Main issues for economic and financial analysis
Energy, waste and transport sectors

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JASPERS Regional Office for Romania and Bulgaria

National CBA Guidelines

- **Developed jointly by relevant Romanian Authorities and JASPERS - based on experience first approved projects and dialogue with EC**
- **National CBA Guidelines to be consistent with EC and Romanian requirements (HG 28/2008)**
- **Valid for ALL projects co-financed by Structural Funds**

- **General CBA Guidance document**
  - Rationale and objectives
  - What is a CBA and why/when perform it (small projects)
  - General methodological Approach (discount rates, reference period, etc.)
  - Macroeconomic assumptions and data to be used
  - Valid for all sectors
  - To be formally embedded in national approval process
- **Sectoral CBA Guidelines for Water, Transport, SW, DHs & Energy**
  - Strategic approach and definition of objectives
  - Project identification and demand assessment
  - Feasibility and Option Analysis
  - Financial Projections
  - Economic Analysis
  - Risk and Sensitivity analysis
  - Conclusions and presentation of results

Sectoral guidelines

- To provide operational guidance for CBA application in specific sectors
- Expert audience (consultants, MAs and IBs, Beneficiaries)
- First round of guidelines on sectors where JASPERS can provide direct support:
  - ✓ Integrated water projects: water treatment, network rehab+ extension, wastewater collection and treatment, storm water and drainage.
  - ✓ Waste management: waste collection, transport, treatment and disposal
  - ✓ Energy: energy efficiency, RES, transport networks, environmental standards, district heating.
  - ✓ Transport: roads, railways, ports and airports, urban transport

Sequence of CBA for National Guidelines

- *Investment identification and definition of objectives*
- *Option Analysis and Selection*
- *Financial Analysis*
- *Economic Analysis*
- *Risk and Sensitivity analysis*
- *Conclusions and presentation of results*

Tentative Activity Planning

General National CBA Guidelines	Agreed
Water CBA Guidelines	Agreed in principle
Solid Waste Guidelines	by end October 2008
Transport Guidelines	by end October 2008
District Heating Guidelines	by end October 2008
Energy Guidelines	by December 2008

CBA Guidelines

Main issues for Energy projects

Romanian energy projects

SOP Competitiveness - priority axis 4

Energy efficiency, security of supply and combating climate change

- Energy efficiency (end users)
- Renewable energy sources (RES)
- Reducing environmental impact in LCPs
- Transport and distribution of gas/electricity
- Interconnections

SOP Environment- priority axis 3

Reduction of pollution, energy efficiency and combating climate change

- District heating rehabilitation

Relations to Art. 55 requirements

SOP Competitiveness - priority axis 4

Energy efficiency (end users)	(State Aid)
Renewable energy sources (RES)	(State Aid)
Reducing environmental impact in LCPs	(State Aid)
Transport and distribution of gas/electricity	(funding gap)
Interconnections	(funding gap)

SOP Environment- priority axis 3

District heating rehabilitation	(funding gap)

Expected Major Projects

SOP Competitiveness - priority axis 4

Energy efficiency (end users)	(unlikely)
Renewable energy sources (RES)	(unlikely)
Reducing environmental impact in LCPs	(yes)
Transport and distribution of gas/electricity	(unlikely)
Interconnections	(unlikely)

SOP Environment- priority axis 3

District heating rehabilitation	(yes)

Option Analysis

HG 28/2008 requires to assess, at least:

- **a zero option (without investment)**, which implies the continuation of the status quo without any intervention;
- **a maximum investment option,** which implies the implementation of the full scope of the investment proposed, to achieve the intended objectives;
- **a minimum investment option,** which includes all the necessary realistic level of maintenance costs and a minimum amount of investment costs, to avoid or delay serious deterioration or to achieve minimum compliance with safety standards.

Option Analysis

An example: environmental project to comply with LCP directive

- **The zero option (without investment)**, implies switching off the unit, continuation of the status quo without any intervention is not possible;

Minimum investment option(s)

- **FGD alternative:** This alternative consists of the installation of flue gas desulphurisation (FGD) into the existing production unit(s).
- **Fuel Switch alternative**: This alternative will consist of investments to reduce emissions primarily through the switch of fuel to low sulphur coal, low sulphur fuel oil, natural gas or biomass.

Maximum investment option

- **New Capacity alternative.** This alternative consists of the construction of a modern, most efficient and compliant production unit(s) to replace the existing one(s). The New Capacity alternative will be defined on the basis of a competitive technology and not necessarily on the basis on the same technology of the existing facilities.

Option Selection

1. Estimate of the remaining economic life of the existing infrastructure, (reference period for the analysis).
2. Estimate expected annual output (in terms of heat and/or power) of the existing unit(s) during their remaining economic life.
3. Estimate of the total investment and production costs under each applicable option for the same economic life and annual output of the status quo scenario. For this purpose:
   - Only "Investment costs" during the remaining economic life (including replacement, and land/decommissioning costs, if relevant).
   - Production costs shall include annual and periodic maintenance costs, fuel costs and the purchase of carbon credits to offset 100% of the CO2 emissions as starting in 2013.
   - no depreciation, amortization, grants, subsidies and other non-cash items).
   - Estimate revenues based on realistic price dynamics
4. Option with highest net present value of difference between revenues from the sale of electricity and heat and annual investment costs and production costs is preferred (unless other externalities apply).

