TRAINING MANUAL 3
FINANCE AND COST RECOVERY

MODULE 3-3: COMPARING THE COSTS OF MSWM STRATEGY OPTIONS

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GTZ-ERM-GKW

This is effectively a rationale for the course – why it is important. It would therefore be useful to refer briefly to some of the economic principles that drive economic evaluation and why economic evaluation has a separate – but strongly related – role to financial assessment.

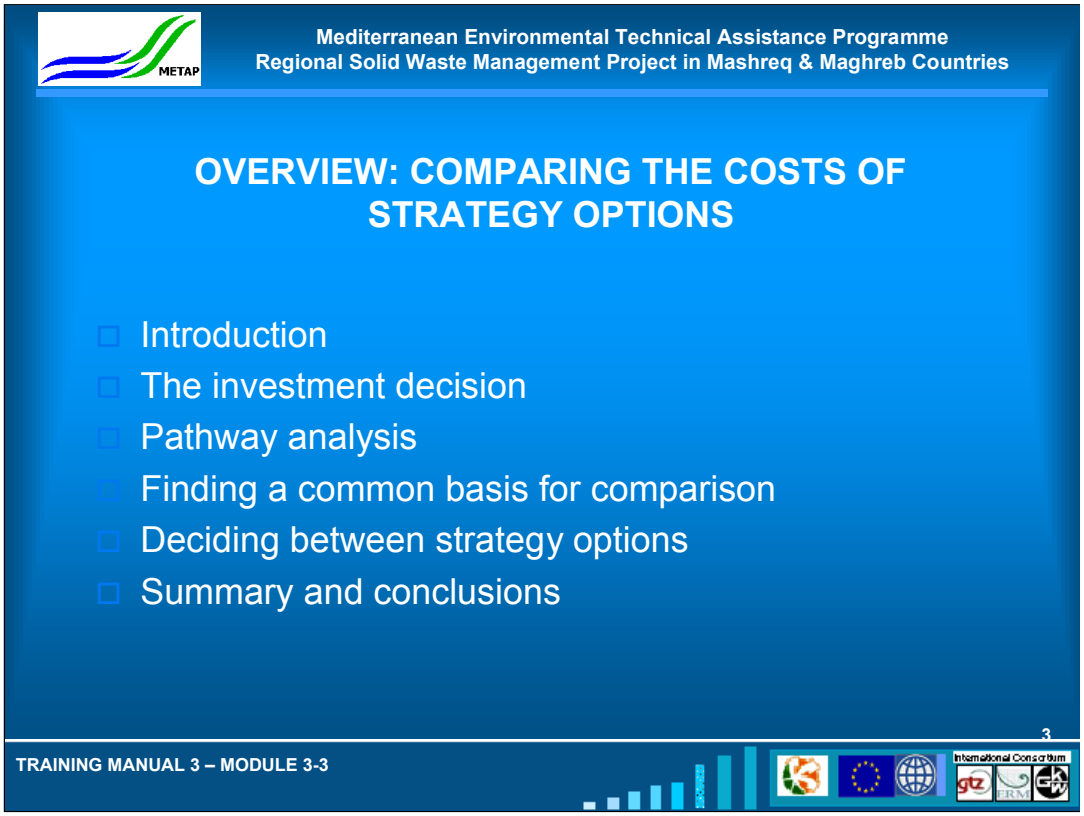
Note that the fundamental economic problem is one of scarcity. Decisions on how scarce resources are used must therefore be properly informed. Economic evaluation is an important aid in this process.

Note that different countries have different economic capacity depending on the stage of their development. Nevertheless, the concept of opportunity cost (using resources in one area precludes the opportunity to use them in another) is common to all economies.

Take the opportunity to refer to the role of economic growth in improving a country's production capacity, that this generates increasing real incomes in the future, and that this is often a prerequisite for the success of municipal waste management projects. Do today what is feasible, practical and appropriate within the constraints set by the current stage of economic development. This relates specifically to affordability – the ability of a country, municipality or individual to generate the resources needed to pay for proposed services.

Unit costs of service (e.g., cost per tonne, m3, person or household), coupled with data on incomes can provide a good indication of the affordability or otherwise of a service. Economic evaluation can help provide this information and thereby help in making decisions about whether or not to invest in a strategy or in individual strategy components.

Note that all of the concepts addressed in this and the other FCR modules are covered in greater detail in the FCR Guidelines and their related Aids to Implementation. These also indicate additional sources of information on many of the concepts being introduced.



This slide is simply an outline of the course – take the opportunity to briefly introduce the concepts that will be covered.

The economic analysis is concerned with decisions about whether or not to invest in a particular strategy (or elements of a strategy). It enables alternative strategies to be compared on a consistent basis.

There are a number of waste management development pathways – some simply relying on waste collection and disposal, others involving more complex waste collection and treatment options. Analysts must be careful to assess the economic viability of each element in such complex arrangements.

The preferred approach is likely to put in place first, those aspects of a waste management system that will be common to all waste management systems. This normally involves mixed collection and landfill disposal possibly with waste transfer.

Economic evaluation provides a common basis for comparing strategy options. This largely involves projecting the future cash flows (cash outlays and cash incomes) for each strategy (and each strategy component) and reducing these to an equivalent value today. This is the concept of discounted cash flow analysis on which much of the economic evaluation is based. The present value of future cash flows then provides a common and unambiguous basis on which to compare options.

Care is needed when comparing options that achieve different objectives, and it is at this point that unit cost analysis becomes important.

This slide shows the stages in the strategy development process represented by this module. The points highlighted in white indicate the compoents of strategy development covered in this Module.

Module 3.2 focused on estimating the costs of existing systems.

This module focuses on the role of economic evaluation in selecting a new waste management strategy (but one that is likely to be building upon an existing one). It leads to the investment decision, the decision about whether to invest in a particular set of waste management measures.

Modules 3.4 and 3.5 focus on the financial costs of the preferred strategy and ways these can be financed.

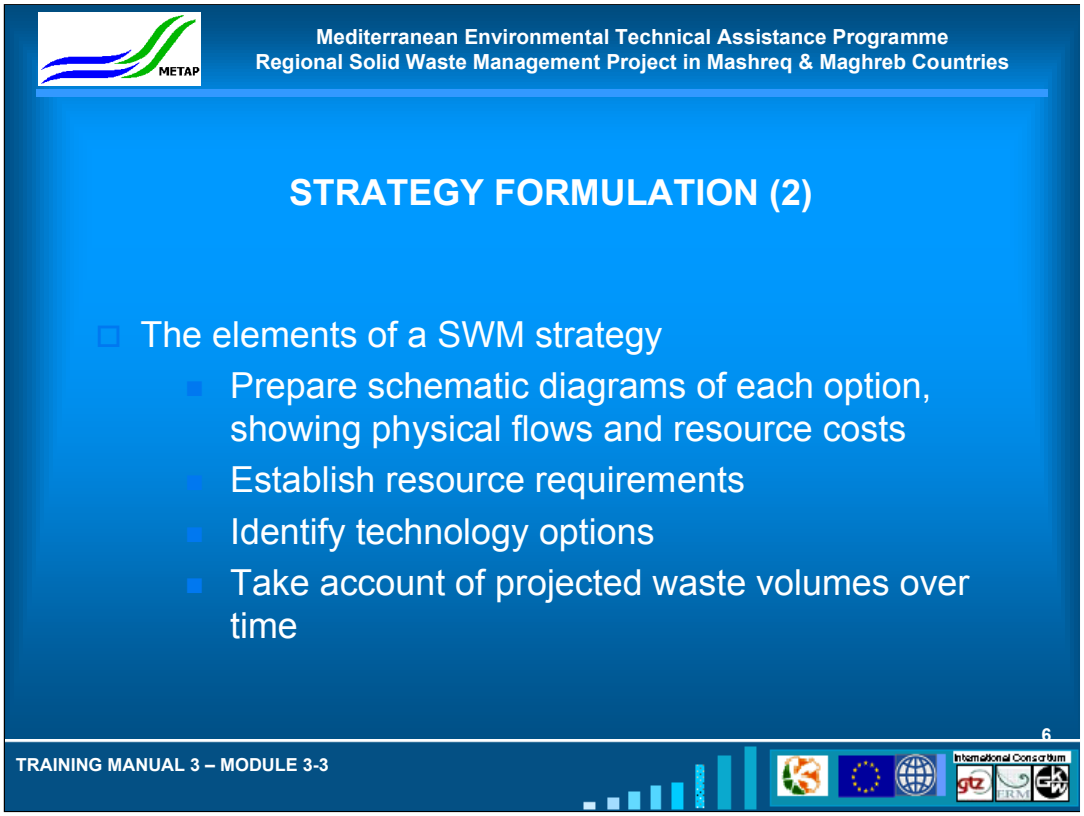
Maybe refer to 'pre-feasibility' analysis at this stage and its role in the identification and initial screening stage of strategy development. This is when a small number of options is normally identified to go forward to the more detailed economic feasibility analysis stage.

