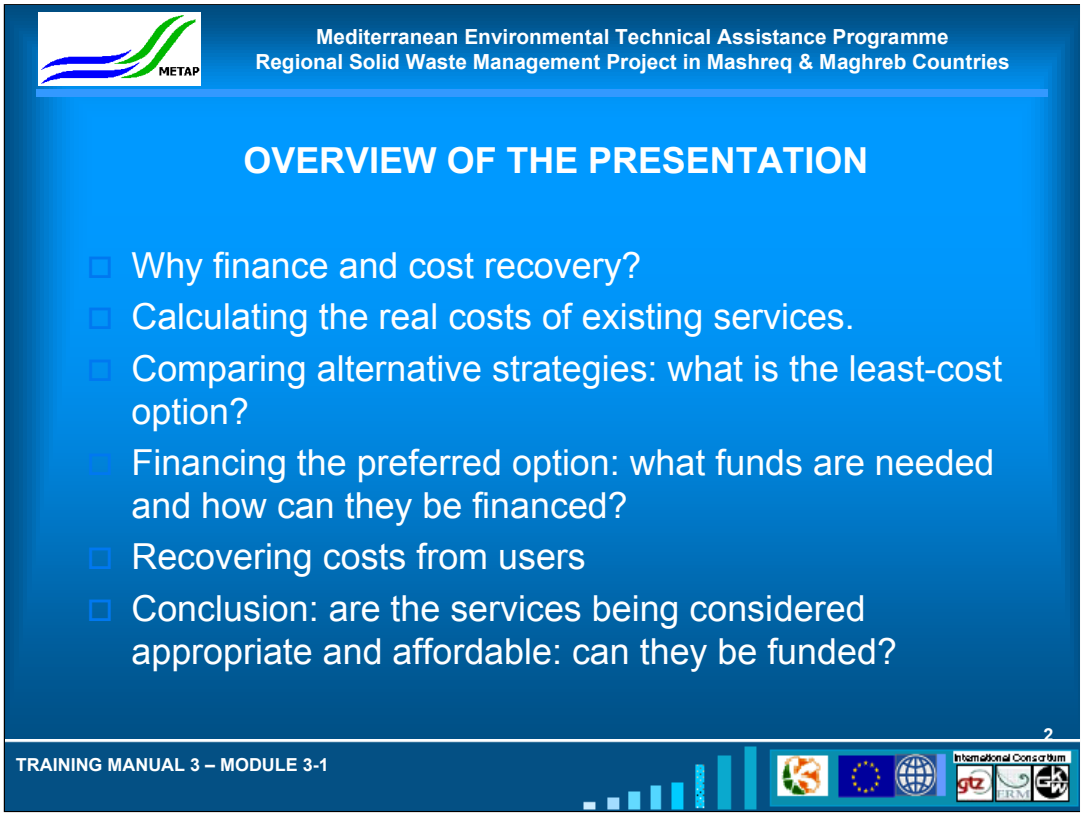
The purpose of the module is to present a general overview of aspects of the economics and financing of waste management services that are considered important to government officials charged with advising on or making decisions on changes to waste management practices. It also acts as a useful introductory module for particpants in the more detailed FCR modules, although it is not a prereqisite for attending them. It draws largely from information covered in Modules 3-2 to 3-5, but not solely on this.



This overview introduces the four main subject areas covered by the presentation. These are: (1) the costs of existing services; (2) the techniques of economic evaluation used to compare strategy options and to help select the preferred option; (3) what the preferred option actually costs and how these costs – both investment and recurrent – can be financed; and (4) the scope for recovering (some of the) costs from the service users.

Each of the four sections closes with some concluding comments.

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.

Questions such as these commonly arise whenever a municipal waste agency embarks on a programme to improve its waste management services. They also arise whenever the agency submits and has to defend a request for an increase in its budget allocation.

It is therefore necessary to have a sound understanding of the principles and methods that can be used to help provide reliable answers to questions like these.

This module provides an introductory overview of these concepts. Greater insight is offered in training courses TM3-2 – TM3-5.

The full costs of waste management services are frequently not known, and there are a number of reasons for this. One is that information collection systems are poorly organised and maintained, and the information necessary to make reliable estimates is simply not available. Another is that managers do not understand the true nature of the costs of the services they are providing.

There are many reasons for this, also. One is that costs and expenditures are widely distributed over a wide range of municipal budget lines and nobody has responsibility for collating these costs and allocating them to particular services or functions. For example, labour costs are frequently treated as a single budget item rather than allocated to the range of different municipal functions on which workers are employed. This is particularly true when the waste management function is operated through a municipal department that has no real commercial authority or independence. Another is that cost accounting techniques that recognise the full costs of services at the time the service is provided are only slowly being introduced into many municipal authorities in the region. This means that significant cost items, such as the value of capital assets used up in providing a service, is not recognised as a cost of service.

These cost issues are fundamental to planning and operating waste management services reliably and cost-effectively, both now and in the future, and form the subject matter of this first section. They are covered in greater detail in FCR Module 3-2.

The distinction between costs and expenditures is an important one.

Expenditures relate only to actual cash outlays – transactions, or money actually spent.

Costs relate to the use of resources. Thus, part of the cost of using a refuse collection vehicle for one year is the value of the vehicle 'used up' in that period. This is generally referred to as 'depreciation'. The fuel and labour used to operate the vehicle are also costs (they involve resources being used up) but they are also expenditures (because cash transactions are involved). These are significant cost items that are often overlooked in the estimation of service costs.

Examples of expenditures (or cash outlays) are

- Investment expenditures made to purchase long-term assets (e.g. a waste transfer station or a waste collection vehicle).
- Operation and maintenance (O&M) expenditures made as part of day-to-day operations (labour, fuel).
- The interest payments made on loans.

Examples of costs are

- Depreciation of long-term assets (e.g., a waste collection vehicle)
- Provisions made (funds put aside) today to finance future expenditures resulting from today's activities (e.g., landfill closure – costs are incurred today, the expenditure is made in the future)
- Operation and maintenance (O&M) expenditures (resources are used up, therefore they are also costs).

This slide relates to the difference between 'cash basis' accounting and 'accruals' accounting.

FCA is effectively another way of describing accruals accounting.

The benefits of FCA are that:

It identifies actual service costs (including unit costs).

It helps avoid 'peaks and troughs' in cash expenses (if budgeting is done on an FCA basis).

It is an invaluable aid when contracting services (because the full costs are known).

It is an analytical tool, allowing WM agencies to account for and examine each component of SWM services (e.g., for head office, collection, transport, disposal, recycling).

It can be used as the basis for benchmarking – measuring performance and comparing it with benchmarks for similar activities elsewhere.

Depreciation is an accounting concept whereby the value of an asset – e.g, a waste collection vehicle – is recovered over its operational life and is treated as an annual cost.

The points to be made here are that knowing the full costs of the services you are providing or propose to provide is key to establishing appropriate and realistic services that are affordable to the community being served. The absence of reliable cost information can (and does) lead to the development of facilities and services that are unable to be sustained financially in even the medium term. Unless attention is paid to the full, life time costs of facilities and services there is a high probability that services will progressively deteriorate to the point of failure.

Information on costs and operations has to be properly collected, maintained and analysed by individuals who understand the purpose of the information. This means having the capacity to systematically collect and record information and having staff capable of managing and using this information. It needs a commitment to improving the overall focus and quality of municipal accounting systems, from cash accounting to full cost accounting. It can also mean a shift in emphasis from merely collecting data to one of collecting the information needed to manage existing services and to plan future services. This is an important distinction.

An example is contained in FCR Module 3-2.

This section focuses on the economic analysis that should be carried out in order to identify waste management development strategies that are appropriate to the community where it is being introduced. Economic analysis answers the questions listed in the slide.

