

Information Paper: CBA and Charging / Cost Recovery

**Report to Local Government New
Zealand**

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Preface

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NZIER was established in 1958.

Authorship

This Draft Report has been prepared at NZIER by Keith Johnson and reviewed by Peter Clough.

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1. Introduction

1.1 Background

This Information Paper provides a starting point for the development of training materials on Cost-Benefit Analysis and Cost Recovery for Local Government.

The subject has gained increased prominence in the wake of the recent release of the report *Funding Local Government* as part of the 2007 Local Government Rates Inquiry. The report argues for the greater use of Cost-Benefit Analysis (CBA) in appraising public investments and for more rigorous approaches to charging and cost recovery.

Initially, NZIER had considered developing two complementary papers:

- A Guide to the Use of Cost Benefit Analysis by Local Government
- A Guide to Local Government Cost-Benefit and Charging / Cost Recovery issues.

An early draft of the ‘Guide to the Use of Cost Benefit Analysis by Local Government’ was released for comment and review. This drew heavily on an excellent source that is also readily available on the Internet at:

http://www.tbs-sct.gc.ca/fin/sigs/Revolving_Funds/bcag/BCA2_e.asp

[Treasury Board of Canada Secretariat (1998), *Benefit-Cost Analysis*, Ottawa]

Following discussions with stakeholders (Local Government New Zealand, the Society of Local Government Managers, and the Department of Internal Affairs), it was decided that:

- there was little need for a separate CBA Guide, given the current general availability of guides / manuals on the subject
- it might be more productive to roll the 2 planned pieces of work together, with greater emphasis charging / cost recovery issues.
- the overall focus should be directed towards starting to prepare case materials for future training courses, rather than on preparing guideline / manual documents that were easily ‘shelved’.

1.2 Structure of the Information Paper

In the event, given the very limited availability of funding for the project, it has proven easier to maintain the distinction between (1) the draft CBA Manual and (2) making a start on providing guidance to Local Government on the relationship between CBA and Charging / Cost Recovery issues. The draft Manual therefore remains as a free-standing document that could be further revised if sufficient demand arises. This complementary Information Paper therefore focuses on

exploring some of the important links that exist between CBA and charging / cost recovery issues.

The structure of the Information Paper is as follows:

- Section 2 provides a brief overview of the rationale for CBA and provides comments on its various forms and applications. Appendix A provides a series of checklists for the design and evaluation of CBAs.
- Section 3 provides a ‘refresher’ on the application of CBA in Local Government drawing on an example that is available on the Internet - Solid Waste Recycling in Chatham County, North Carolina, USA.
- Section 4 reviews typical areas where the interrelationships between CBA and charging / cost recovery are particularly relevant or particularly problematic.
- Section 5 provides a worked example on the relationships between charge setting, demand management and project design
- Section 6 briefly reviews the general issues that arise in setting effective and just user charges for government services.

2. Costs and Benefits – an overview

2.1 Introduction

In making ‘do it’ and ‘don’t do it’ decisions we inevitably look at the trade-offs between costs and benefits.

Economic Cost-Benefit Analysis (CBA) provides a structured approach to assessing trade-offs. As such, it essentially sets common sense within the context of economic theory. Many people in the public sector now have a basic understanding of CBA, and a wide variety of sources of guidance is available. In New Zealand, the sources include:

- Treasury – NZ, (2005), Cost Benefit Analysis Primer, available at:
<http://www.treasury.govt.nz/publications/guidance/costbenefitanalysis>
- Ministry of Economic Development - source material on Regulatory Impact Analysis, available at:
http://www.med.govt.nz/templates/ContentTopicSummary_606.aspx

This Information Paper does not therefore seek to supplant or even complement the available material. Rather it starts to focus on ways in which training materials can be developed that explore the links between CBA and charging / cost recovery issues in the public sector.

However, it necessarily starts by reviewing the rationale for CBA and setting the scene for the consideration of charging and cost recovery issues.

