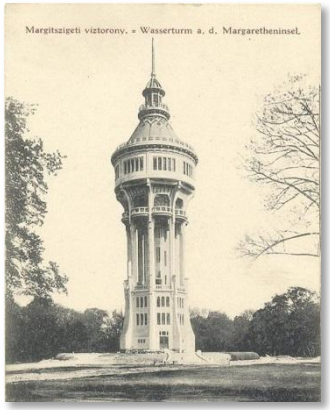
Global infrastructure development and reconstruction needs based on global urbanization trends

Trillion: 1,000,000,000,000 (one million million; 10^{12})

Source: UNEP City Level Decoupling 2013
http://www.unep.org/resourcepanel/portals/24102/pdfs/Cities-Full_Report.pdf

Water infrastructure

- The oldest
- The most essential
- „The most expensive”
- The longest life cycle



Public Procurement Reform in the EU

Life-Cycle Costing approach became more important

Recital:

„(96) It should hence be made clear that, except where it is assessed on the basis of price only, contracting authorities can determine the most economically advantageous tender and the lowest cost ***using a life-cycle costing approach****. (…)* ***Common methodologies should be developed*** *at Union level for the calculation of life-cycle costs for specific categories of supplies or services. Where such common methodologies are developed, their use should be made compulsory.*

Article 67:

(2) The most economically advantageous tender from the point of view of the contracting authority ***shall be identified*** *on the basis of the price or cost,* ***using a cost-effectiveness approach, such as life-cycle costing „***

(Directive 2014/24/EU of the European Parliament and of the Council)

Source: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:32014L0024

The effect of the new European procurement regulation

- „The dictate of the lowest price is over”
  (Etelka Barsiné Pataky, The president of the Hungarian Chamber of Engineers)
  - The contracting authorities can specify common Life-Cycle Costing methodologies and make them compulsory
    - New methodologies and skills are needed to apply Life-Cycle Costing in practice
      - Dynamic Cost Comperison is an adequate answer for these challenges

Dynamic Cost Comparison (DCC)
Main principle:

In order to formulate a correct picture of the cost-efficiency of a technical solution, **all cost occuring throughout the whole life** cycle should be taken into account **in dynamic approach.**

Life Cycle approach

Dynamic approach

Real term thinking

Application of DCC

- **Cost-efficiency analysis**
  - Option analysis of water infrastucture investments
  - Reconstruction planning
- Ex-post evaluation of completed investment projects
- Rolling Development Plan (Gördülő Fejlesztési Terv)
- Examination of Cost Recovery Principle
- **Procurements: Life-Cycle Cost calculation**

Dynamic Cost Comparison (DCC)

The target: Determination of the optimal, most cost-efficient solution

The main characteristics of the method:

- **Whole Life-Cycle Costing**
- **Dynamic approach**
- **Real term thinking**
- Calculate with all the relelvant costs
- In accordance with the European and Hungarian regulations
- Well-founded methodology, tranparent analysis
- Improves the quality of the planning and decision-making process
- „The common language” of the technical and the business professionals

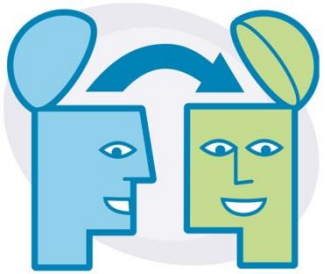
Comparison of investment evaluating methodologies

DCC: Efficient method for efficient solutions

Dynamic Cost Comparison (DCC)	Extended Dynamic Cost Comparison (EDCC)	Cost-benefit Analysis (CBA)	Multi Criteria Analysis (MCA)
Problem analysis			
Determination of targets			
normativ targets, same utility level		maximalization of social utility level	
Search for possible alternatives			
Selection of alternatives for futher analysis			
Effects analysis			
direct cost effects	direct and indirect (external) cost effects	direct and indirect (external) pozitive (benefit) and negative (cost) economical effects, and environmental and social effects expressed in monetary terms	direct and indirect, positive and negative, quantifiable and non quantifiable economical, environmental and socal effects
Eveluation of effects			
Present value of costs (PCPV)		Net present value (NPV)	scoring and weighting system
Annual costs (AC)		Internal rate of return (IRR)	
Cost-efficiency indicator		Benefit-cost ratio (BCR)	
Decision criteria			
Minimal total cost		Maximal benefit-cost ratio	
min. PCPV; AC;		max. NPV; IRR; BCR	max. score

The DCC project

- International methodological project
- Knowledge transfer
- With the participation of 5+1 CEE countries (HU, BG, RO, SK, CR+DE)



The original objective of the project: Improvement of the planning process with a new methodological approach of option analysis