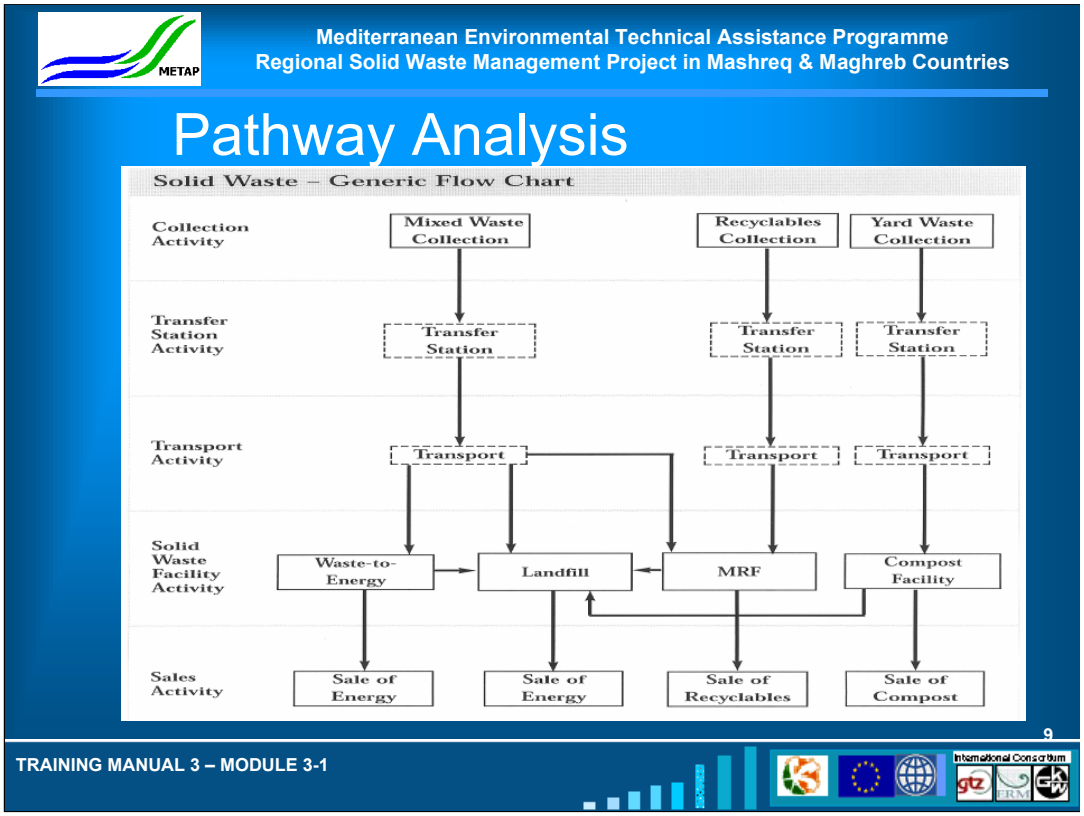
Different countries and municipalities have different economic capacity depending on the stage of their development. By improving production capacity, economic growth generates the higher levels of incomes that are often a prerequisite for the success of municipal waste management projects. Do today 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 sustain the proposed services.

Economic evaluation can help in making decisions about whether or not to invest in a strategy or in individual strategy components.

Avoid 'big bang' solutions that aim to introduce a number of new functions at the one time (e.g., an integrated programme of waste collection, recycling, energy recovery, composting and disposal). See the following slide.

Do the important things first (this is often waste collection and disposal). Analyse the economic implications of all proposed project components. Be ruthless in your analysis – assess the consequences of the failure of one or more of your proposed components.

Keep it simple – progressively develop the waste management system over time. Learn from experience – your own and that of others.



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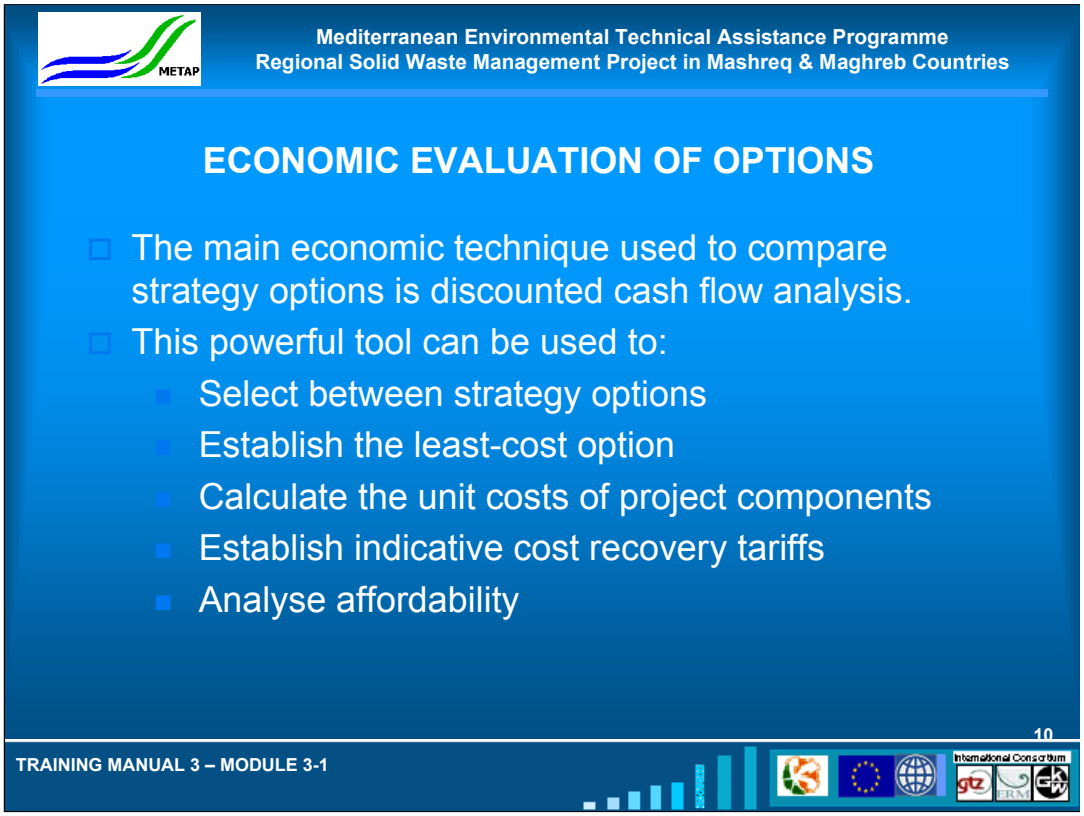


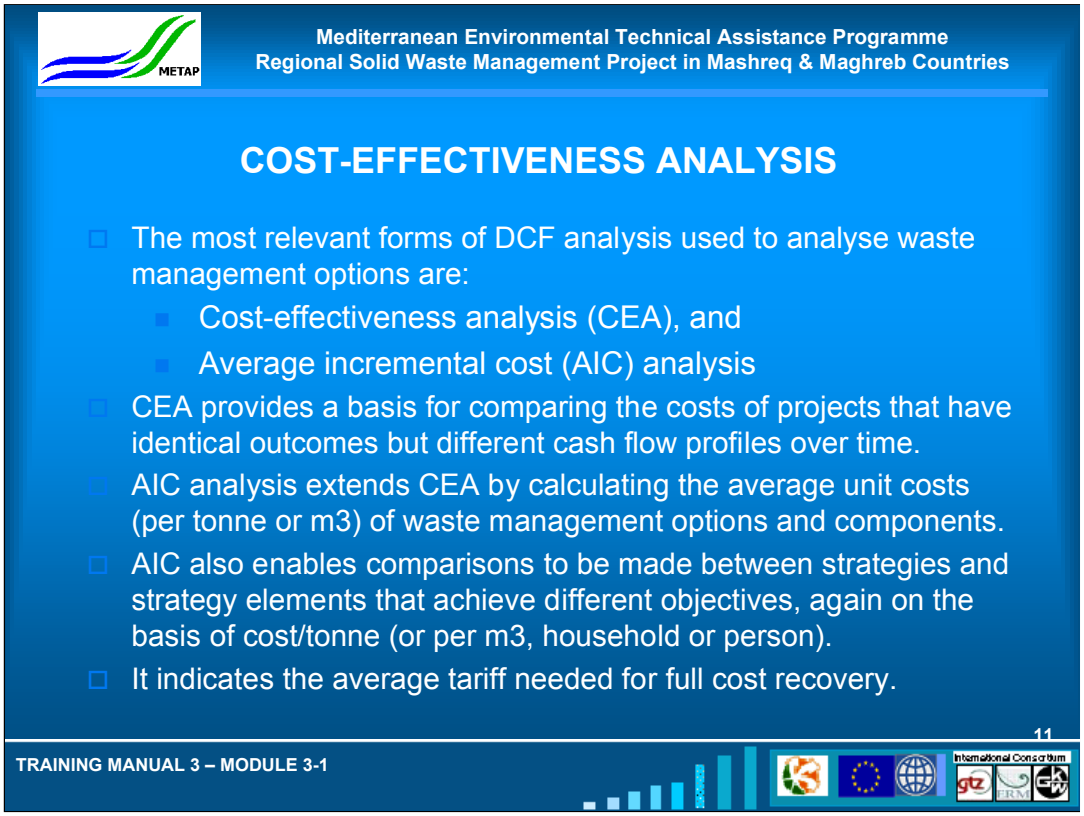
Introduce the concept of DCF analysis as the basis for comparing options that have different cost (and revenue) profiles over time. The aim is to give delegates a general overview of what the concepts are and why they are important.