2.2 Why benefit-cost analysis?

Brief reflection on the question suggests that rates, local authority trading enterprise revenues, and central government assistance money should (other things being equal) go to support programs where it will do the most good, given the choices available. Defining ‘does the most good’ and ‘given the choices available’ captures the essential focus of cost-benefit analysis.

The basic elements are costs, benefits and choices. It is not a long step from 'doing the most good' to 'creating the greatest (net) benefit.' The same resources can not be committed to different ends. With a limited budget, we must be certain that each project chosen has the largest possible value per dollar expended.

The basic methodology for cost-benefit analysis is grounded, consistent and systematic. It has been built directly on economic theory. Adopting and applying the basic methodology provides an assurance that proper comparisons can be made between project alternatives and between different types of projects.

2.3 Where cost-benefit analysis fits into the project planning process

Business plans set out a Council’s strategies, objectives and performance commitments. All projects should be consistent with the objectives stated in these overarching documents. Cost-benefit-analysis can also assist in reprioritising strategic investments in the light of adjustments to the objectives, size, and scope of programmes. Ideally, cost-benefit analysis should be applied repeatedly as a project moves through the project cycle:

- at the pre-feasibility study stage, where it can be used to test broad options against a ‘do-nothing’ or ‘business as usual’ approach. At this point, the analysis may have to be based on broad order of magnitude costings, drawn from past experience or cross comparisons to similar project that have been implemented in other jurisdictions. The estimation of benefits at this point generally relies on unrefined forecasts.
- at the feasibility study stage, where it can be used to test the validity of a ‘go-ahead’ decision. At this point, higher levels of accuracy should be available on costs, based on refined estimates (e.g. ‘bills of quantities’ costings). The estimation of expected benefits at this point will generally be based on properly grounded assumptions and forecasts
- at the evaluation study stage, where is it can be used to test whether a projects’ expected benefits have in fact been realised through the implementation process. At this point, the full capital costs are generally known accurately. However, forecasts may still have to be made of future operating costs and benefits as few evaluations wait until the overall life of the project has passed (often 20-25 years)

From what has been said above, it is clear that there are 2 major categories of benefit-cost analyses:

- those that look forward and consider the merits of a particular investment or action (known as ex ante analyses)
- those that look backwards to some degree to evaluate the relative success of an investment or action that has been, at least partially, completed (known as ex post analyses).

Sometimes, to reduce confusion, ex ante analyses are also referred to as project appraisals, as opposed to ex post analyses which may be referred to as project evaluations. All of the statements that are made in this paper apply to ex ante appraisals.

In the case of ex post evaluations, some adjustments may be required to the basic methodology to take account of changes that have been experienced in the policy and economic environment within which implementation has taken place (including the indexation of realised flows of costs and benefits to bring actual past expenditures into alignment with today's values).

2.4 The basics

Benefit-cost analysis is simply rational decision-making. Our natural grasp of costs and benefits is sometimes inadequate, however, when the alternatives are complex or the data uncertain. Then we need formal techniques to keep our thinking clear, systematic and rational. These techniques constitute a model for doing cost-benefit analysis. They include a variety of components:

- identifying alternatives;
- defining alternatives in a way that allows fair comparison;
- adjusting for occurrence of costs and benefits at different times;
- calculating dollar values for things that are not usually expressed in dollars;
- coping with uncertainty in the data; and
- summing up a complex pattern of costs and benefits to guide decision-making.

It is important to keep in mind that techniques are only tools. They are not the essence - the essence is the clarity of the analyst's understanding of the options.

2.5 Alternative approaches to economic analysis

As far as possible, cost-benefit analysis puts both costs and benefits into standard units (usually dollars) so that they can be compared directly. In some cases, it is difficult to put the benefits into dollars, so we may employ cost-effectiveness analysis, which is a cost-minimization technique. For example, there might be two highway-crossing upgrade options that will result in the same saving of lives. In this case, we choose between the options on the basis of minimum cost per life saved.