Financial Analysis

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To establish:

- Level of financial self-sufficiency and performance indicators
- Funding Gap (if not State Aid) and project financing structure
- Financial sustainability of the project (cumulative cash flows)

- Projections of financial flows of the project for without (status quo) and with project (selected option) scenarios:
  - ✓ Revenues
  - ✓ Operating and maintenance costs (cost savings)
  - ✓ Total planned investment (including residual value)
- Reference period depends on economic life of the infrastructure
- Financial discount rate set at 5% in real terms, unless otherwise justifiable due to prevailing sectoral return on investments
- Project impact = Difference between with and without scenario (incremental approach)

Project profitability indicators

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- Incremental cash flows used to determine financial performance indicators before and after EU grant
  - ✓ If not state aid, FNPV/C needs to be <0 (or FRR/C< 5%)
  - ✓ If revenue generating: Funding Gap calculation
  - ✓ If FG: important to clarify relevant revenues and costs (infrastructure owner) in light of regulatory framework and affordability issues
- Project assessment with requested EU grant:
  - ✓ financial package completed with cofinancing & loans
  - ✓ ensure FRR/K (return on "national" capital) not excessive (in line with prevailing sectoral return on investment)
- Financial sustainability
  - ✓ requires cumulative cash flow positive for all years
  - ✓ ideally at project level, surely needed at operator/plant level

Economic Analysis

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- Identifying benefits
  - ✓ Benefits from improved health conditions
  - ✓ Benefits from reduced economic losses due to pollution
  - ✓ Reduction in the level of CO_2 emissions (financial impact)
  - ✓ Other costs savings
  - ✓ Other benefits difficult to monetise
- Adjusting costs
  - ✓ Fiscal corrections
  - ✓ Converting financial prices into economic prices
  - ✓ Add negative externalities

<u>CBA Guidelines</u>

Main issues for Solid Waste projects

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Definition of Project Objectives

- General objective → Priority Axis of SOP
- Specific objectives:

Specific Objective	Value without project	Expected value after completion
1. Increase in coverage of waste management services	[…]% in urban areas and […]% in rural areas, with final disposal <u>not</u> in accordance with the relevant EU Directives.	100% in urban and min. 90% in rural areas, with final disposal in accordance with the relevant EU Directives.
2. Reduction of quantity of landfilled waste	Percentage of total collected waste going to landfill: 100% Percentage of total collected biodegradable waste going to landfill: 100%	Percentage of total collected waste going to landfill: max. 60-70%, rest diverted or recycled Maximum percentage of total collected biodegradable waste going to landfill: 50% by 1995 weight achieved by 2013
3. Increase of quantity of recycled or reused waste	Percentage of packaging waste recovered and recycled: […]%	Proposed systems contain separate waste collection and pre-treatment and sorting measures supplemented by recycling activities. Establishment of the sorting and composting plants at the Integrated Waste Management Centre will contribute to obtaining the quantities of recyclables and organic waste for treatment and reuse. Bringing stations will allow for additional separation of recyclable and/or hazardous materials from domestic origins
4. Establishment of efficient management structures	Collection of waste is fragmented at the local level, with low standards of operation and cost recovery. There are no proper institutional arrangements for the operation of area-wide collection -, recovery- systems and final disposal facilities.	Collection of waste and operation of final disposal facilities have been successfully tendered to waste management operators, with clear standards of operation and clear responsibilities of all parties involved to ensure sustainability.
5. Reduction of number of historically contaminated sites	Huge number of unregulated dump sites in beneficiary region: […]	All unregulated dump sites closed and rehabilitated.

Identification of Alternatives

1. Comprehensive strategy for waste collection, treatment and disposal in the project area (Master Plan or equivalent)
2. Identification of sites and technologies for final treatment and disposal of waste (landfill sites, transfer stations, integrated waste management centres or alternative facilities)
3. Screening of suitability of the possible sites and technologies based on <u>qualitative</u> criteria
4. Based on the options that pass the qualitative criteria, definition of a number of possible combinations of facilities and accompanying measures (the **ALTERNATIVES**) that will fulfil the project objectives
5. Estimation of all the costs associated with each one of the identified alternatives (investment + O&M)

Selection of Most Suitable Alternative

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1. Verification of consistency with the underlying sectoral strategy and/or Master Plan.
2. Then,
   1. If overall impact for each alternative is the same: least-cost analysis
   2. If impact is significantly different: ranking through economic analysis (ENPV or ERR)
3. Sometimes, similar options (in terms of least-cost) can be complemented with qualitative criteria.