MaSzeSz
Magyar Szennyvíztechnikai Szövetség

EWA
EUROPEAN WATER ASSOCIATION

DWA

DBU
Deutsche Bundesstiftung Umwelt

ARA
ASOCIAȚIA ROMÂNĂ A APEI

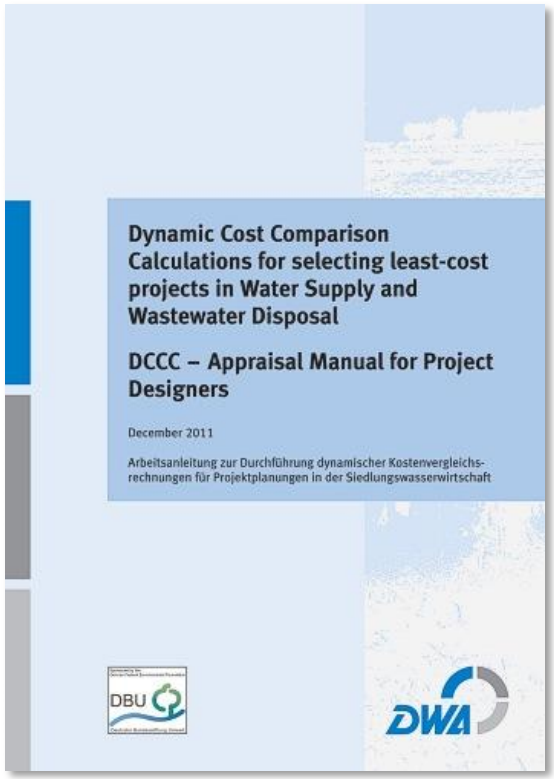
BWA
BULGARIAN WATER ASSOCIATION

Jaspers
Joint Assistance to Support Projects in European Regions

The DCC project

- Adaptation of a 30 years old German standard in countires of the CEE region
- Multidisciplinar, international working group: engineers, economists, regulators

DCC Hungarian adaptation



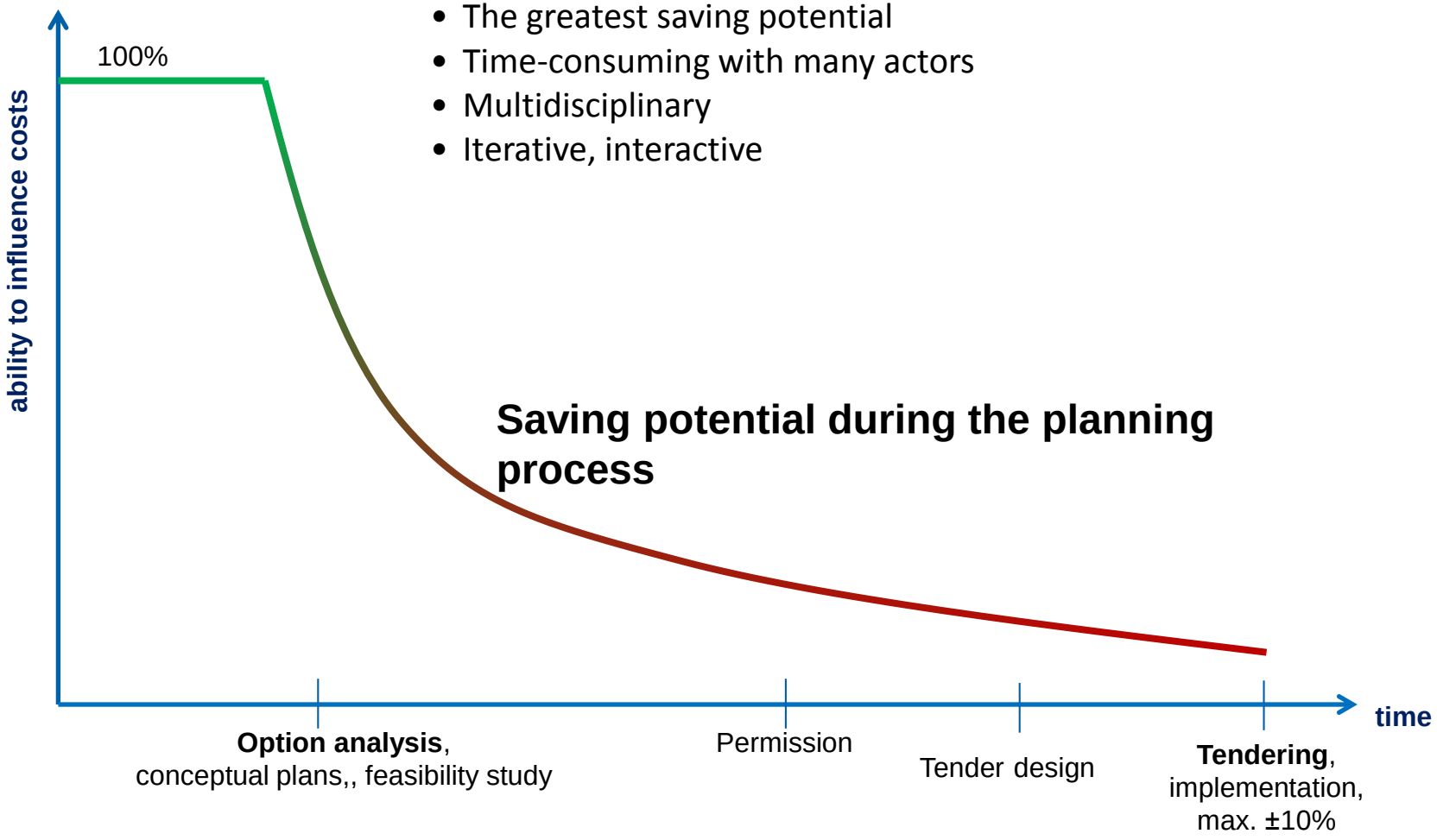
The adaptation for CEE region (In English)

The 8th edition of the original German DCC Manual

The importance of option analysis in water infrastructure investment projects

The most important decision of the planning process!

- The greatest saving potential
- Time-consuming with many actors
- Multidisciplinary
- Iterative, interactive



2015 / CXLIII. Hungarian national directive about procurements:

76.