The feature that distinguishes cost-benefit analysis from cost-effectiveness analysis is the attempt cost-benefit analysis makes to go as far as possible in quantifying diverse benefits and costs in money terms. However, cost-benefit analysis rarely achieves the ideal of measuring all benefits and costs in money terms ... so the distinction may merely be a difference in degree and not in kind.

Overall, it is useful to bear in mind the total range of available techniques for economic analysis (see Table 1) – and the pros and cons of the different but closely allied approaches:

Table 1 Comparative strengths of alternative approaches to economic analysis

CBA	CEA
<p>Result: Gives guidance on what activities or projects to undertake, and how much to invest in them.</p> <p>Focus: On <i>allocatively efficient</i> use of society's resources - the value or benefit maximising combination of resources.</p> <p>Requirements: Care, consistency, and transparency in analysis. Data on outcomes/effects which might be difficult to obtain and quantify. Benefits and costs should ideally be expressed in monetary terms. All significant benefits and costs should be included whether or not they can be monetised.</p> <p>Scale differences: Effective in comparing projects of different size.</p>	<p>Result: Gives guidance on the best means of achieving particular outputs, but does not indicate whether or how much of those outputs are desirable.</p> <p>Focus: On cost effective use of society's resources - <i>productive efficiency</i>. Having decided to do something, what is the maximum effectiveness for a given cost, or for given effectiveness, the minimum cost.</p> <p>Requirements: Care, consistency, and transparency in analysis. Data which might be difficult to obtain and quantify. Costs expressed in monetary terms but benefits can be in physical units or some index representing level of achievement of outcomes.</p> <p>Scale differences: Can generate misleading results in comparing projects of different size.</p>
Multi-criteria analysis	Economic impact analysis
<p>Result: Gives guidance on what activities or projects to undertake.</p> <p>Focus: On cost effective and <i>allocatively efficient</i> use of society's resources.</p> <p>Requirements: Care, consistency, and transparency in analysis. Data which is difficult to obtain and quantify. A scoring system for comparing benefits/outcomes.</p> <p>Scale differences: Can be used in comparing projects of different size.</p>	<p>Result: Indicates size of the spending flows associated with a project or event, and employment effects.</p> <p>Focus: On size and distribution of spending flows.</p> <p>Requirements: Care, consistency, and transparency in analysis. Less demanding data requirements than other methods. Care in distinguishing net effects of the project i.e. new spending as distinct from spending diversion.</p> <p>Scale differences: Unhelpful for comparing projects of different size.</p>

Source: NZIER

In summary, the available techniques are:

- *Cost Benefit Analysis (CBA)* which attempts to quantify in money terms as many of the costs and benefits as possible, including important items whose

economic value is not reflected in market values.¹ Such analysis gives guidance on what activities or projects to undertake, and how much to undertake, to the extent that it shows the value of benefits obtained to be greater than the costs incurred. (If the ratio of the present value of benefits to the present value of costs is less than 1, the proposal is unacceptable on economic efficiency grounds. Wellington City Council may develop its own decision rules which will vary from time to time according to the range of funding demands and budget constraints.)

- *Cost Effectiveness Analysis (CEA)* which compares the costs of different ways of producing the same or similar outputs, which are taken as given and are not necessarily given a monetary value. Such analysis gives guidance on the best means of achieving particular outputs, but does not indicate whether, or how much of, those outputs are desirable. (The higher the ratio of outputs to the cost of inputs, the more cost effective the option.)
- *Multi-Criteria Analysis (MCA)* which in some forms compares “scores” of multi-attribute outputs against the costs of achieving them, and may resemble a cost effectiveness analysis or cost utility analysis. A well known example is health treatment, in which alternative regimes are compared using ‘quality adjusted life years’ as the yardstick of effectiveness. But MCA need not collapse the attribute scores into a single utility index, and it allows some flexibility for examining trade-offs between different combinations of criteria.
- *Economic Impact Analysis (EIA)* which traces the effect of a project’s expenditures through the local economy, both their initial distribution between employees and suppliers and through subsequent rounds of spending through economic multipliers. Such analysis gives no guidance on the efficiency of resource use, but it can be influential where non-efficiency goals, such as job-creation, are elevated to high priority.