The main purpose of the economic evaluation is to help identify the most appropriate solution to the waste management problems being addressed. This might not be the most appropriate solution in social, environmental or even financial terms. The outcome of the economic evaluation is, however, a key factor in deciding on the most appropriate option to go forward to detailed financial analysis.

Explain that, in theory, the economic evaluation (the investment decision) is quite separate from the financial analysis (the financing decision), but that, in practice, this is not always the case. This is because concessionary loans and grants available to public sector projects can influence the nature of the investments that can be undertaken. Note also, however, that this can sometimes lead to distortions and the selection of projects that are not necessarily appropriate to the specific conditions of the country.

This slide identifies the key steps involved in the strategy formulation and evaluation process before financing considerations. These are covered in the following slides.

The four items highlighted constitute the basic subject matter of economic evaluation.



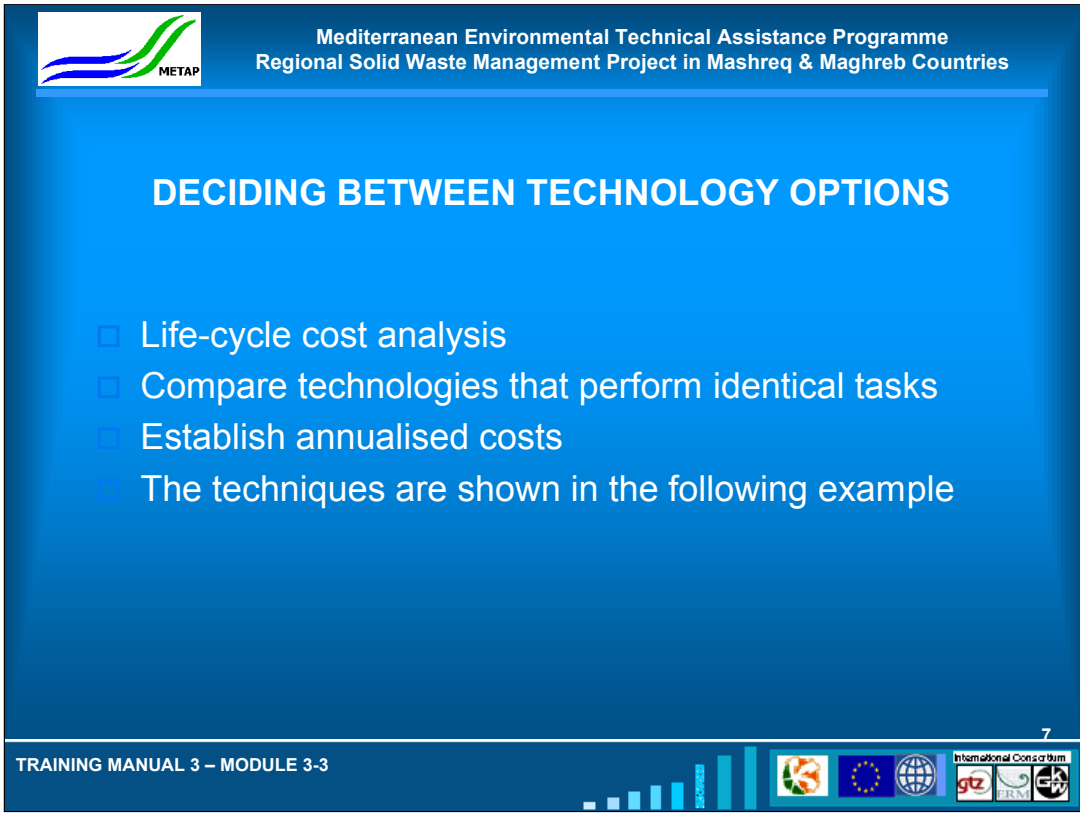
Waste management projects involve flows of solid waste (tonnes). Projecting these physical flows, taking into account population and socio-economic dynamics, is the first stage in determining service needs, how these are expected to change over time and their costs.

The determination of physical flows is usually addressed early in the strategy development pre-feasibility process. This is important to the economic evaluation: to establish the number and scale of facilities and equipment, to calculate operating costs, to calculate unit costs (e.g. costs per tonne of waste), to calculate tariffs and to undertake affordability studies.

Introduce the concept of cost flows (investment costs and operating costs). Explain the difference between costs used in the economic evaluation and those used in the financial analysis. Economic evaluation is concerned with resource costs only – plant and equipment, labour, materials, fuel, etc. These are shown in the year the costs are incurred. It is not concerned with interest, depreciation, tax or debt repayment. These are covered in the financial analysis.

Note that costs used in the economic evaluation are presented in constant values (relating to a particular year) whereas those used in the financial analysis must take inflation into account and reflect projected values of the day.

Introduce the idea of benefit flows at this stage, making the point that a project is only worthwhile if the benefits gained by society from the investment are expected to exceed its costs.



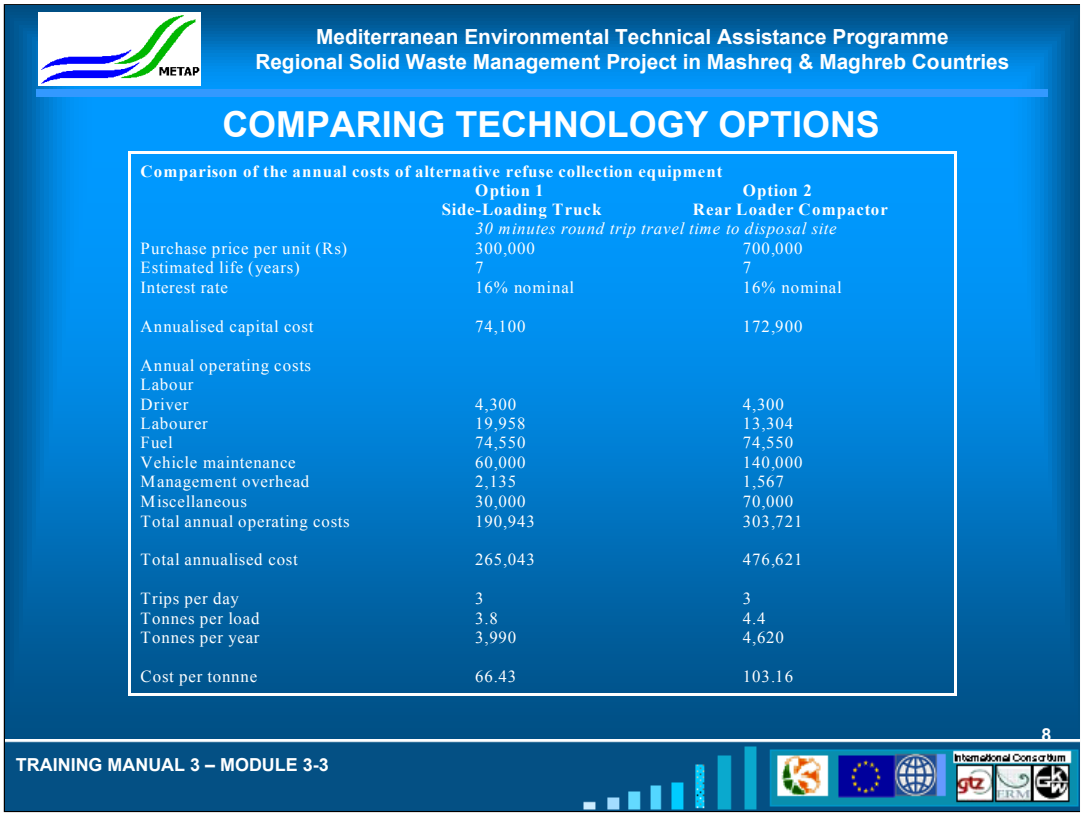
The purpose of this and the following slide is to distinguish between evaluating a waste management strategy and deciding on individual components of the strategy.