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.

DCF analysis is concerned with examing realistic projections of costs and revenues in the future. From these projections a deep understanding of the cost consequences of alternative approaches to waste management and the different combinations of waste management measures can be gained.

The analysis should also be subjected to rigorous sensitivity analysis to ensure that the consequences of unexpected changes to costs or other assumptions (such as sales and prices of recovered materials) can be properly recognised.

Note that most waste management planners are optimists – in reality, costs and operational assumptions almost always change for the worse rather than for the better. Scrutinise all outcomes, and ask the question ‘what if?’



This is a natural progression from the previous slide on DCF analysis.

Cost-effectiveness analysis is used when comparing project options that achieve identical objectives. This constraint is removed when extending CEA to AIC analysis.

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.

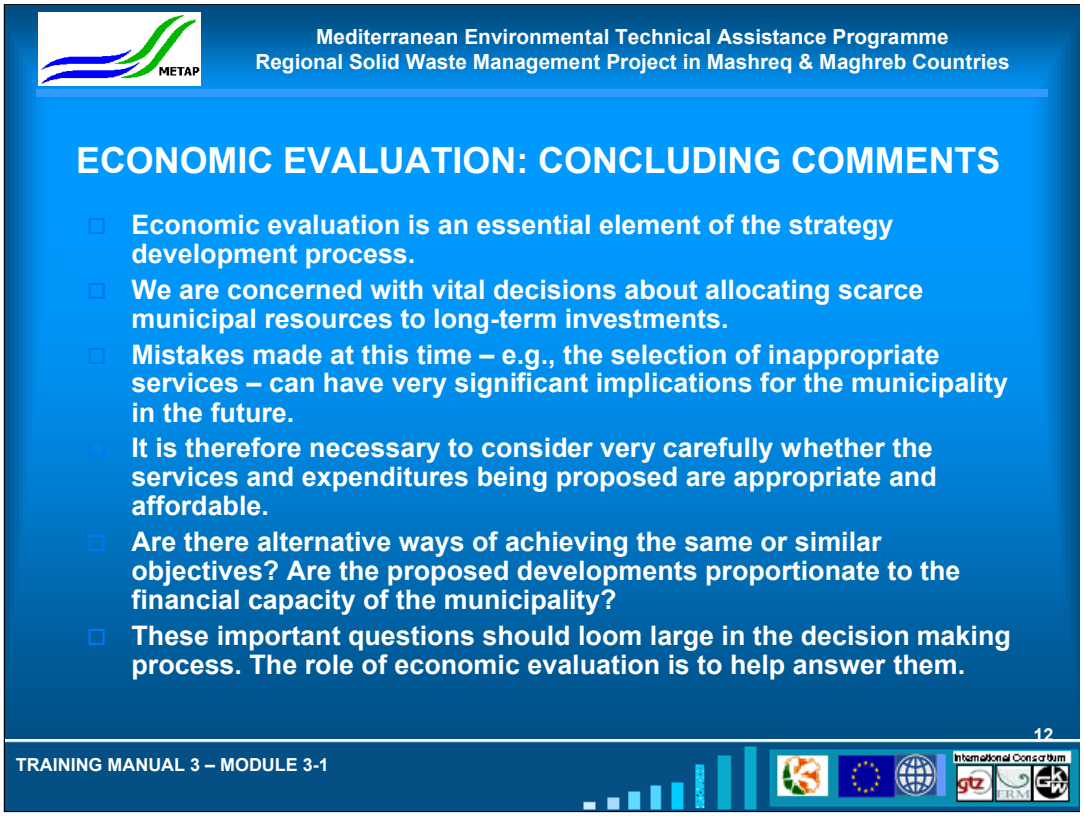
Stress the importance of rigorous sensitivity analysis, showing how plausible changes to key assumptions can have significant implications for economic outcomes.

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 (e.g., cost/tonne) 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. It 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. It can be used in preliminary affordability analysis.

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. See next slide.



This slide is self-explanatory.

This is the introductory slide to the issue of finance rather than economics.

Having selected a preferred waste management approach from the economic analysis the next stage is to examine in detail its financing requirements and how these are to be met. This covers both the initial investment requirement and the annual recurrent funding requirement.

Explain the reasons for undertaking the financial assessment and the outcomes expected from it. This is part of the general introduction to the module leading into the more detailed analytical aspects covered by the module.

The overall objectives of the financial analysis are to:

•establish the total investment funding requirement

•identify and optimise the mix of investment funds used by the project,

•establish the annual revenue requirement,

•establish the sources of recurrent funds to be used by the project, and

•assess the affordability of the proposed funding arrangements to the municipality and to users.

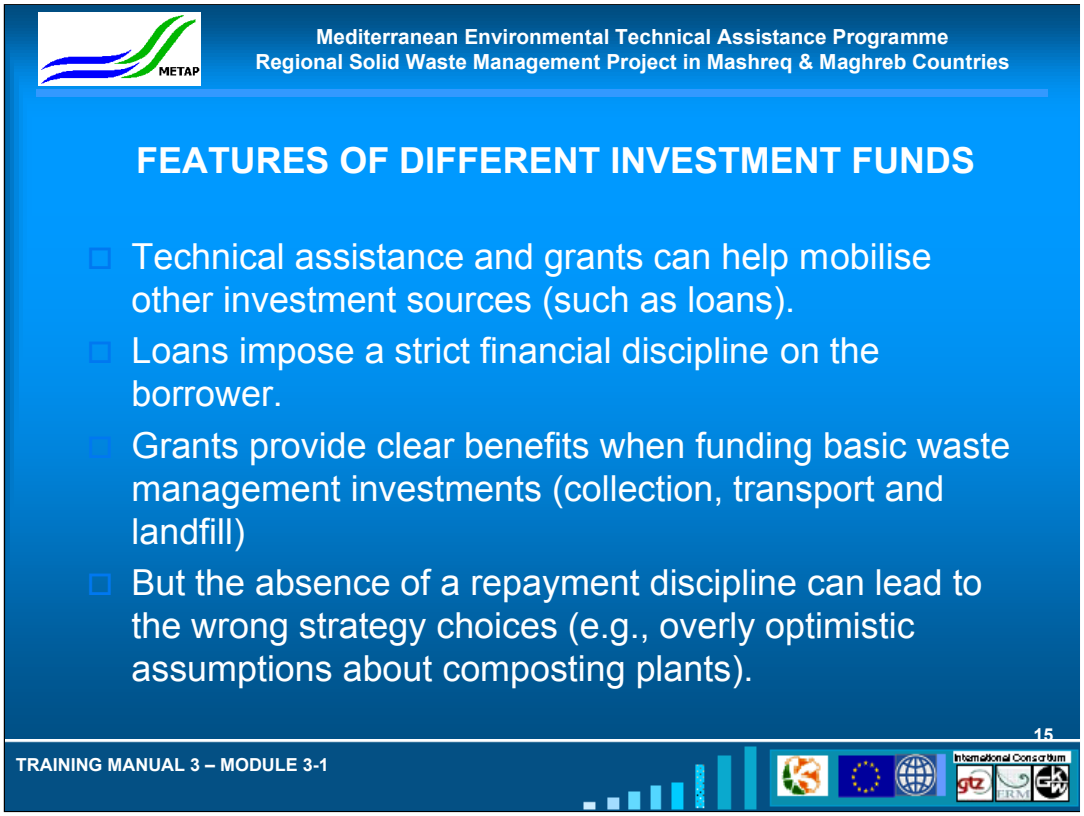
There is a very close relationship between investment requirements and their funding and the annual revenue requirement. The implications of this relationship are stressed in the module.