(5) …The Contracting Authority may not use the lowest price as a single principle of the evaluation criteria in the case of designing, engineering and architectural services and construction investment…

78.

(4) The Procurement Authority may publish manuals about Life-Cycle Costing methodologies (…) Regarding to this directive an other legal act may specify compulsury Life-Cycle Costing methodologies in the case of particular procurement objects.

Source: http://net.jogtar.hu/jr/gen/hjegy_doc.cgi?docid=A1500143.TV

Project preparation and procurement

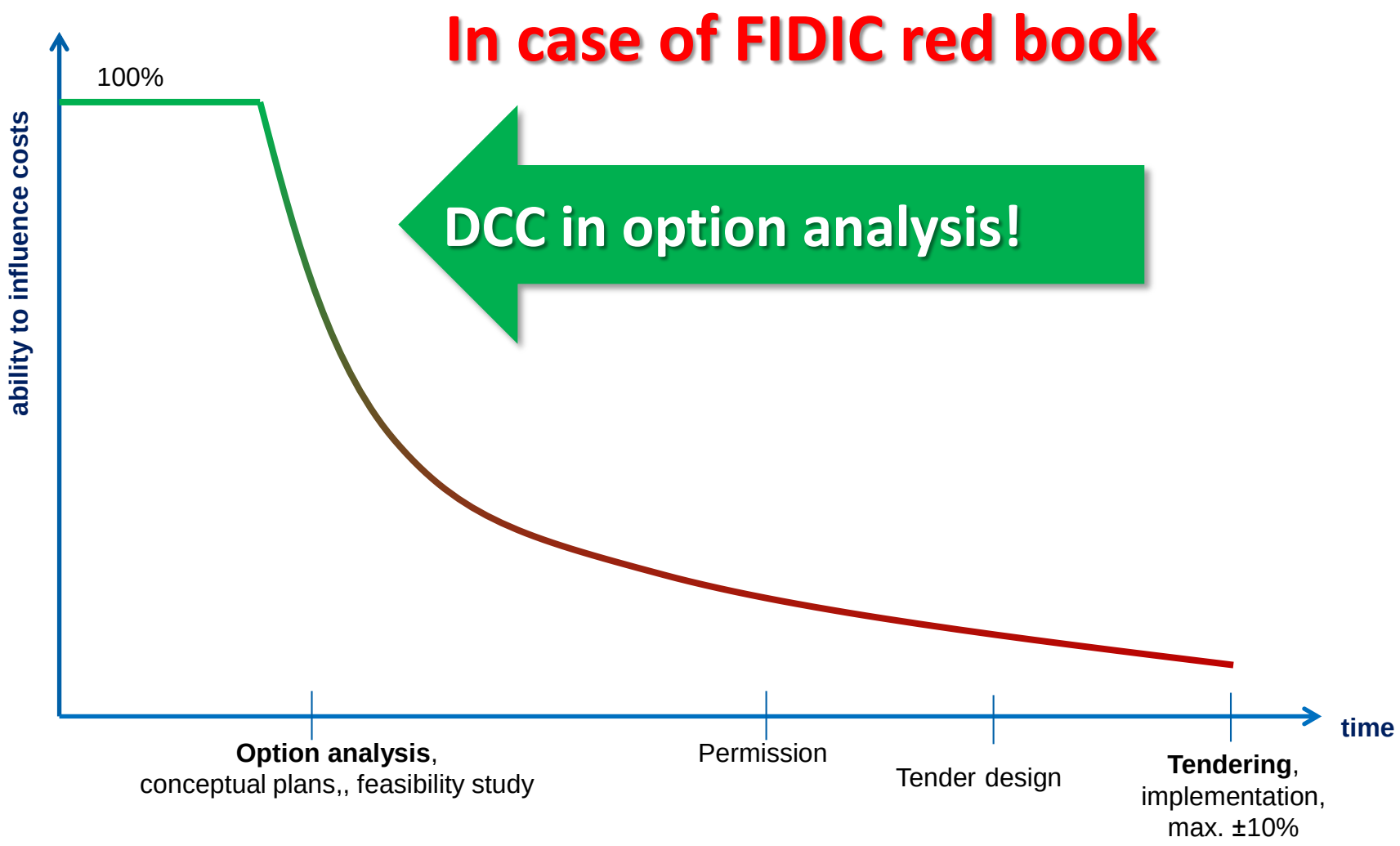
Technical planning stages:

- Technical design with preliminary water rights permit
- Technical design with water rights implementation permit
- Detailed implementation plan