For example, one strategy option may require the purchase of a fleet of waste collection vehicles to collect mixed waste and to transport it directly to landfill. The municipality may be faced with two alternative types of vehicle for performing this task, each with different characteristics, including costs. It is necessary at the outset to establish which vehicle would be used to do this task.

The following slide is a simple example of how to compare the annual costs of two waste collection vehicles that will achieve the same waste management objectives.

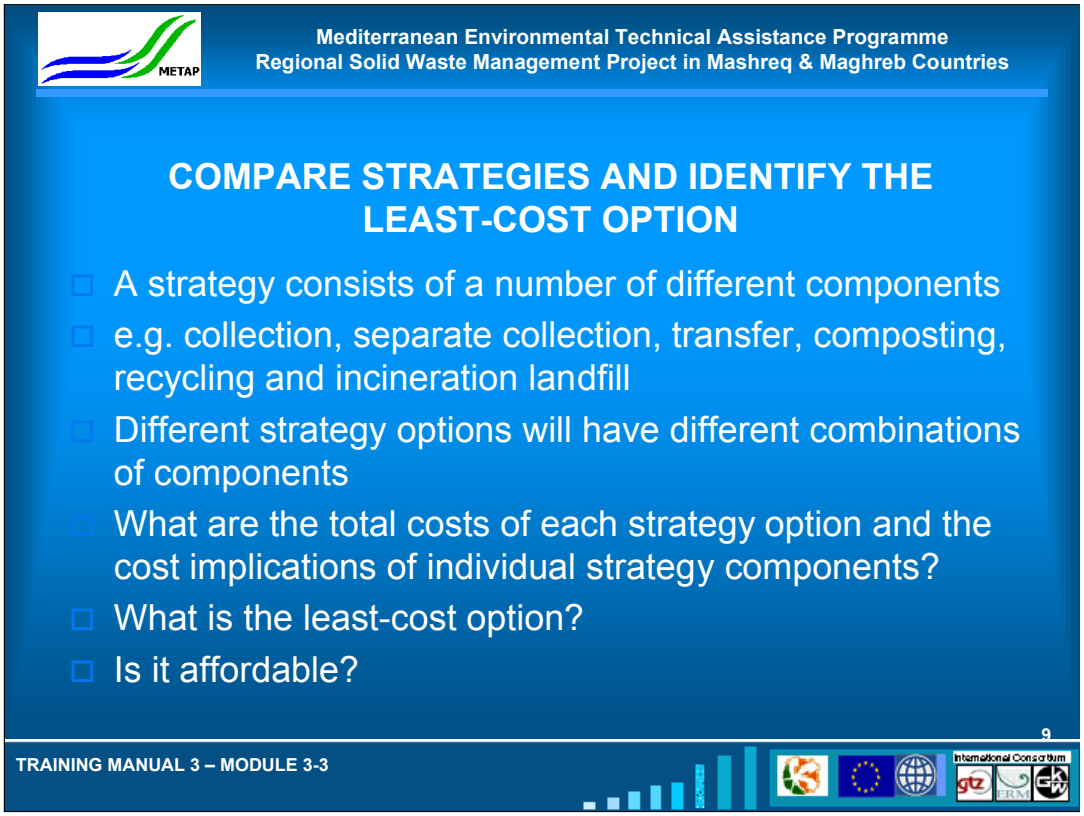
Technical decisions of this kind are made when choosing between technologies that achieve identical objectives. The selected option is then used in the strategy development process. Note that technical considerations play an equally important role in the final decision on technology options. The slide addresses the financial component of technology

selection only



Note that the data used in the example are for illustrative purposes only. The currency, Rs, relates to the currency of the country in which the costs were first calculated. Economic data, such as the expected useful life of vehicle or interest rates, must be determined as appropriate.

The analysis effectively reduces variable costs and performance characteristics to a common basis, measured in terms of cost per tonne. Annualised capital cost uses the normal financial calculation of an annuity payment.

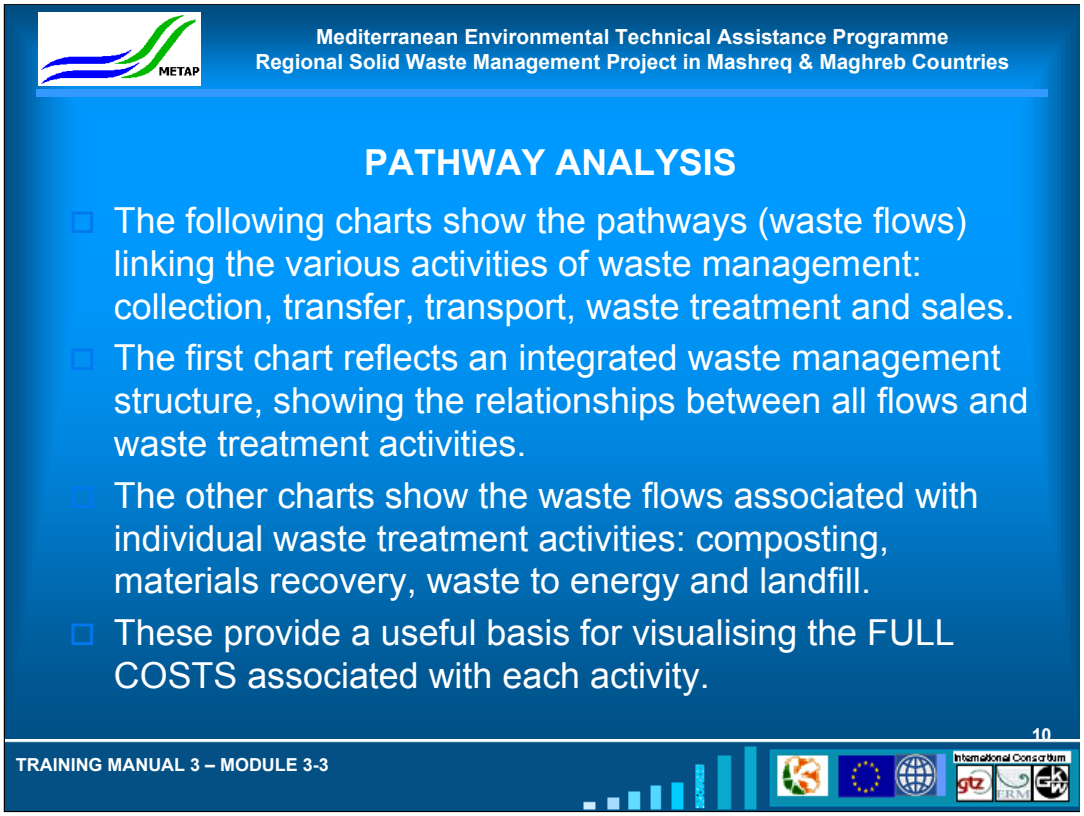


This introduces the strategy development process – formulating alternative development paths that the economic evaluation is required to compare. It also introduces concepts – e.g., unit costs – that are addressed in detail in the module.