The next nine slides focus on these aspects – first looking at investment requirements and funding, then recurrent funding requirements, and finally on how these two components are brought together in the financial cash flow statement. This summarises all the financial sources, both investment and recurrent, and the applications of these funds (eg, to meet debt service obligations) over time.

The financial cash flow statement is a crucial document, and should reflect practical realities rather than theoretical optimums. For example, a cash flow statement that shows 100% revenue collections from Year 1 would not be realistic. In practice, not all projected waste amounts will be collected, not every user will be billed, and not every billed user will pay his bill. These are realities that have to be factored into the financing analysis and their implications examined closely. The statement should also be subjected to comprehensive sensitivity analysis to test the implications of negative changes in factors such as these.

Note that although municipal waste management agencies might potentially have access to retained earnings, this is a very rare occurrence. Part of the overall message of the FCR training modules is the introduction of greater commercialisation into such agencies is an outcome to be encouraged. Under such circumstances agencies would take greater responsibility for the longer term viability of their operations, including the possibility of accumulating annual surpluses in special accounts to finance, for example, asset replacements when due. This is fully in line with the concepts of full cost accounting and budgetting.

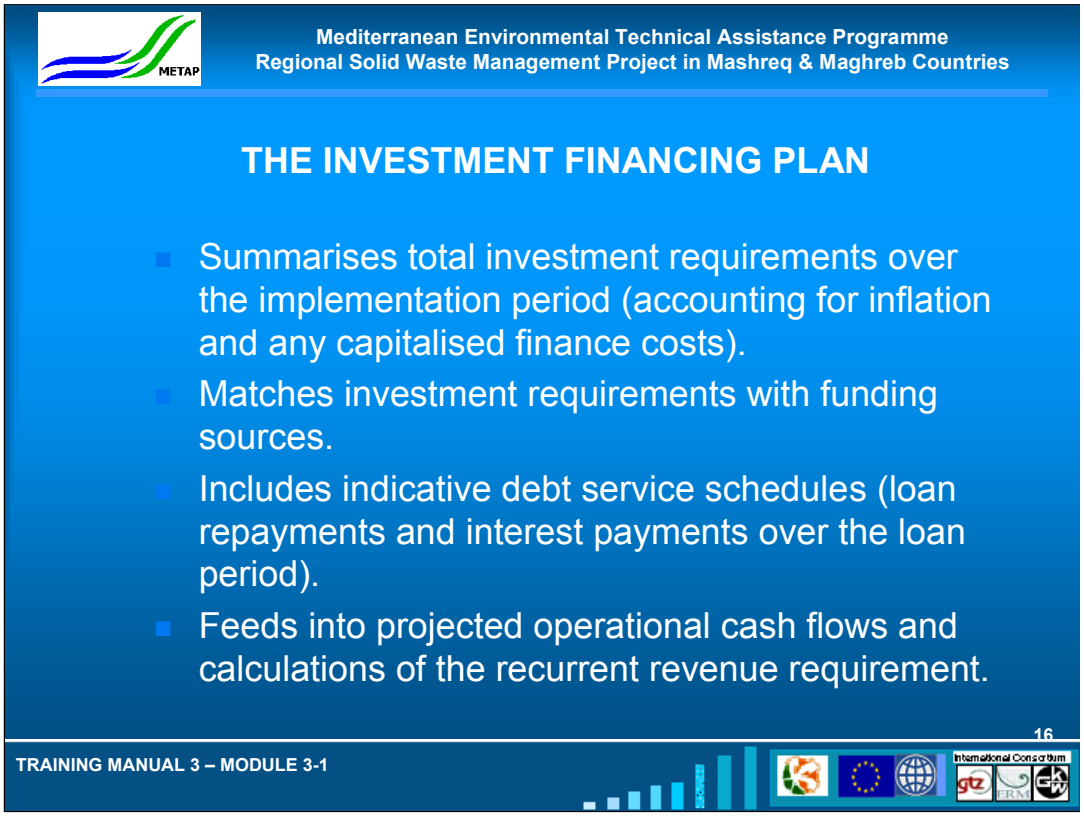
Note that private sector finance is a potential option, but that this will depend on a variety of factors, including the stage of development of domestic capital markets; and institutional, regulatory and enforcement arrangements. Note that recent experience in Egypt suggests that large international waste management firms may be reluctant to accept the financial risks associated with large integrated waste management programmes, preferring to become involved on the basis of design, build and operate contracts.



One of the benefits of loans is that they force project sponsors to look very closely at if and how the loans can be serviced. This imposes a strict discipline that is not found with grants. It forces sponsors to look more closely at the full resource costs of their proposals and to ask questions about whether or not they are really affordable in the longer term. Grants, on the other hand, can be seductive – because the money is « free » they can entice municipalities into the development of facilities that may be neither appropriate nor affordable in the longer term.

This is one of the principal reasons why decisions about waste management strategy should be based on the findings of economic analysis – before any consideration of financing options. Clearly, it is never this clear cut in practice – the availability of finance will have an influence on the decisions being made. Neverthless, the economic analysis should be the principal guide to decisions based on affordability and sustainability considerations.

Note that grant funding can be very useful for establishing basic waste management arrangements (eg, waste collection, transport and disposal facilities) but can also to lead to inappropriate waste management facilities being adopted or to the introduction of complex facilities before a municipality has the institutional and management capacity to incorporate them into an improved waste management structure. Grants under such circumstances can be counter-productive, exposing the municipality to future operational and financial risk, possibly jeopardising the more basic elements of the waste service, and should therefore be avoided.



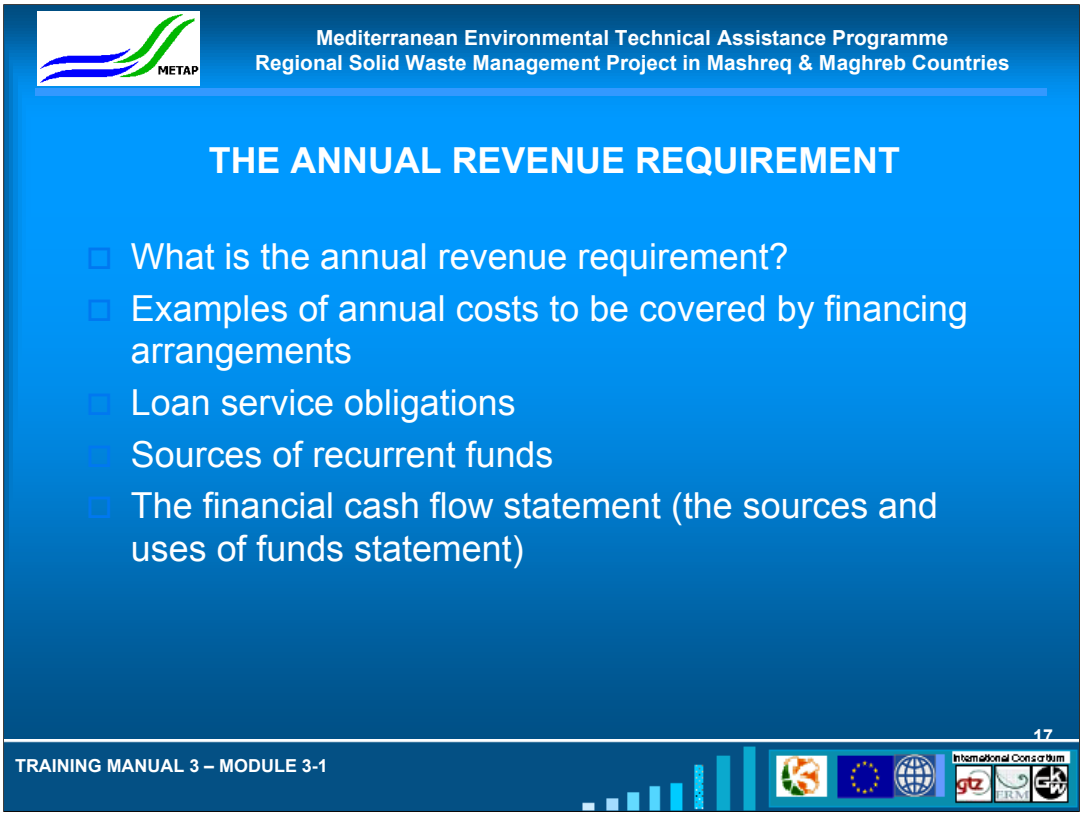
The mix of investment funds is usually designed to minimise future debt servicing requirements. Using this mix of investment funds the minimum annual revenue requirement can be estimated. This, in turn, enables analysis to be focused on the financing policy (including cost recovery) through which the recurrent revenue requirement is to be funded. This has direct implications for issues of user charges and affordability.