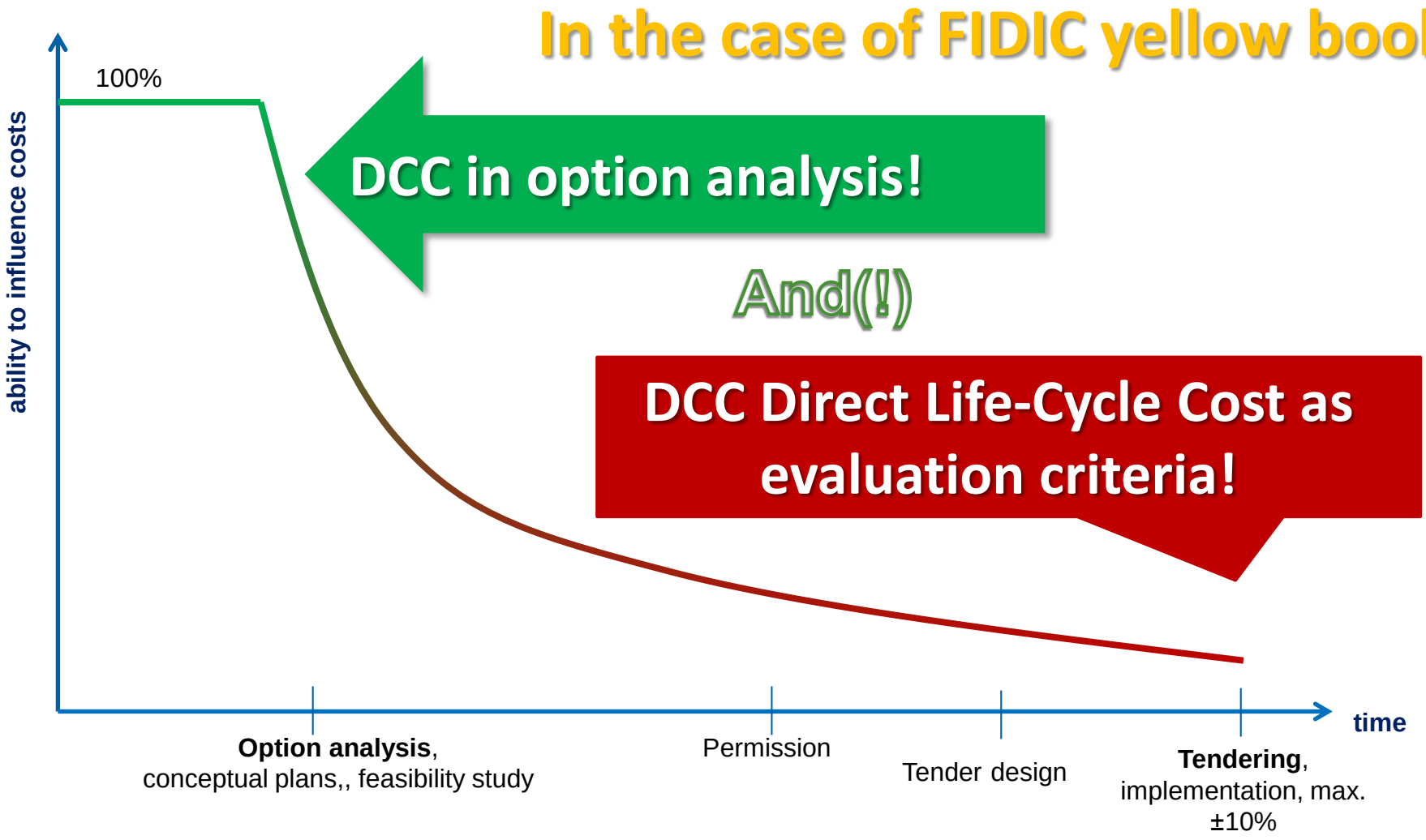
The contractual criteria of construction:

- FIDIC red book
- FIDIC yellow book

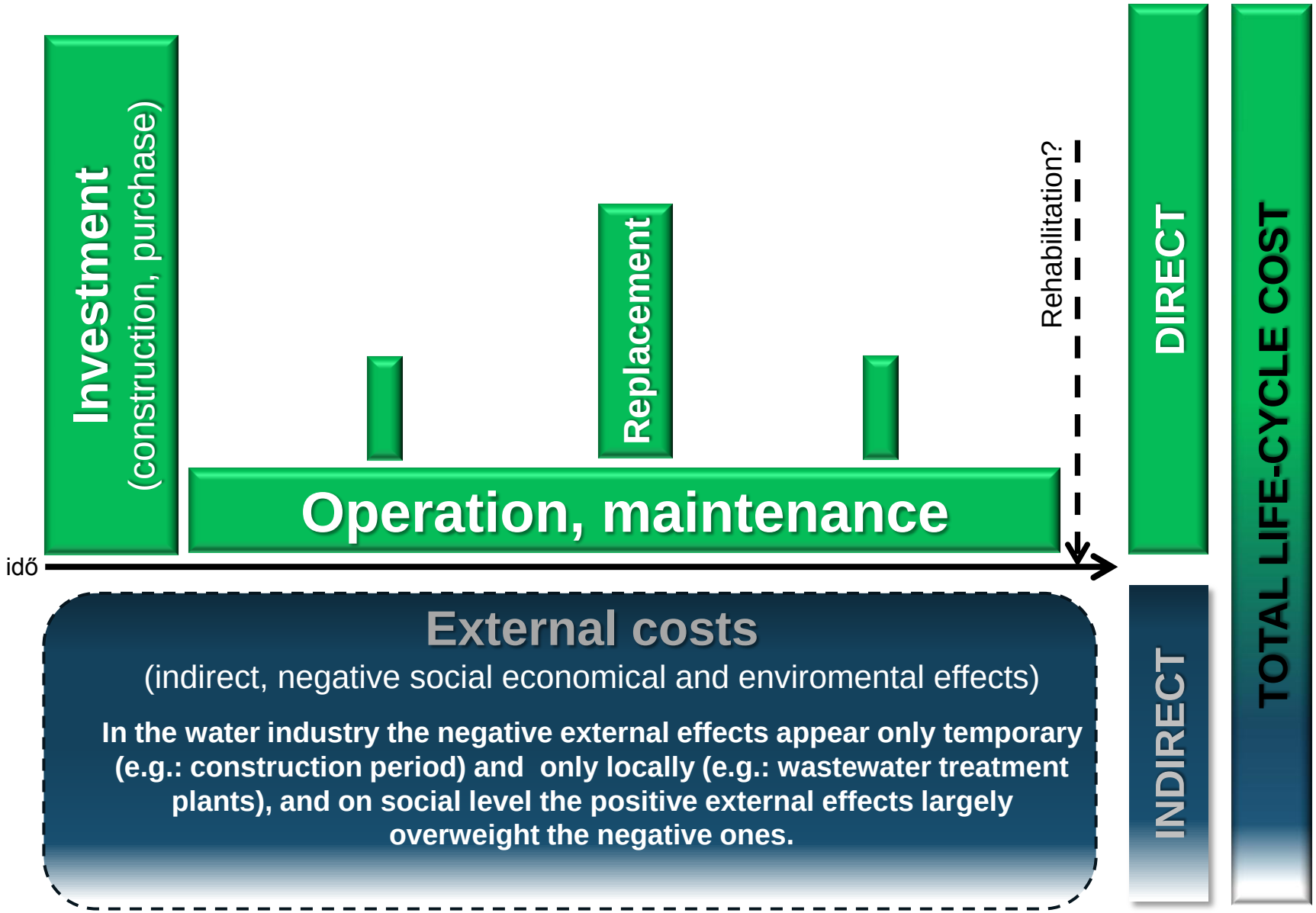
Application of Life-Cycle approach during the planning process