2.6 Common applications of economic analysis

Common applications of economic appraisal to capital and current expenditure include:

- new or replacement *capital projects* - whether or not to undertake a project; whether to undertake it now, or later; whether to buy one piece of equipment or another;
- use or disposal of *existing assets* - such as whether to sell land, or replace facilities by less costly ones, or relocate facilities elsewhere;
- setting worthwhile *standards* of design or provision which do not impose unduly excessive costs - as in environmental quality, health and safety policy;

general policy and management appraisal - such as decisions on what services to provide, how much and to what level.

¹ There may be no relevant market values available, or where there are markets, values may be distorted by imperfections such as the existence of monopoly or government interventions and thus may not reflect the opportunity costs of resources in question.

2.7 Economic versus Financial Analysis

It is important to bear in mind that there is distinction between:

- *Economic analysis* which is broad in scope and which considers decision-making in terms of national benefits and costs (or more occasionally regional / sub-national benefits and costs). As such., it takes into account effects on individuals, firms and other entities in the economy, as well (ideally) as the wider costs and benefits that arise as a result of associated shifts in the use of resources and impacts in such areas as environmental protection (i.e. ‘externalities’)
- *Financial analysis* which focuses on purely monetary transactions, within a firm or entity. In essence, financial analysis considers decision-making in terms of the cash realities / opportunity costs that are faced by companies and entrepreneurs. Tax is clearly such a reality. This means that financial analysis must take into account the tax liabilities that arise as a result of a project investment and its cash flows (and therefore any offsets against tax that may arise from depreciation allowances).

The financial analysis of a project is also sometimes part of a wider ‘business case analysis’. This is likely to involve consideration of such issues as the financing plan (e.g. the split between borrowing and equity), the financial cost of capital (i.e. the interest rate at which the project promoter can borrow), and the expected distribution of returns (e.g. by dividends, preferential share issues etc.).

2.8 Relationship of project appraisal to budgeting

Clearly budgets such as those drawn up by Councils, are couched in financial rather than economic terms. However, a properly drawn budget should allocate resources to activities in a manner which most effectively meets the needs of the community being served. This purpose can be served by economic appraisal which:

- allows comparison of options and selection of less costly means of meeting given needs (cost effectiveness analysis)
- aids restructuring of activities by identifying those which cost more than the likely resulting benefits (cost-benefit analysis and multi-criteria analysis)
- identifies new potential activities supplying benefits in other ways.

Clearly though, the evaluation of the impact of user charges as a means of raising revenue may involve both financial and economic assessments – an economic assessment to justify charging and a financial assessment that relates the net cash flow to the Council’s budgetary processes.

2.9 Point of view

It is now clear that the benefit-cost analyst must work consistently from a clear point of view. Whose costs and benefits are being assessed? In an economists

terms 'Whose opportunity cost viewpoint is being taken?' However, an analyst is not necessarily restricted to a single point of view. The government might take the economic point of view, for example, or a broad social point of view, or both. And when it comes down to making a decision, it may require a full assessment of the financial / fiscal impacts of its investments. Whatever the point of view chosen, each specific analysis must take a single point of view and it must be stated clearly at the outset.

It is obvious that a cost from one person's point of view can be a benefit from another's. What is obvious when stated, however, is sometimes not obvious in the midst of an analysis. It is not at all uncommon to see lists of benefits or costs that are apples and oranges as far as a consistent point of view is concerned. Should taxes levied or charges imposed be counted as a benefit or a cost? Should jobs created be considered a benefit or a cost to the project? The answers depend on the point of view.

If there is a single decision-maker, then an analysis from one point of view is often adequate. If the interests of more than one person or group are affected, then several analyses might be necessary. Consider the decision to construct a recreational facility in a park. The analyst who wants to provide advice to his or her manager or an elected official might need to know how the project would look from the general social point of view (all costs and benefits to New Zealanders, from the local authority point of view, and from the point of view of local environmental / non-governmental groups).