Using grant funds in the financing mix reduces the amount of funds needed each year to meet essential financial outlays (by avoiding loan service obligations) as well as the amount needed to meet the lending conditions of the providers of debt.

For example, IFI's typically demand that the annual revenues generated by a project (either through user-charges or government transfers) are sufficient to cover all cash outlays (including debt service obligations and any investments) by a factor ranging from 1.3 to 1.5. This is known as the debt-coverage ratio. Maximising the share of grants in the financing mix reduces the annual debt service obligation and thereby reduces the minimum revenue requirement.

The investment financing plan sets out information related specifically to project investment requirements. It shows:

- the sources and amounts of the various capital funds to be used,
- the investment profile showing investment expenditures over time,
- the loan disbursement profile,
- applications of investment funds from other sources (e.g., bilateral grants, municipal contributions)
- the debt service schedule.



This and the following slides introduce the annual revenue requirement, what it is, and how it can be financed. In particular, obligations imposed by the lenders of debt and realistic projections of the amounts of fees to be collected from users must be recognised.

It is important to establish recurrent funding requirements early in the project development stage and identify what the sources of these funds are. There is often a single-minded focus on how investment funds are to be mobilised, with little attention given to what the recurrent costs will be and how they will be met. This is vital for project sustainability.

The actual financing policy adopted will depend largely on the degree of autonomy enjoyed by the WM agency over its financial affairs. A key point stressed throughout the FCR modules is the need for WM agencies to be given greater levels of financial autonomy (i.e. to operate increasingly on a commercial basis) for waste management services to be properly managed on a cost-effective and sustainable basis.

The extent to which this is the case will dictate the annual revenue requirement (e.g., if the waste management agency is to be responsible for asset replacement over time, then it will need to have the powers to cover depreciation allowances and to set depreciation funds aside in separate accounts for future application).

The commercial status and structure of the service provider therefore has a significant bearing on the recurrent costs to be funded.

Typical structures are:

A municipal waste management department

A wholly-owned municipal enterprise

An autonomous enterprise operating under municipal contract

Examples of the levels of recurrent costs to be covered under different funding regimes are listed in the following slide.

The chart indicates progressive increases in the financial autonomy of the waste management agency.

At the simplest level, it may be required to cover its direct annual operating and maintenance costs. Under this regime all capital costs and overheads are covered indirectly by the municipality – usually as part of its general budget line items (e.g., expenditures on office staff, vehicle purchases). This indicates the lowest level of financial autonomy.

At the other extreme, the waste management agency operates on fully commercial lines, responsible for generating the incomes needed (possibly including guaranteed transfers from the municipality) to cover all the costs (including a return on capital employed to reflect the opportunity cost of money). This kind of arrangement is rarely seen in practice.

An important element in improving the quality and cost-effectiveness of municipal waste management services is progressively to give the waste management department the legal powers and authority for it to operate along commercial lines – this having the dual effect of focusing accountability more strongly on the waste service providers.

The extent to which this is possible will depend on factors such as political philosophy, legal authority, the size of the waste management department and its sources of funding.

The chart is self-explanatory, but some discussion of debt coverage ratios might also be appropriate at this stage.

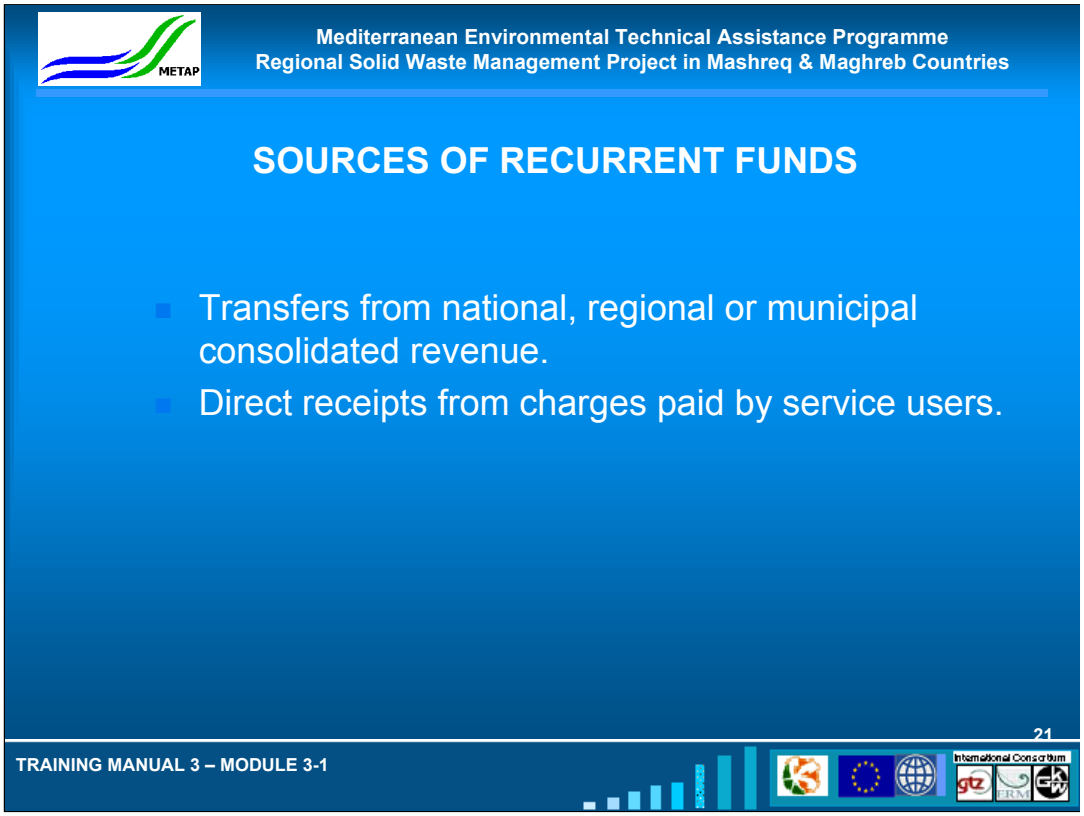
DCR is a measure of financial viability. It is an indicator of the ability of an enterprise to cover annual debt service (interest, principal repayment plus commitment fees). It is a measure of the extent to which free cash flow covers annual debt service. IFIs will normally expect to see a DCR of 1.3 to 1.5.

Free cash flow is defined as EBDIT minus tax paid, minus capital expenditure.

EBDIT is earnings before depreciation, interest and tax.

This provides a cushion against expenditures being higher or revenues lower than projected.

Maximising the share of grants in the financing mix reduces debt service obligations, thereby reducing the annual revenue requirement (including debt coverage obligations).