Formulating alternative strategy options is a process usually undertaken by a core team of waste management professionals, including specialists advising on economic, financial, institutional and social aspects. The detailed economic evaluation occurs once a small number (usually only 2 or 3) of technically feasible options has been identified. These options that usually involved different flows of waste materials and products, each having different implications for cost. These types of flows are illustrated in the following slides.

The economic evaluation establishes the least cost option and, importantly, the implications for costs and economic viability of making plausible changes to any of the key assumptions and forecasts on which the strategy is based.

It is crucial that any uncertainty in the strategy process – maybe regarding the practical feasibility and costs of waste separation at source – is properly and dispassionately identified at this stage and the possible implications of this uncertainty carefully assessed.



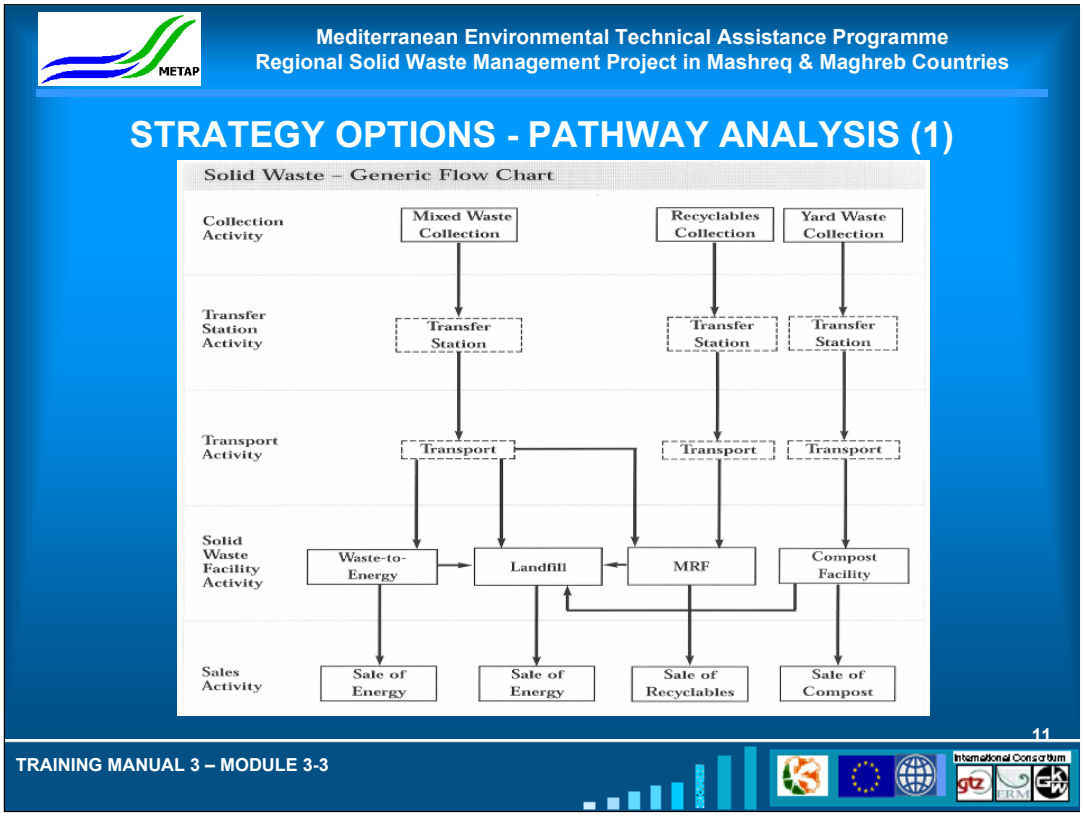
The charts are illustrative – they show waste and product flows associated with waste management strategy options.

It is important to establish at the outset of the economic evaluation process precisely what these flows are. This will enable the total costs of the various strategy components to be objectively determined. For example, evaluation of the waste to energy path involves accounting for all of the costs arising at every stage in the collection, transport, treatment and final disposal process.

A common mistake in strategy evaluation is to base decisions on the average costs associated with the total strategy rather than on the marginal costs of each strategy component. For example, it can be easy to 'hide' the possibly high costs associated with a waste recycling facility within the average costs of the overall system. Looked at separately, a decision might be made to abandon the recycling component, thereby reducing the average costs of the remaining system.

The implications of this are that comparisons of the costs of different strategies need to take account of the full costs of a particular pathway. For example, it is not possible to compare the costs of landfill with the costs of recycling or composting; it is, however, possible to compare the costs of a strategy based on recycling or composting with one based on landfill disposal. This is because both the recycling and composting routes depend (among other things) on the availability of a final disposal site (landfill).

Also the introduction of a recycling or composting plant can alter the relative economics of a landfill facility (possibly increasing its costs as a result of lower economies of scale). Aspects such as these must be identified and properly assessed in the evaluation process.

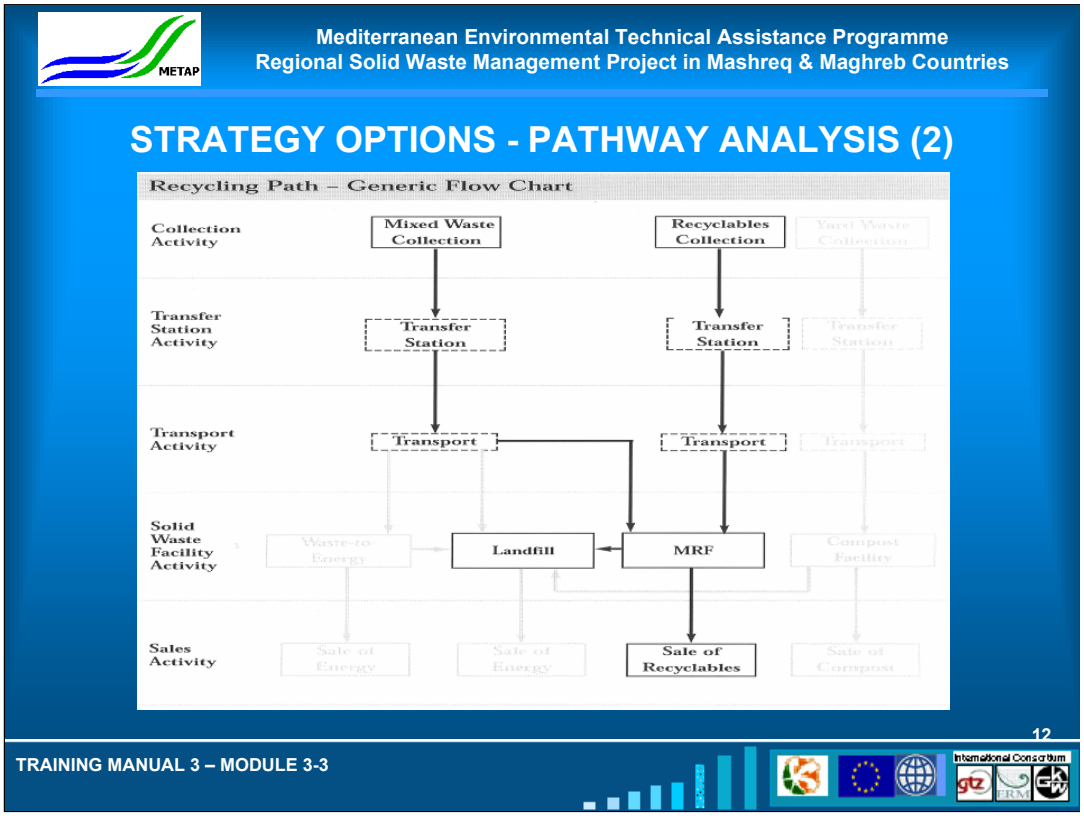


Note that MRF refers to materials recovery facility. The dotted lines indicate an activity that does not necessarily occur in the pathway (transfer stations are the main example).