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Financial Analysis

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- Unless revenues and costs can be curtailed, this requires financial projections for the whole system (typical case: regional waste management projects)
- Relevant aspects:
  - Financial sustainability
  - Financial structure (equity+loans+grants)
  - Compliance with Polluter Pays Principle
  - Consistency with affordability constraints

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Financial Analysis (2)

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- SW Applications supported by:
  - Clear decision on tariff levels and organization of service
  - Sound institutional agreements re. competencies and responsibilities of municipalities and county council (mandated by IDA)
    - Investment contracts for landfills and transfer stations
    - Service contracts for operating
      - landfills and transfer stations
      - collection, transportation and transfer of waste
  - Specific financing mechanism for each contract: dedicated direct tax / fee, partial allocation, and remuneration of operator; for landfill, particularly detailed

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Economic Analysis

- Economic benefits:

Resource cost savings, (i) proceeds for the sale of recyclable products, compost and energy (which can be taken for the financial projections or the calculation of the project funding gap and financial profitability indicators); and (ii) avoided investment and operating costs at the landfill site (which can be estimated at a certain standard amount per tonne of waste diverted from the landfill).
Reduction of visual disamenities, odours and health risks, (i) increase in land values in the areas surrounding the rehabilitated dump sites (which can be estimated at a certain amount per hectare of rehabilitated dumpsite); (ii) avoided cleaning costs for not having to treat impact of uncontrolled discharges of leachate and/or the cost to develop alternative water sources when applicable (which can be estimated at a certain standard amount per tonne of waste either diverted from the landfill or properly disposed at the landfill).
Reduction of greenhouse gas emissions, estimation of the annual expected reduction in tonnes of methane and carbon dioxide (CO_2) due to the project, transformation of the methane quantities into CO_2-equivalent using a standard conversion factor and monetization of the resulting quantities of CO_2 and CO_2-equivalent using a standard value of EUR per tonne of CO_2.

- Note that the increase of economic activity in the region as a result of the project is not a project benefit per se. Instead the economic impact of employment generation will indirectly be considered when correcting the cost of un-skilled labour with the shadow wage.
- Also, these potential benefits may be minored by the negative effect (in terms of disamenities) in the areas surrounding the new final disposal facilities.

CBA Guidelines

Main issues for Transport projects

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Key issues – alternatives studied

- **'Without project'** scenario – key for an incremental analysis:
  - A realistic assessment of the existing condition and likely situation over appraisal period
  - Careful estimation of O&M costs
  - Must include the benefits of other planned investments
- **'With project'** alternatives:
  - From long-list at PFS to shortlist for FS
  - FS' short-listed options compared with CBA

Key information for options analysis

- Each of the options analysed within the CBA need to be studied in sufficient detail as to arrive at a reasonably accurate estimate of:
  - Investment (Capital) Costs – including construction cost, land purchase, management costs (including consulting services, etc.).
  - Operation & Maintenance (O&M) Costs
  - Demand (traffic) expected (different investment options may result in different time savings which in turn may result in different traffic levels)
  - Timetable for the preparation and construction of the project
  - If applicable the impact on safety (number of accidents) and environment.

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Economic analysis

- Specific assumptions resulting from the traffic analysis should be made **for each project option**, such as:
  - Traffic volumes per vehicle category
  - Traffic speeds and journey times per type of vehicle and road section;
  - Accident ratio (incidence rate);
  - Capital and O&M cost estimates;
  - Environmental impact (air pollution loads, etc.).

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Main Economic Impacts

Net Impacts (Costs or Benefits) to:	ROAD	RAIL	Others…
Users			
	Time (VoT)	Time (VoT)	…
	Vehicle Operating Costs (VoC)		…
Providers (operators)			
		Vehicle Operating Costs (VoC)	…
Safety			
	Accidents costs savings	Accidents costs savings	…
Environment			
	Air pollution	Air pollution	…
	Climate Change	Climate Change	…
Infrastructure Managers (Government)			
	Capital costs	Capital costs	Capital costs
	Maintenance & Operation Costs	Maintenance & Operation Costs	Maintenance & Operation Costs

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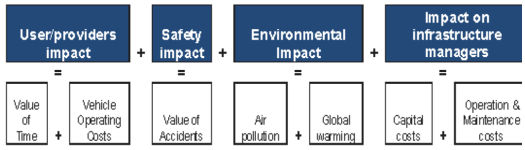
Economic analysis

- **ENPV (@ 5.5% discount rate):**



Key unit values

- VoT, VoA, etc.
  - GTMP
  - HEATCO
- Adjustment over time – elasticity to GDP growth
  - 0.7>…<1
- Important, but to be looked at in conjunction with other key assumptions:
  - Trip purpose distribution
  - No passengers/vehicle, etc.
- Sensitivity tests

Financial Analysis

- Not so relevant in many transport projects
  - Not revenue-generating
    - E.g. non-tolled motorways and roads, etc
  - Or revenue-generating, but revenues<OPEX.
- If revenue-generating, classical gap-calculation methodology.