This slide introduces the principal methods for financing the recurrent costs of waste management: transfers from the municipal government or from user charges. There is no necessarily preferred way to finance recurrent costs. It is not uncommon for the recurrent costs of waste services to be paid either by users, by the municipality or by some combination of the two. Ideally, those who benefit directly from the use of a service should pay for the service – the user (or polluter) pays principles.

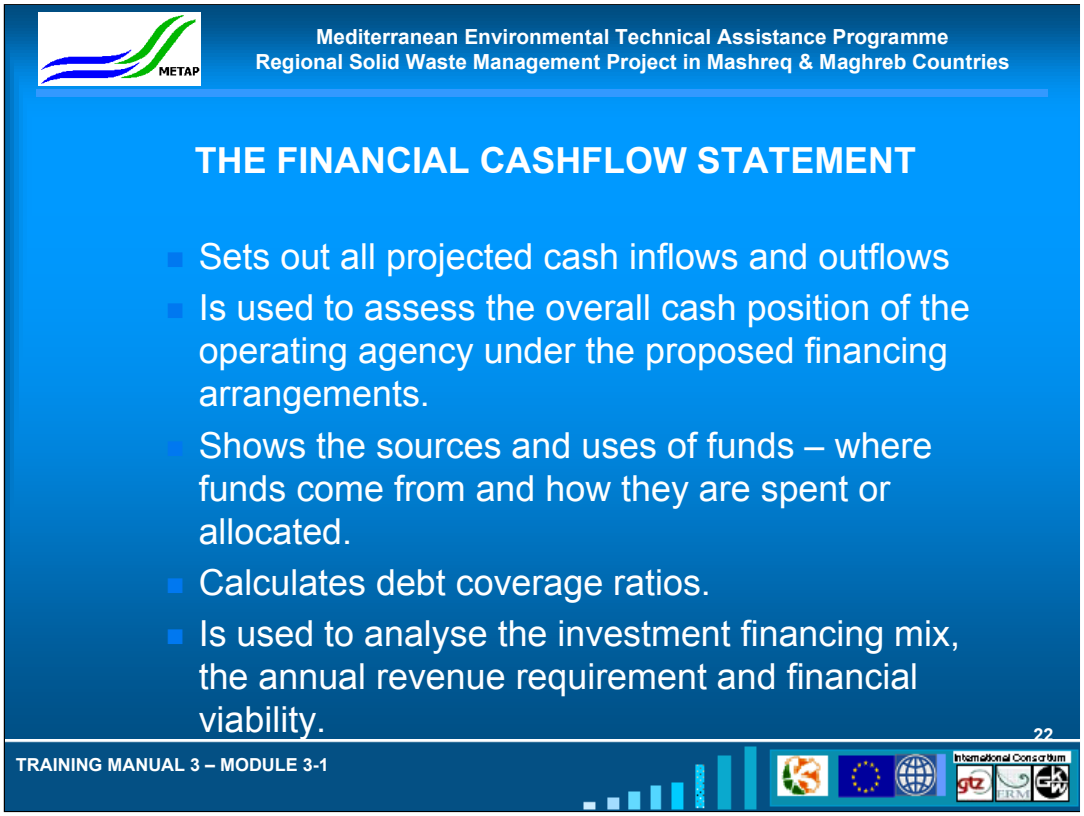
However, waste management is a public service that cannot simply be described as a private good – there is a strong public good element to it. If a water user does not pay his water bill he can be disconnected. The main affect of doing this is on the user and his family. This is not the case with waste. If waste services are withheld, the action can affect the public in general, as the result of poor sanitary conditions.

Note, however, that regardless of how these costs are funded, a main objective must be to ensure that the waste management agency has sufficient funds to cover budgeted outlays. If part of its income stream is dependent on municipal transfers, then provisions must be in place to ensure that the funds are provided and that they can be used for the intended purpose.

The amount of fees collected depends on the level of the charges and, importantly, on the extent to which users pay these charges. A common cause of project failure is the inability to collect the income stream projected at the feasibility study stage – this is because of overly optimistic assumptions about the number of households billed and their willingness to pay the new charges.

Realistic projections must therefore be made about the extent of service coverage, the number of users billed, and the proportion of users that pay the bills. Additional sources of funds must be identified in advance to meet the deficit between fee collections and annual costs. Options are additional commitments from the municipal government and/or higher average charge rates (the implication being that those who do pay subsidise those who don't). Raising charge levels to cover this shortfall would be strongly resented by those that do pay the waste bill.

User charges are considered in the final section of the module.



The financial cash flow shows the sources and uses of funds for the project – where funds come from and how they are spent. This key working document is used to calculate the minimum annual expenditure and revenue requirements for different combinations of debt and grants. Debt coverage ratios are also calculated.

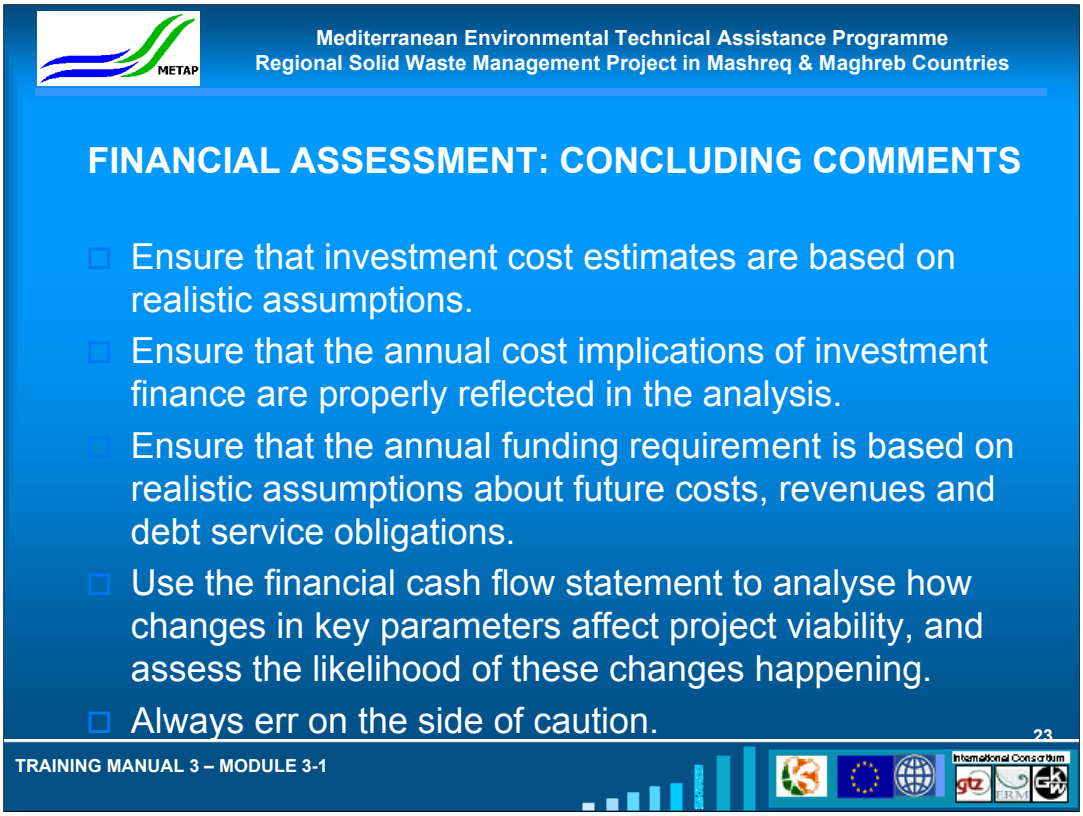
The financial cash flow statement contains the main outputs of the financial analysis. These are used in deciding on the investment financing mix, the annual revenue requirement and financial viability.

Note that this is an iterative process: changes in the investment financing mix (shown in the investment financing plan) are reflected in the financial cash flow. Similarly, constraints on recurrent financing sources (either from users or as municipal government transfers) will affect the sustainable financing mix.