Application of Life-Cycle approach during the planning process



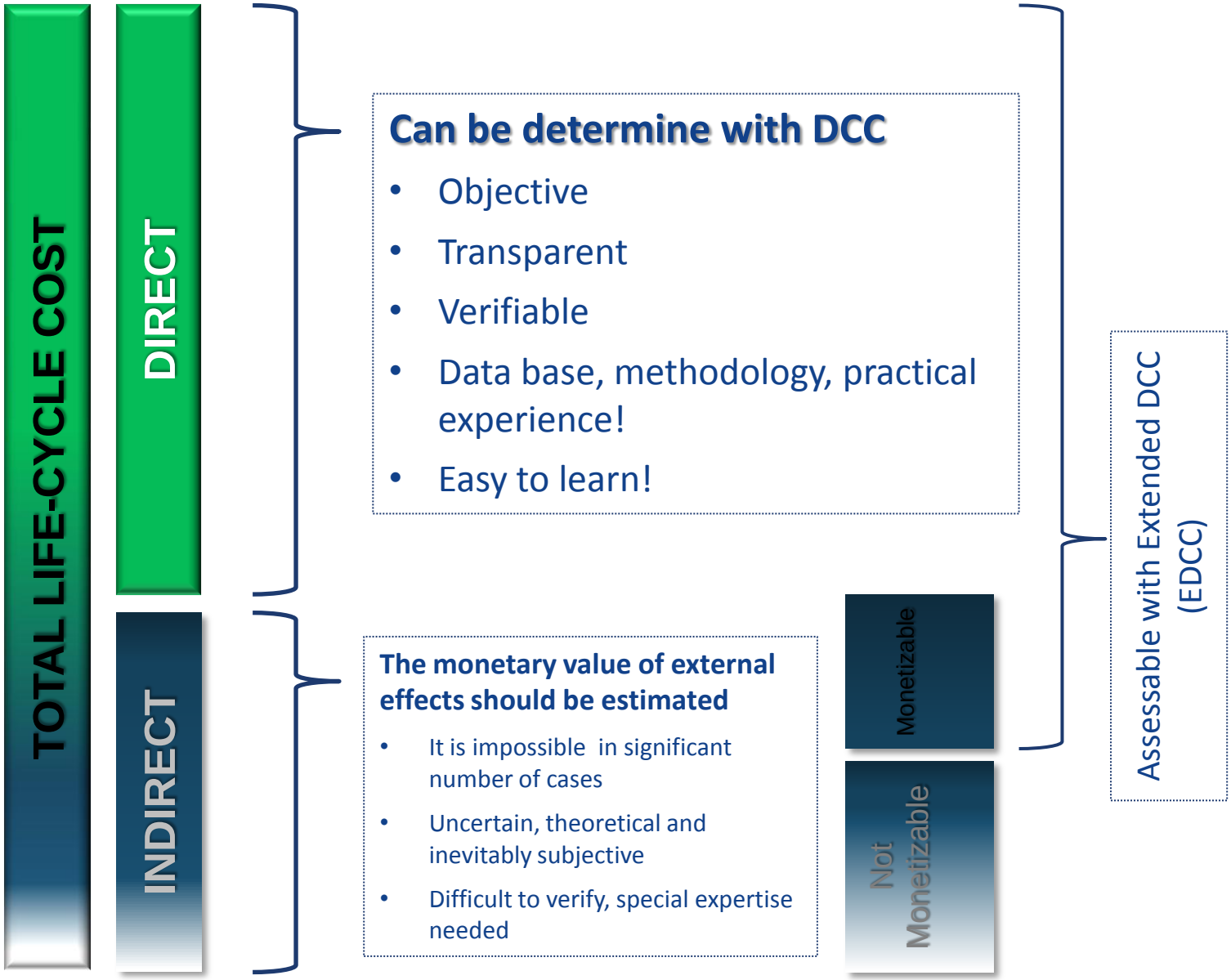
The elements of the Total Life-Cycle Cost