This slide summarises the various components and pathways that can be included in a waste management strategy.

The following slides illustrate the pathways of each component. Schematic representations of a waste management strategy proposal provide useful insight into how to structure the economic evaluation of the individual components of an integrated waste management system, identifying the total unit cost implications of each waste management pathway.

This can then enable decisions to be made on whether or not to include a particular waste management pathway in the development programme, based on information on the full additional costs and possible financing and cost recovery implications of each component.



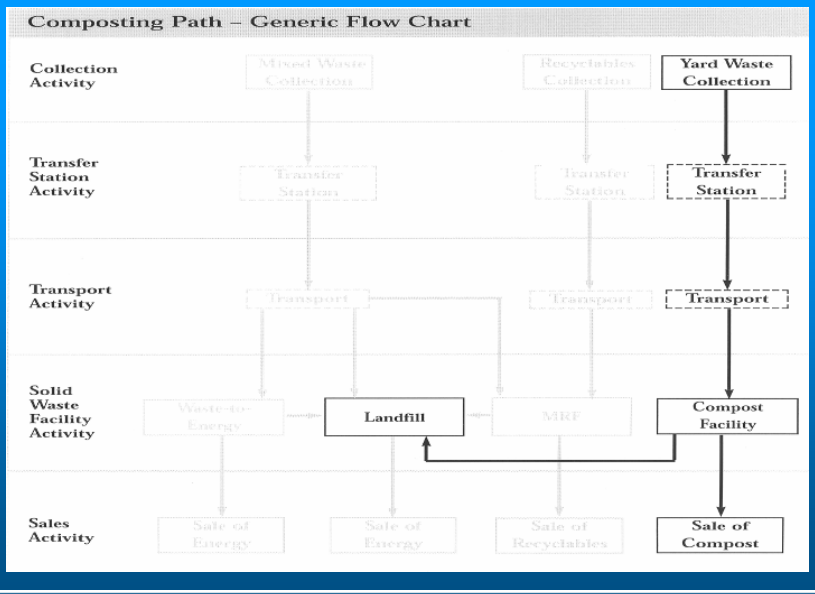
By separating out the various pathways involved, and establishing their waste and resource flows, a far better understanding can be had of the actual costs (and unit costs) of the different options. In particular, a systematic approach to defining material pathways can ensure that every element involved in a particular waste management measure can be identified and the full costs attributed to that measure.

In the case of the materials recovery facility represented by this pathway it is necessary to take account of two collection systems, two transfer and transport systems, full landfill costs plus materials sales costs and revenues.

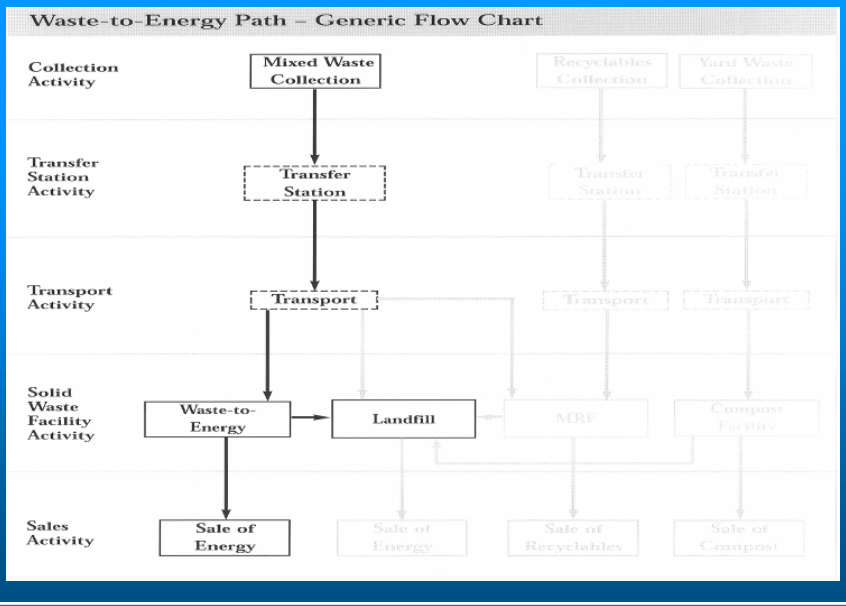
The costs of this system might then be compared with a system that excludes the separate recyclables collection system, confining collection to mixed waste only. This might then also be compared with the option of all waste being taken directly to landfill for disposal. A systematic process such as this allows the full cost implications of alternative strategy approaches to be properly assessed, providing hard information to help guide the decision making process.

Similar comments apply to the other pathways shown in the following slides.

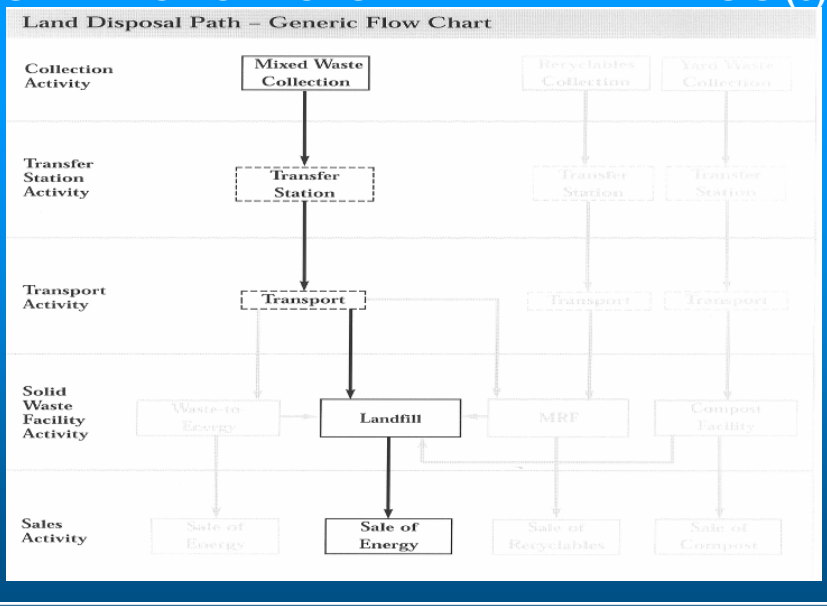
STRATEGY OPTIONS - PATHWAY ANALYSIS (3)