For example,

- •Changes in the investment financing mix (shown in the investment financing plan) are reflected in the financial cash flow (in both sources and applications of funds).
- •Constraints on recurrent funding sources (from either users or municipal transfers) will affect the sustainable financing mix.
- •This, in turn, holds implications for the affordability (and therefore viability) of the proposed strategy.

Changes in the financing mix can significantly affect key items in the financial cash flow, including the annual revenue requirement, tariff levels, municipal transfers, affordability, the free cash flow requirement and debt coverage ratios. Changes in tariff collection ratios (optimistic – pessimistic) can also significantly affect financial viability.

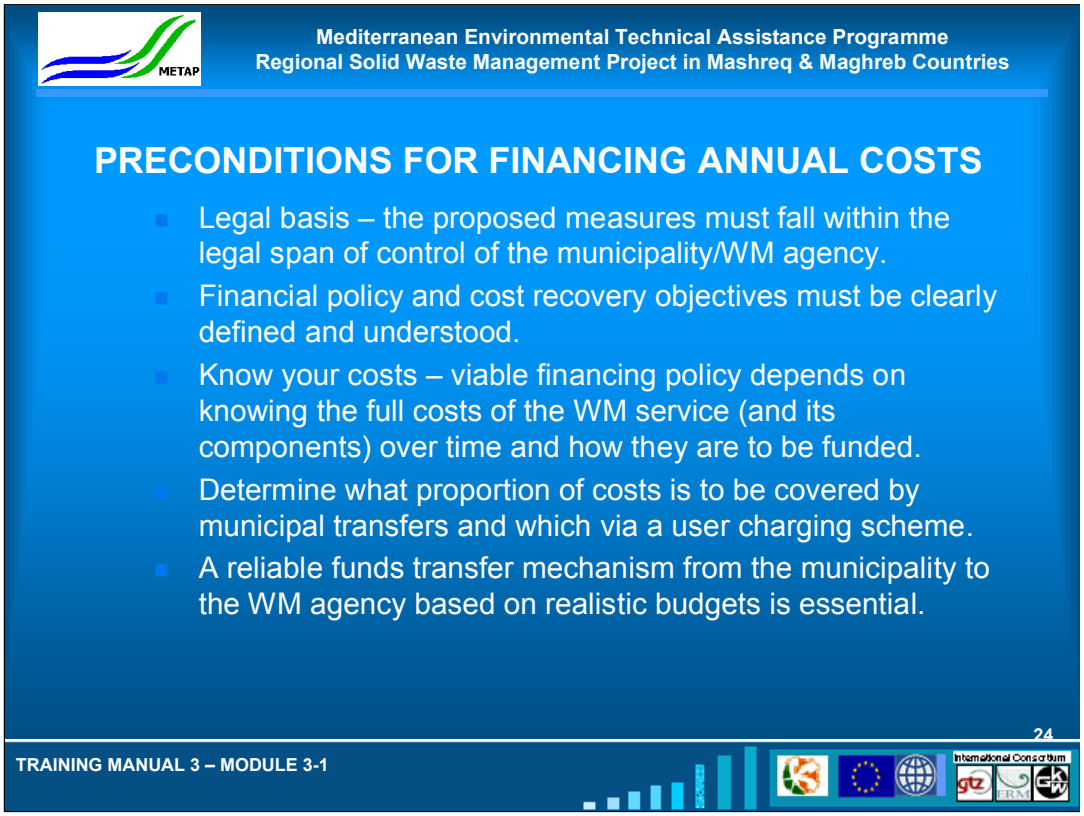


The financial cash flow statement is a dynamic tool that is used to assess the effects of making changes to key operational assumptions. For example, changes in the financing mix can significantly affect:

- the annual revenue requirement,
- tariff levels or municipal transfer requirements,
- Individual and municipal affordability,
- free cash flow and debt coverage ratios.

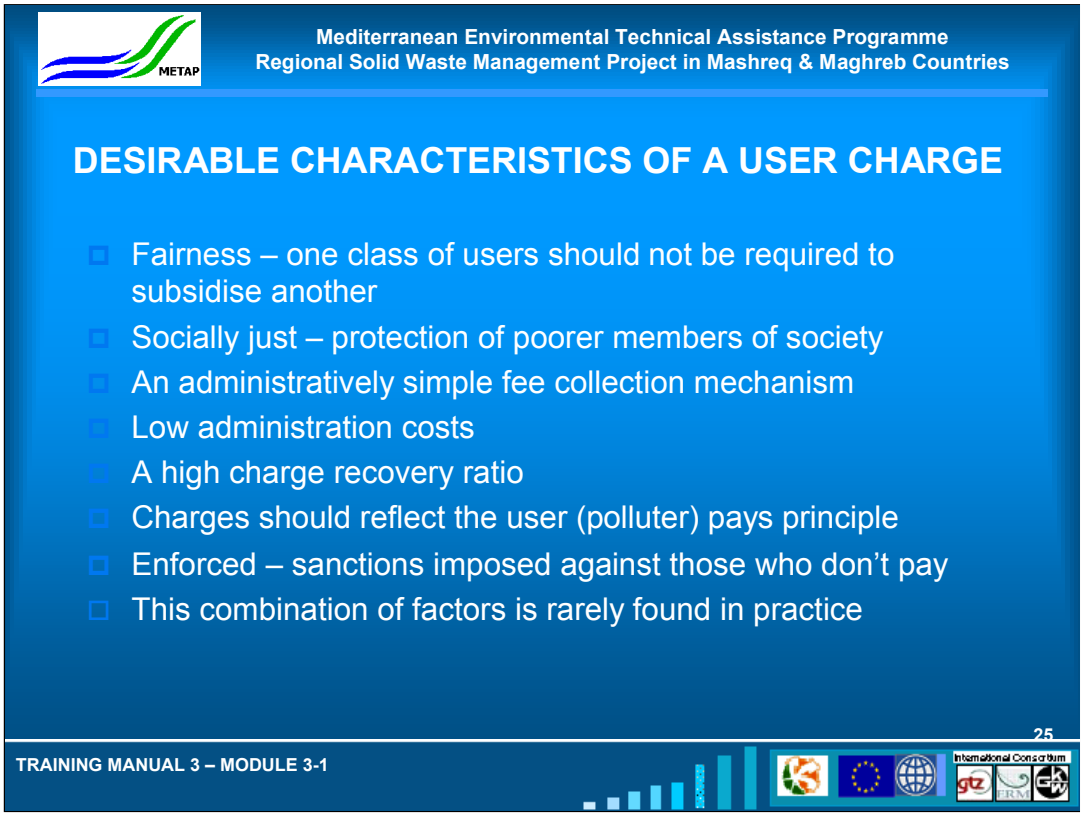
Also, changes in tariff collection ratios can significantly affect financial viability:

- The financial cash flow statement can help identify the minimum municipal subsidy needed to cover adverse (yet realistic) outcomes revealed in a sensitivity analysis.
- The municipality or operating enterprise may need to make provision for such contingency funding in advance of getting loan approval (i.e. it may be a condition of the loan).



The preconditions listed above must be satisfied before an effective recurrent cost funding strategy can be developed – based on municipal transfers, user charges or a combination of the two. Realistic provision has also to be made in the event that user charge collections are below projections.

This section focuses principally on user-charges.