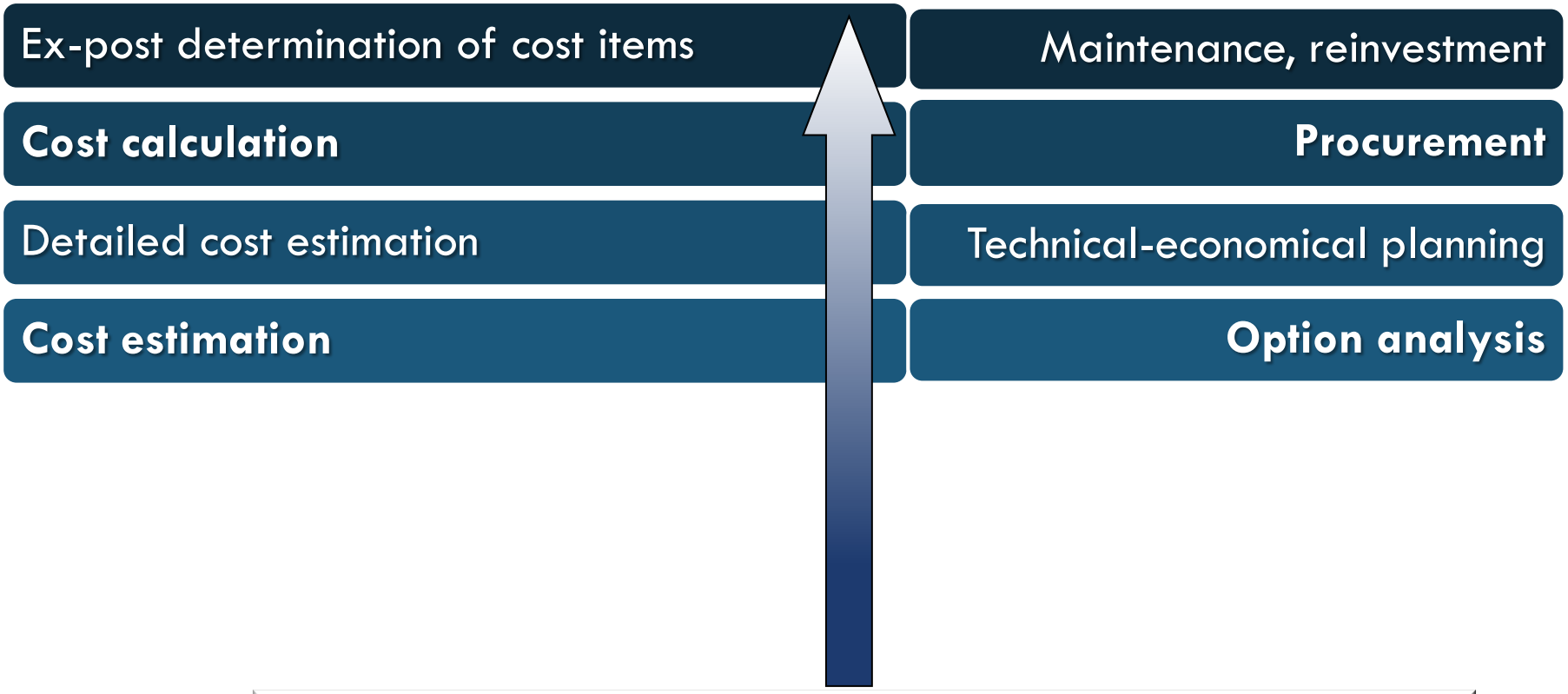
The main parameters of Life-Cycle Cost calculation

Parameter	Option analysis	Procurement
Defining the cost elements:	approximate	accurate
Defining lifetimes:	overview	accurate
Forecasting operation costs:	estimation	data disclosure
Forecasting the changing of cost elements:	sensitivity analysis	data disclosure, garanties

Calculating the Life-Cycle Cost



The reliability of cost data



Reliability, accuracy, and precision of details increasing by the maturity of the procedure

Average service lifetime and investment cost of facilities

„The specific costs of water supply, water treatment, wastewater collection and wastewater treatment” (Environment and Energy Operational Programme: Manual of specific costs)

Typable water infrastructure objects:

- Specific cost
- Average lifetime
- Categorization (civil works, machinery, energy and process control)

DCC Manual: Annex 1

Environment and Energy Operational Programme: Manual of specific costs

By the 24/2013 (V.29.) regulation Ministry of National Development made required to preapare asset inventory of water utilities

Comparison of technical solutions

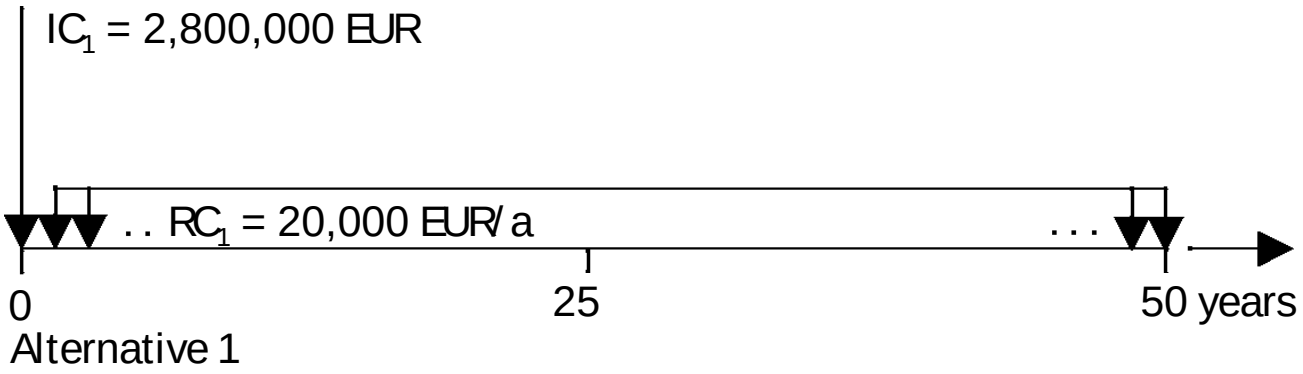
Equivalent technical solutions shall be compared: providing the same result during the same period of time, by using the appropriate indicators.