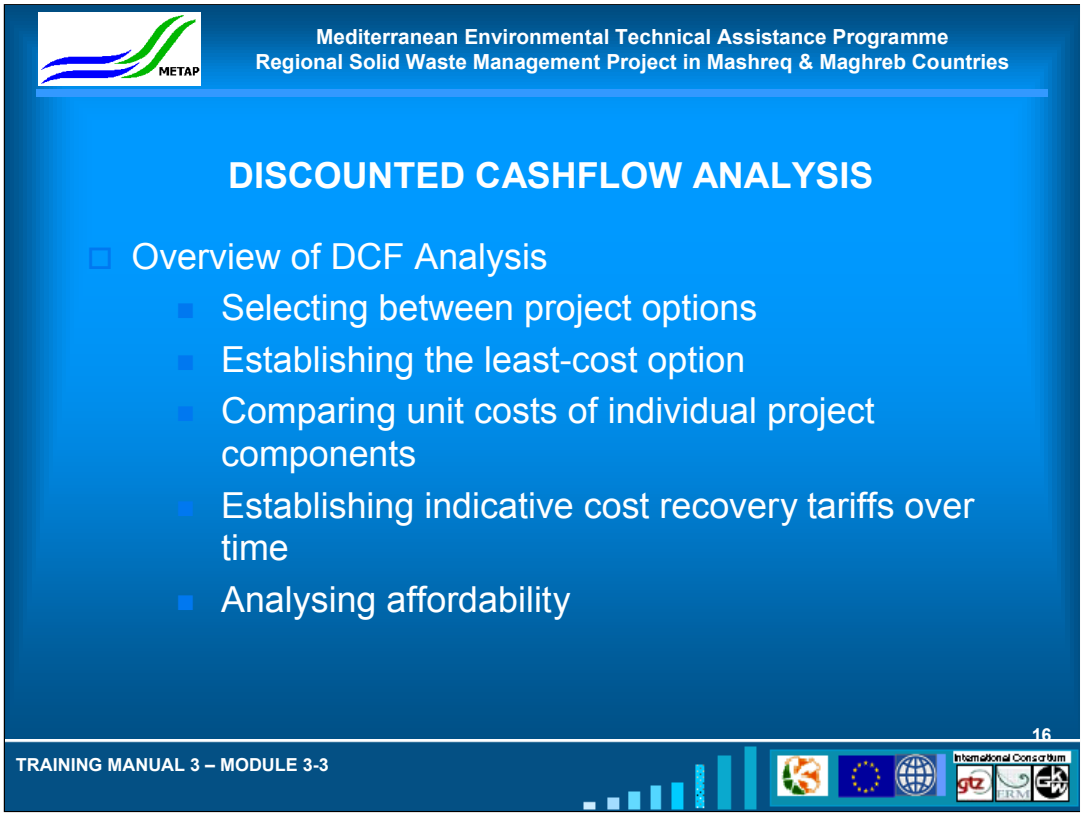


STRATEGY OPTIONS - PATHWAY ANALYSIS (4)



STRATEGY OPTIONS - PATHWAY ANALYSIS (5)





Introduce the concepts of DCF analysis and present value as a basis for comparing options that have different cost (and revenue) profiles over time. The aim is to give delegates a general overview of what the concepts are and why they are important. It should not be necessary to give detailed explanations of the various techniques – an understanding of the concepts and their importance is what is required.

Aim to engage participants in discussion of the concepts – why discount, for example. The need to take account of all project costs (not just investment costs). The need to have a way of comparing cash flows when these are unevenly distributed in time.

Draw upon simple worked examples.

Mention that these techniques are used in the following slides on cost-effectiveness analysis, average incremental cost analysis and affordability analysis.

Note that we are concerned with the timing of cash outlays (on resources, such as expenditures on capital equipment and labour) and inflows (such as revenues derived from the sale of recovered materials) and not with financial costs (such as interest payments or depreciation provisions). DCF analysis provides a common basis for comparing alternative strategies over time.

The techniques of DCF analysis

Discounting cash flows and the discount rate

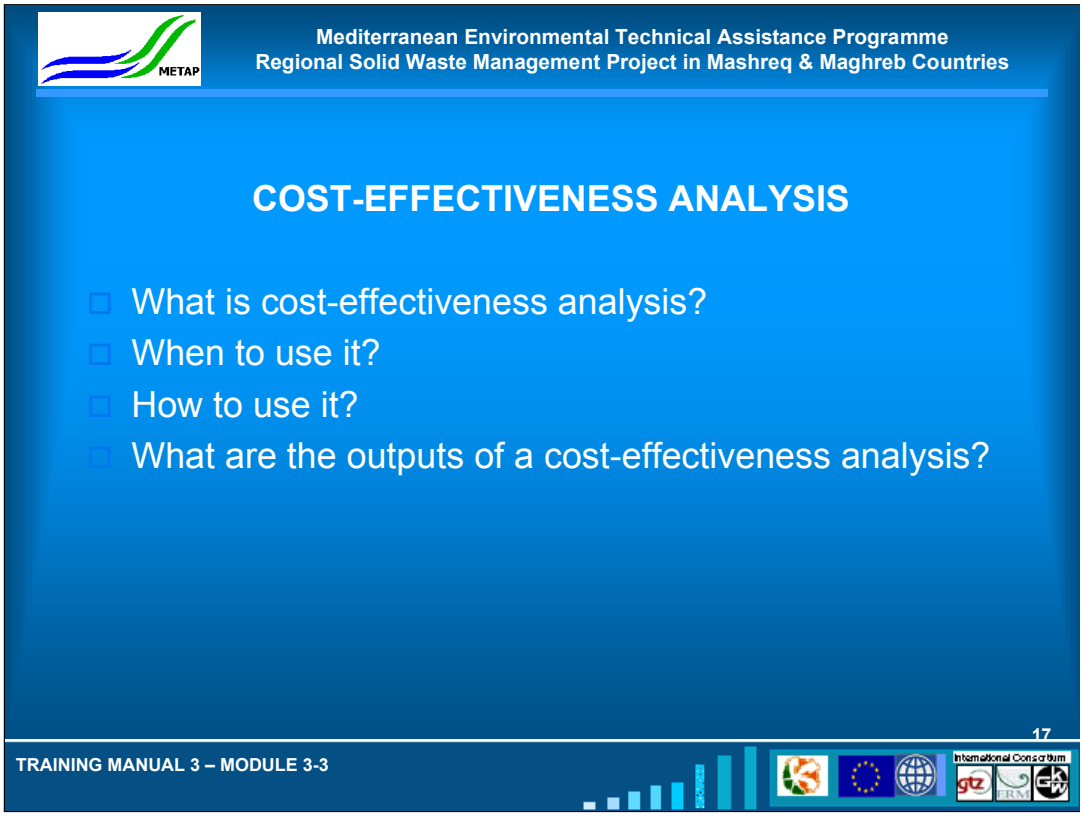
What cash flows to include and which to exclude

The present value (PV) of a cash flow

Unit costs

Cost-effectiveness analysis and the least-cost option (when comparing options that have identical objectives)

Average incremental cost analysis (also enables the unit cost implications to be assessed of options that do not achieve identical objectives)