The point of view defines the 'in group' and the 'out group.' The in group consists of those people whose costs and benefits are to be taken into account in the analysis. For example, suppose that the in group comprises all the citizens of a town called Waihinonga. In that case, if some of the resources of the Waihinonga citizens are used up, there is a cost to be counted. If some of their resources are given to people outside Waihinonga, there is a cost to be counted as well.

On the other hand, if one citizen of Waihinonga, however, gives resources to another citizen of Waihinonga without anything being used up, then the total resources of Waihinonga citizens are not affected and no cost or benefit is to be counted. A transfer payment has been made. The geographical boundaries of the areas influenced by local government projects (i.e. their hinterlands) may therefore need to be carefully defined. And some attempts may be needed to measure spillage and extra-regional transfers, as well as overall levels of resource use and benefits.

As well as identifying costs and benefits correctly, one must choose parameters that are consistent with the point of view of the analysis. For example, the appropriate discount rate (that relates the values of costs incurred and benefits realised at some time in the future to present values) depends on what point of view is being taken in the analysis. In the case of local governments, the selection of an appropriate discount rate may be tricky, if it is decided that the national rate advised by the NZ Treasury is inappropriate. One possible starting point is the

opportunity cost of local finance – which could be approximated by the yield offered on Local Authority bonds (if bonds of this type are being issued).

3. Cost-benefit analysis in Local Government – an example / model

3.1 Introduction

As previously discussed, there is a wide range of readily available guides and manuals on the general application of CBA. The challenge then is to make available models that can be used for group or self-training / reference purposes.

The following section therefore provides an overview and web reference for a simple and well-structured example of the application of CBA. This concerns Solid Waste Recycling in Chatham County, North Carolina, USA. Hopefully, the novel aspects of the problem and its solution (at least to New Zealand eyes) adds to its interest.

The example can be found at: www.p2pays.org/ref%5C08/07862.pdf. Readers are urged to consult the original.

3.2 Background

3.2.1 Pre-project Collection System

Chatham County is a small rural community covering 707 square miles with a population of around 40,000.

Concomitant with the siting of the new county landfill, Chatham County had established a network of garbage / rubbish drop-off locations throughout the county. These drop-off locations were generally sited on personal property on the good will of the property owners. The exact number of sites tended to fluctuate, but at last count, 42 sites served the residents of the county.

Each site was outfitted with from one to twenty-five dumpsters (i.e. large skips) depending on site usage and space. The dumpsters were essentially open-top, galvanized steel boxes with a volume of about six cubic yards. They had special metal sleeves on the sides of the boxes which enable them to be emptied by a front-loading truck.

The garbage truck entered two hydraulic arms into the dumpster box's sleeves, lifts the box over the front of the cab, and dumped the contents into the compacting chamber of the truck. Each dumpster location required servicing between two to three times per week.

The dumpster system had originally been established to curtail illegal dumping and decrease the myriad of backyard and unsanitary dumps throughout the county, and it was largely successful in meeting this goal. However, developments in both regulatory policy and social sentiment toward solid waste management exacerbated many shortcomings of the dumpster collection system.

More recently, the county had established five recycling drop-off locations to service the county. These sites were located at highly trafficked areas in the county such as near stores and government office buildings. These sites service those people motivated to separate their recyclables and take them to a location other than their regular garbage drop-off point.

3.2.2 The proposed project - Staffed Collection System

In place of the dumpster sites, Chatham County was exploring converting to a network of staffed collection centres. The county had recently completed its first "trial" site at the time of the appraisal, hoping that this site would be the prototype for others to follow.

A staffed collection centre is a facility to which residents of the county can bring both their household garbage and recyclables. In place of the dumpsters, the collection centre has a stationary garbage compactor.