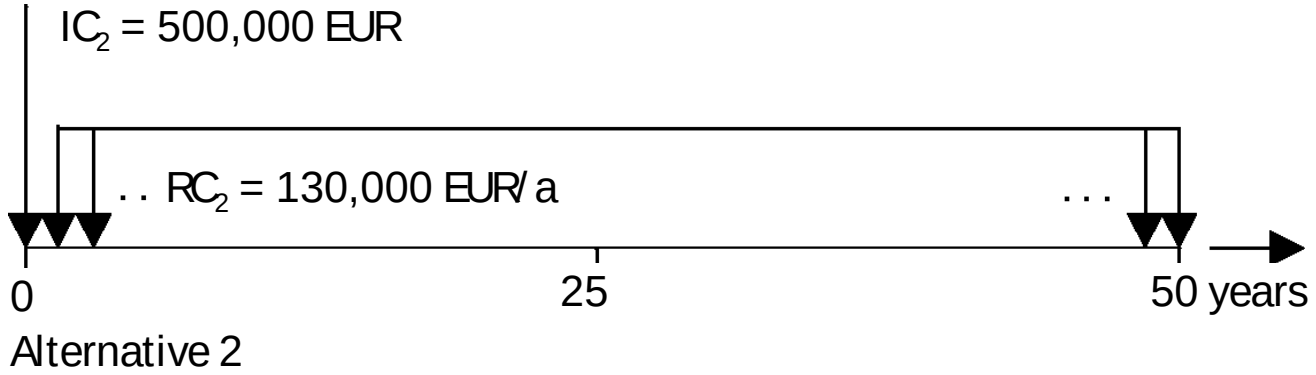
Typical scenarios: The technical alternatives

1. have the same expected lifetime,
2. have different lifetime expectancy, but their lowest common denominator is in reasonable future,
3. have different lifetime expectancy, but their lowest common denominator is „too far”.

1. The expected service lifetime is the same for each alternatives

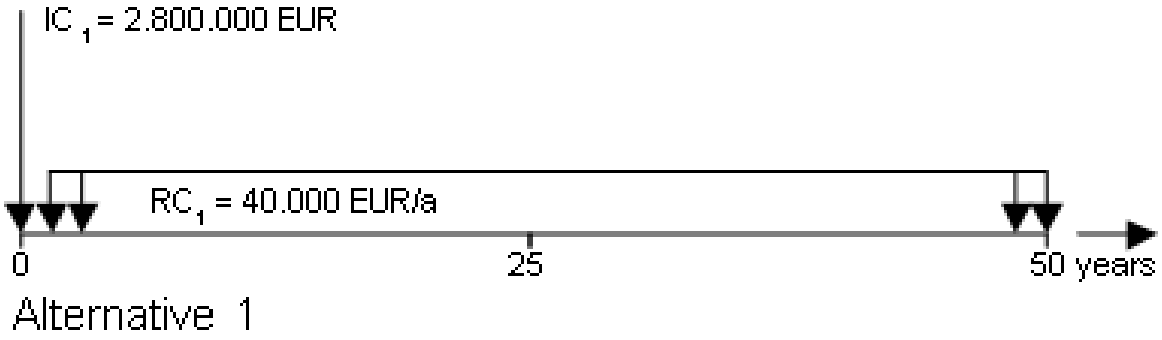
Comparing present values (EUR) of the costs during the whole life cycle of the alternatives



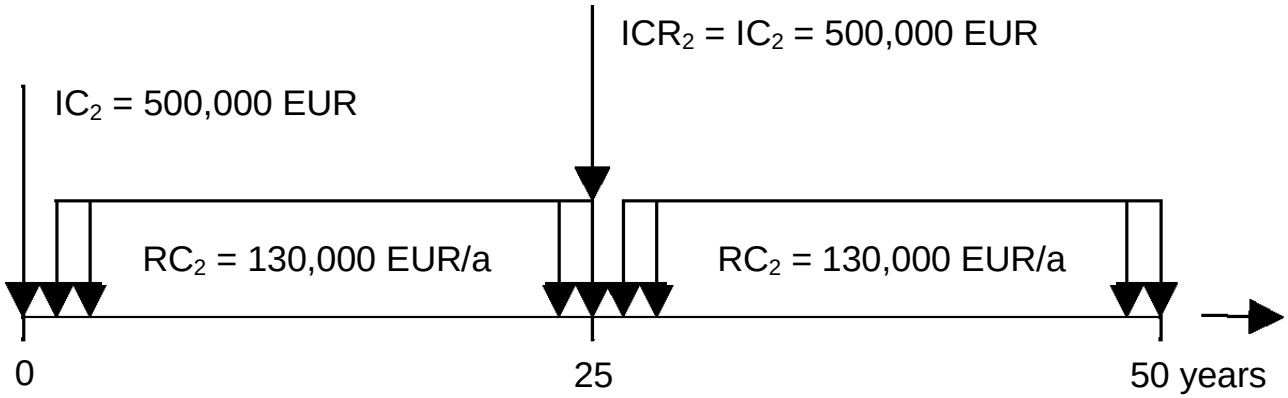


2. Different lifetime expectancy, but lowest common denominator is in the reasonable future

Comparing present values(EUR), annual costs (EUR/a) and specific costs (EUR/m^3) of the alternatives on the period defined by the lowest common denominator