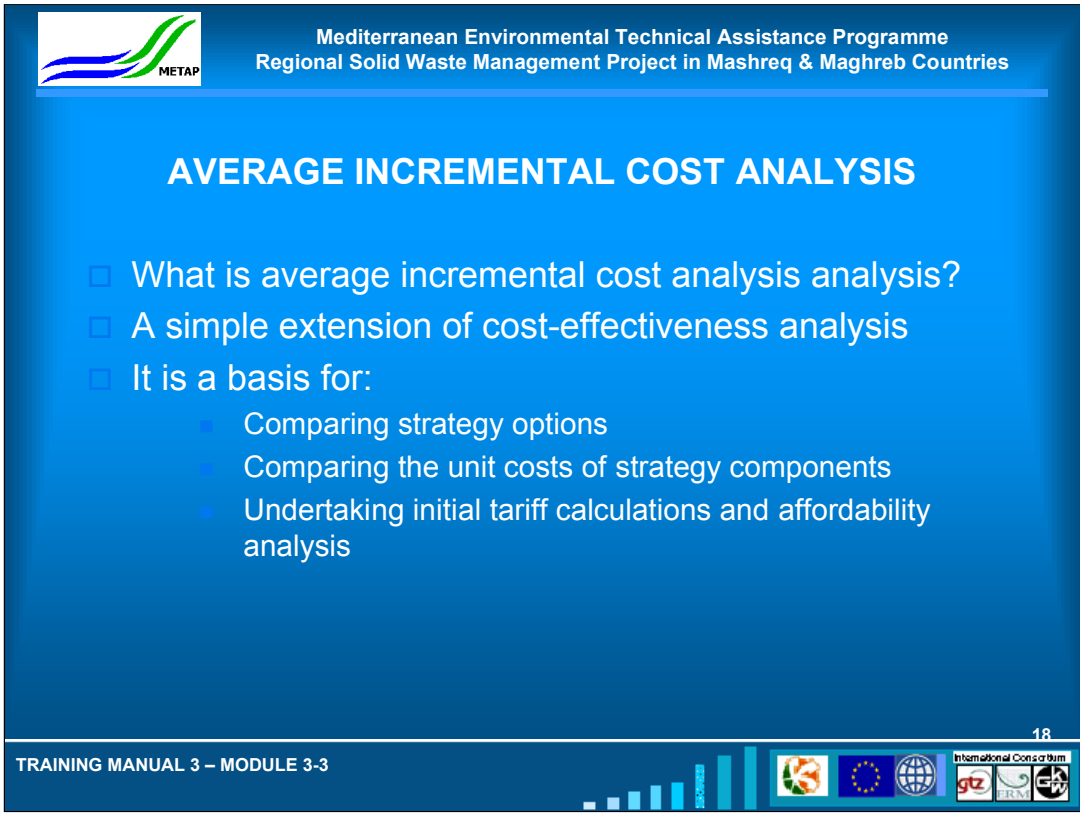


This session is a natural continuation of the previous slide on DCF analysis, in which the main concepts have already been explained.

Ensure that delegates understand that cost-effectiveness analysis is used when comparing project options that achieve identical objectives. This constraint is removed when extending CEA to AIC analysis (see the following slide).

Make delegates aware that although cost-effectiveness analysis can tell us the least-cost method of achieving a specific objective, it says nothing about (i) whether or not the project is economically viable or (ii) whether it is affordable. Affordability is addressed later in the module.

Stress the importance of rigorous sensitivity analysis, showing how plausible changes to key assumptions can have significant implications for economic outcomes.



This slide is a natural continuation of the previous one on cost-effectiveness analysis. AIC is a logical extension of CEA.

Average incremental cost analysis is a powerful tool that can be used for comparing strategies and strategy components on the basis of their unit costs. It is a simple concept.

It enables the unit costs of projects that achieve different objectives to be compared, and the relative differences between the two to be gauged.

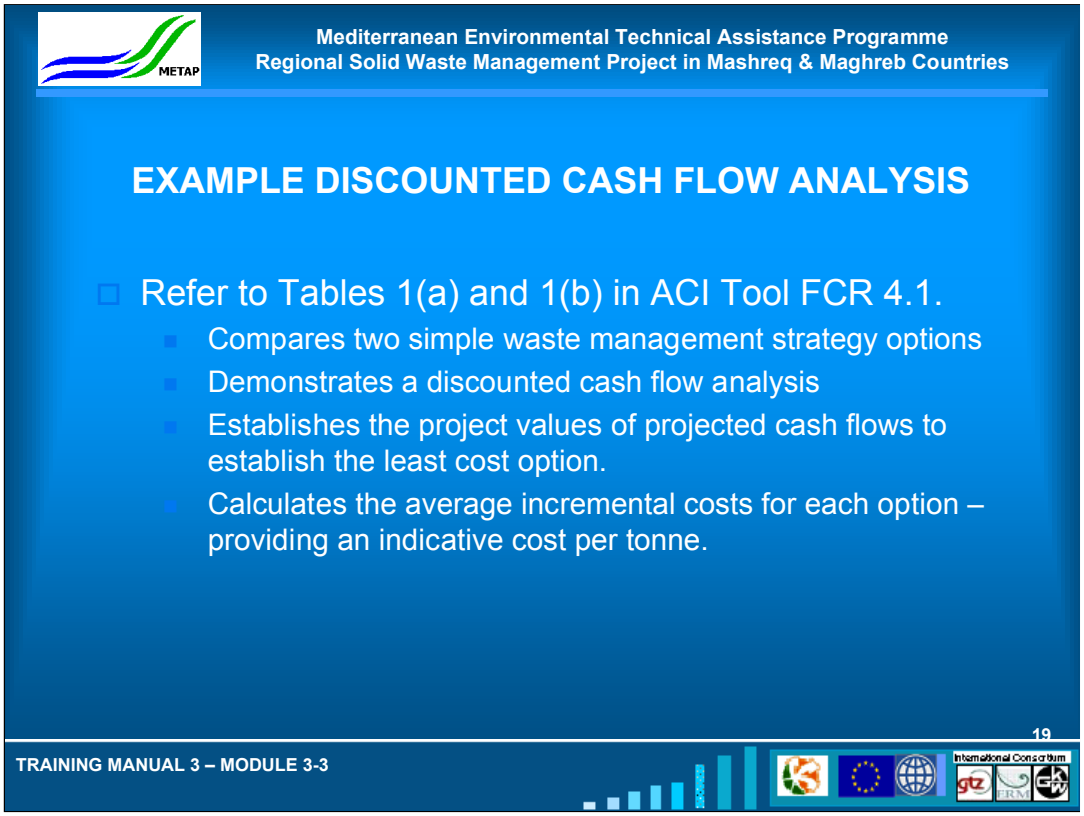
Average incremental cost approximates the long-run marginal costs of a project. This is the revenue required per unit of of waste collected for the present value of the cost stream to equal the present value of the revenue stream.

It is calculated by dividing the PV of the cost stream by the PV of the physical flow (e.g., in tonnes of waste) to give a cost per unit (e.g., cost/tonne).

Conclude by stressing the importance of CEA and AIC analysis to proper evaluation of alternative strategies and the various components (waste management pathways) of individual strategies.