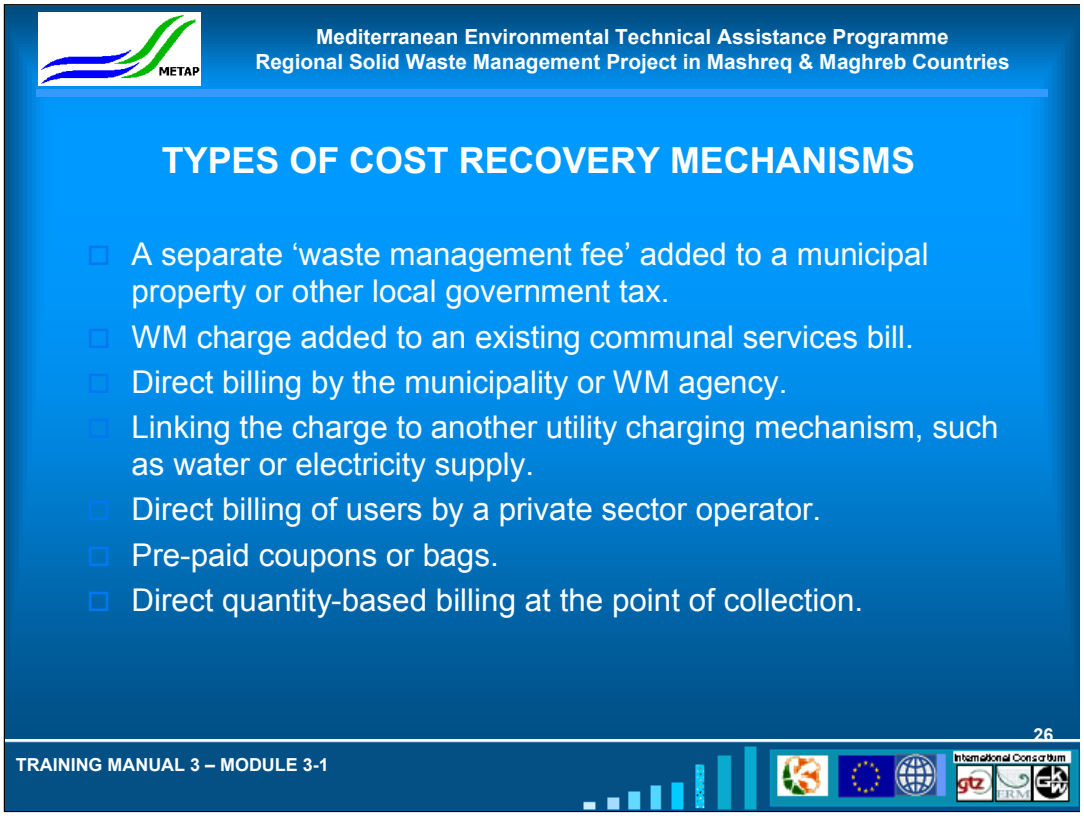


Note that this ideal combination of factors is rarely found in practice.

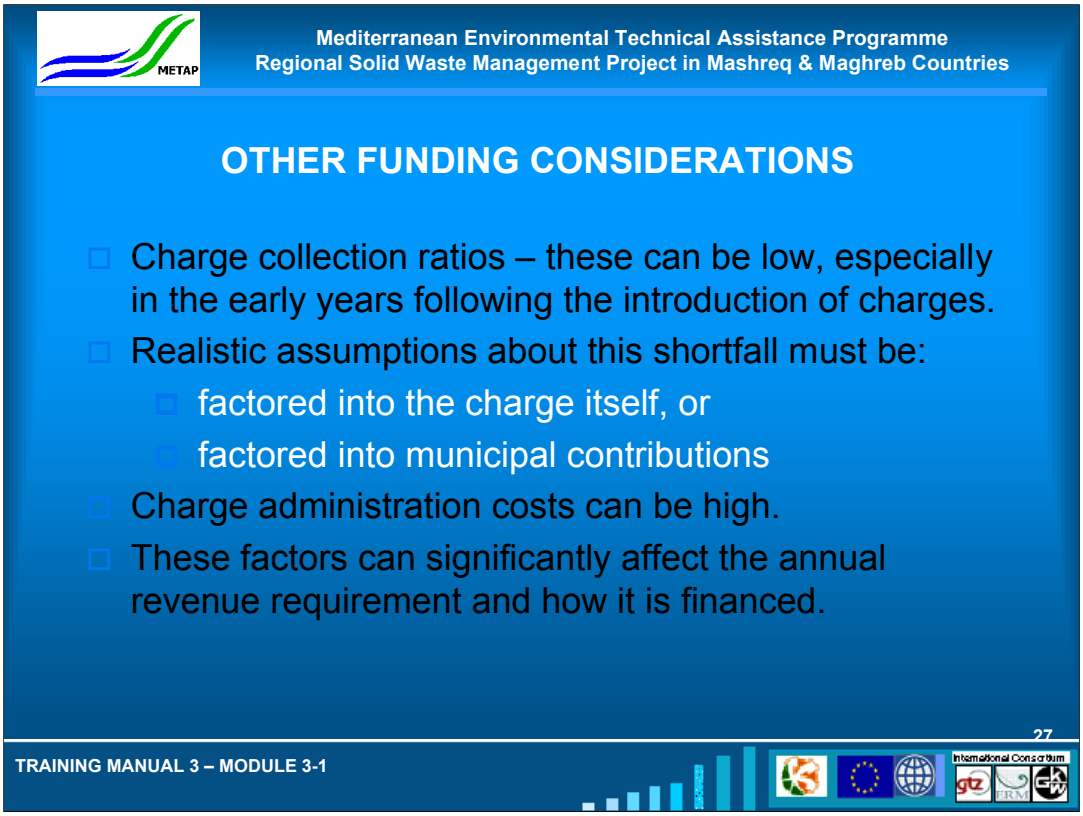
The most desirable qualities of a charging mechanism are that it should be simple to implement, it should lead to a high charge collection ratio and should be generally acceptable to most users.

Systems already used in the region, where waste management charges are linked to electricity supply, tend to be of this kind. A case can also be made for cross-subsidies between users on social grounds, particularly between richer and poorer members of society. This again is an element of the differentiated charge system currently being used in Egypt.

On the other hand, the charge system used in Jordan, where fees are also linked to electricity bills, is based on a single flat rate fee for household users to ensure administrative simplicity (and claims that the system is unfair).



This slide is self-explanatory. Further discussion of these approaches can be found in the FCR Guidelines and Aids to Implementation.



These factors are important. It is quite common for revenue projections to be based on quite unrealistic expectations of payment levels, especially in the early years after implementation. The experience to date in Jordan and Egypt with electricity-linked charges suggests that charge collection rates have so far been very good. The earlier system used in Jordan, however, led to extremely low levels of collection, and the accumulation of a very high level of bad debts by the WM agency.

It would be prudent for financial planners to adopt conservative estimates of the probable fee payment rates in the early years, and to have standby facilities in place to cover any shortfalls. Ideally, these should be provided by the municipality. If high levels of underpayment persist in the longer term, then this would suggest a need to modify the system. If not, users who pay may be required to pay higher charges to subsidise those who don't.

The amounts of fees collected depends on the level of the charges themselves and, importantly, on the extent to which users pay these charges. A common cause of project failure is the inability to attract the income stream projected at the feasibility study stage – this is because of overly optimistic assumptions about the number of households billed and their willingness to pay the new charges.

Realistic projections about the level of this projected shortfall must be made at the outset and measures put in place to fund it. Options are guaranteed transfers from the municipal government and higher average charges (the implication being that those who do pay subsidise those who don't).

These questions relate to the intrinsic affordability of the services. Is their success based on overly optimistic forecasts of costs, revenues from sales of recovered materials, markets for compost or cost recovery from users? What happens if any of these factors fails to materialise – can the service still operate effectively or is it exposed to high levels of unplanned expenditures or revenue requirements?

Problems such as these are real, and occur all too frequently. Subject all proposals to very careful scrutiny, ask the question: what if? If the question cannot be answered, pause and think again.

Keep strategies simple – don't be too ambitious by aiming to introduce new and complex systems at the one time. Develop an integrated strategy progressively over time – do the things that are essential first – defer until later those aspects that are desirable but not essential.

GENERAL CONCLUSIONS

- There is no 'correct' method of cost recovery – aim to adopt an approach that builds on existing structures, and that is compatible with local culture and customs.
- Establish cost recovery policy within a clearly defined financial policy framework for waste management.
- Ensure that the proposed measures fall within your existing span of control.
- Consider introducing new cost recovery measures progressively over time, funding the shortfall in funds out of other municipal sources.

GENERAL CONCLUSIONS (2)

- These conclusions
  - can have implications for the scope and timing of improved waste management services, and
  - can significantly affect the annual revenue requirement and how it is financed.
- Improve financial planning and management capacity:
  - improve the financial skills base,
  - improve budgeting and accounting procedures, and
  - establish effective management information systems.