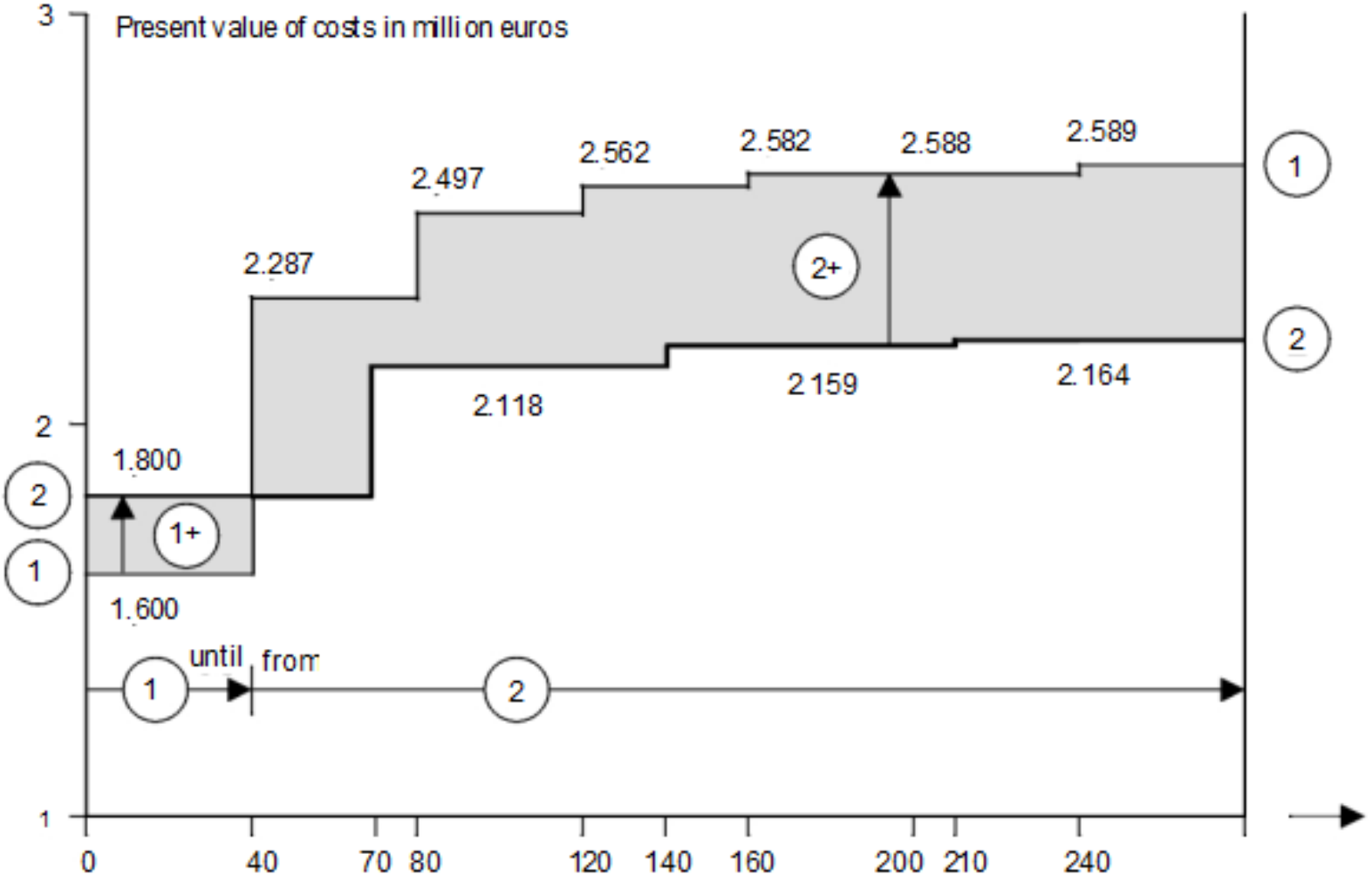
Alternative 1



Alternative 2 (initial investment + reinvestment)

3. Different lifetime expectancy, but their lowest common denominator is „too far”.

Temporal development of present values of alternatives



Conclusions

1. The Life-Cycle Cost approach has already been in use in the infrastructure and water utility sectors (in Germany for more than 30 years)

2. The Life-Cycle approach should be applied on the right stages of the planning process for sustainaility and affordability

3. In case of water utilities Direct Life-Cycle Cost is an appropriate base for evaluation and easy to apply in practice

4. The Direct Life-Cycle Cost can be calculated with DCC in a accurate, verifiable and a transparent way

5. **Adapting the methodology of Dinamyc Cost Comparison to the procurement enviroment!**

6. DCC Life-Cycle Cost training and capacity building for every stakeholder group

Thank you for your kind attention!

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20. November 2015, Budapest