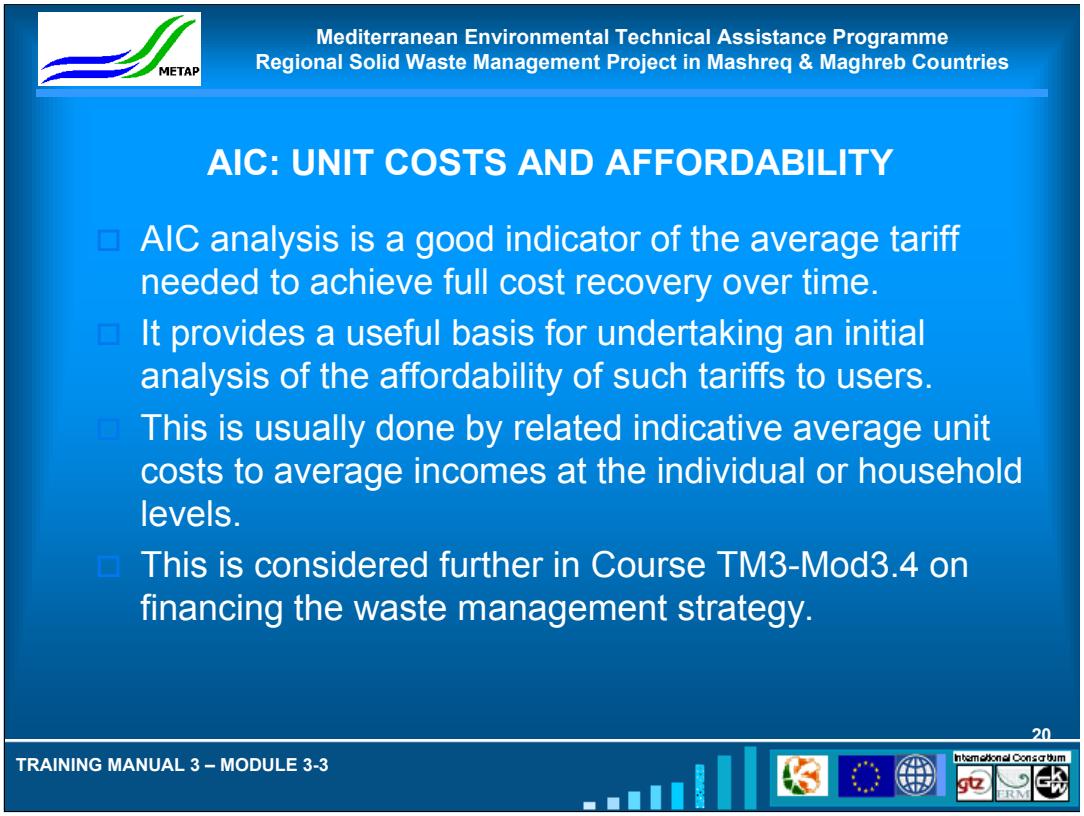
AIC also provides a good preliminary estimate of the average tariff that would recover the full cost of a strategy (or strategy component) over its projected life.

Illustrate these concepts using tables and charts from a simple example.



The tables referred to focus on two simple waste management strategy options: (i) all waste is collected and transported directly to a landfill and (ii) part of the waste is transported directly to landfill with the remainder transported first to transfer station and then to landfill, transported in large haulage vehicles.

The example is useful for describing the nature of the cash flows used in a DCF analysis, the determination of the least cost option, and the unit costs (using AIC) of the two strategy options and of their various components (collection, transfer, haulage and disposal).



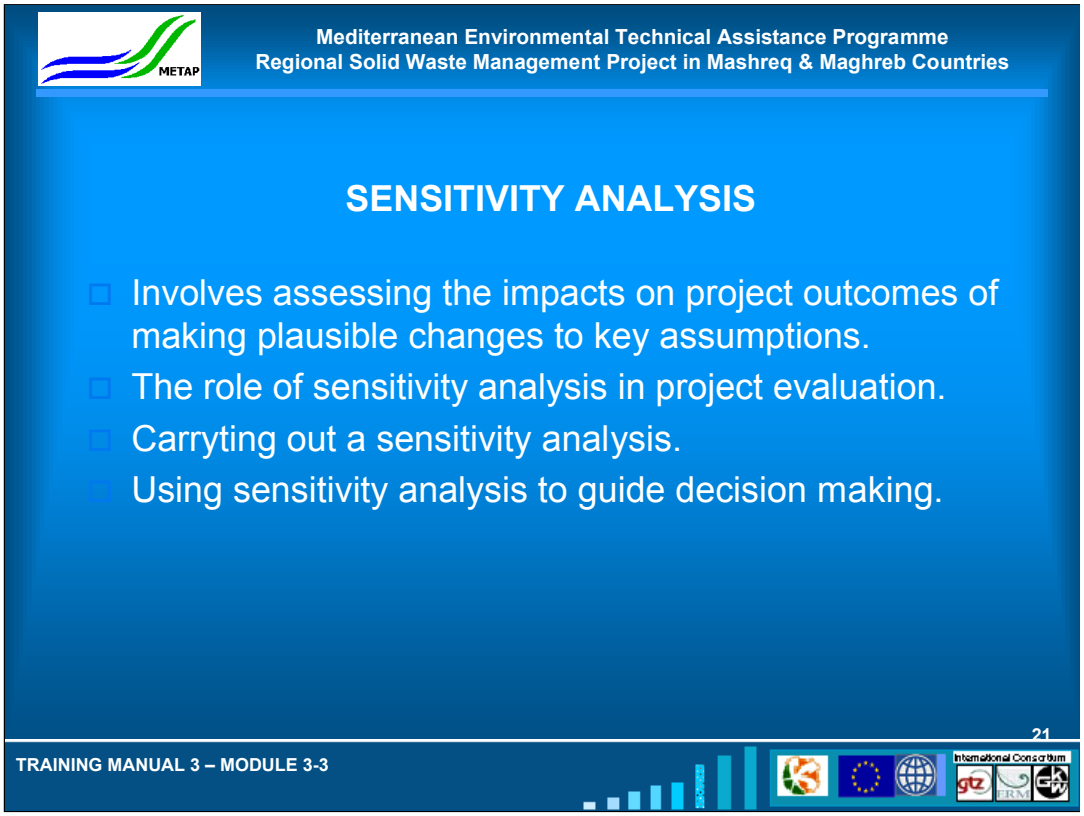
The slide follows on from the previous one on AIC analysis. The aim is to introduce the concept of affordability within the context of the economic evaluation.

AIC, as a measure of the average unit cost of service, can be represented as a unit cost per capita or household and this compared with average annual income to give an indicator of affordability. It can give a good early indication of the actual unit costs of proposed services (before financing considerations) and therefore can be an important factor in establishing the appropriateness of a strategy before detailed attention is given to financing options.

The underlying focus is on the national economy and its capacity to allocate scarce resources to the project. This is usually done by relating average annual waste management costs per capita to average annual incomes. This provides an indicator of the relative amount of resources that must be allocated to the project. This can then be compared with yardsticks to assess whether the project is affordable to society as a whole. Although there is no firm rule, waste services are usually taken to be affordable if their annual represent less than 1-1.5% of average annual disposable household income.

Note that this should be a key factor in deciding if the project should be accepted or not. Even if the project is to be financed substantially by grants, its inherent economic affordability – whether it can be maintained, operated and replaced in due course – is a key factor in determining its long-term sustainability.

The issue of affordability is therefore a vital consideration in the decision making process. It is looked at again given in the financing module, where the financing mix of loans and grants is taken into account in establishing the affordability of debt obligations to municipalities and of user-charges to households.



The aim of this session is to demonstrate the importance for effective project evaluation of carrying out detailed sensitivity analysis. This involves assessing the impacts on project outcomes of making plausible changes to key assumptions.

Provide a simple example of the implications of changes to key economic parameters on the economic outcomes and conclusions.

Economic evaluation is an essential component of the strategy development process. Whether facilities are being designed for a small municipality or a large city, the effects of decisions made at this time will influence financial capacity for many years to come.

Mistakes made at this time can have very serious consequences for the future, in terms of the quality and effectiveness of waste management services, their costs and their affordability. Also, wrong decisions made today can significantly reduce the capacity of municipal authorities to introduce or improve other (possibly unrelated) municipal services.

An inappropriate decision to take a very large loan (thereby reducing a municipalities long-term borrowing capacity) is a common example.

That is, we are concerned with far-reaching decisions about the allocation of scarce municipal resources to long-term investments. It is therefore necessary to consider very carefully whether the services and expenditures being proposed are appropriate and affordable, and ensure that a decision to allocate resources as proposed will not preclude the achievement of other important municipal objectives.

These are important considerations that should loom large in the decision making process. Such considerations make it all the more important that a systematic economic evaluation is made of all proposals to commit high levels of municipal funds (and including its borrowing capacity) to a particular development proposal. Are there alternative ways of achieving the same or similar objectives? Are the developments being proposed proportionate to the financial capacity of the municipality?