Residents deposit their garbage in the receptacle end of the machine, and as its name indicates, the compactor compresses the garbage into a relatively small receiving container. This receiving container is hauled away one time per week. Residents can recycle a wide array of materials (glass, aluminium and foil, newspaper, steel food cans, plastic bottles, office paper, corrugated cardboard, large appliances, motor oil, tyres, etc.) in various bins.

Both the garbage container and the recyclables container are hauled by a roll-off truck. Using a steel cord, the roll-off truck down loads an empty container and hoists the full container onto its body. Then, the entire container is hauled to its appropriate destination, the landfill or recycling market. The truck earns its name because the containers have small metal wheels so that they actually roll on and off the truck.

In addition to recyclables, the central facility also is able to collect bulky items such as mattresses, yard waste for composting, and paints and other household hazardous waste. The facility may contain a swap shop which is a small shed where people can leave items they no longer need but which still have a usable life.

A staff member maintains the site, keeping the site clean and organized as well as ensuring full containers are hauled in a timely manner. She/he enables the county to collect the expanded array of recyclables and perform the services described above.

Perhaps most importantly, the staff member helps to educate the community about importance of waste reduction and helps them to recycle. She/he is able to control the materials that enter the waste stream, and, by looking at drivers' licenses, ensures the site is only being used by Chatham County residents.

The county planned to construct eleven of these centres in total. They were to be located along the major roads of the county, creating a network of collection points convenient to almost all residents. The sites will be placed so that residents can use them on their way to somewhere else, such that few would have to drive more than ten kilometres to arrive at a site.

3.2.3 The analysis

The example provides:

- A clear statement of purpose (i.e. examining the problems associated with the current 'open dumpster' solid waste collection and exploring the costs and benefits of replacing it with a network of staffed collection centres)
- Background on the demographics of the catchment area, the characteristics of the waste stream, the organization of the current waste disposal system, regulatory influences promoting change, and the evolution of public attitudes
- A concise description of the proposed replacement project and its advantages and disadvantages
- A full project description of the expected costs and benefits of the proposed project in relation to its technical and organizational characteristics and its expected impact on users
- A clear statement of the internal assumptions of the CBA. For example, it notes that Chatham County could issue bonds at a rate between 4.9% and 5.4% but that the then current interest rates (1993) were below this rate. It then settles on 4% as an appropriate discount rate.
- The measurable monetary benefits fall into 2 categories:
 - Costs avoided by phasing out dumpster collection
 - Benefits earned from the sale of recyclables.

The wider matrix of potential advantages of converting to the new system is presented below in Table 2.

Table 2 Matrix of potential project advantages and disadvantages

ADVANTAGES	DISADVANTAGES
<ul style="list-style-type: none"> • Promotes recycling and waste reduction 	<ul style="list-style-type: none"> • Garbage disposal is less convenient because fewer sites

- Provides mechanism through which staff person can educate public
- Allows for more efficient collection equipment to be utilized, (roll-off truck and stationary compactor)
- Reduces out-of-county use of Chatham's solid waste system
- Reduces commercial use of residential collection system
- Reduces collection staff size
- Reduces waste destined for the landfill
- Provides safer place for waste disposal
- Reduces contamination levels in recyclables
- Enables county to better control materials that enter waste stream, thus reducing risk and liability at landfill
- Reduces liability due to reduction in people climbing in open dumpsters
- Reduces abuse of county solid waste collection facilities
- Provides greater flexibility in accommodating future solid waste management practices
- Increases public understanding and awareness of environmental issues
- Garbage disposal is less convenient because of restricted hours
- Risk of increase in backyard and illegal dumping
- Difficulty of overcoming the inertia of the accepted open dumpster system
- Need to hire staff to maintain sites

Source: NZIER

3.2.4 Results – basic CBA

Monetary costs and benefits are fully set out in the spreadsheets that are attached to the analysis (see Pdf web document). They distinguish four main categories: (1) costs, (2) benefits, (3) variable effects, and (4) net benefits. Initially, the items in the categories are characterised in terms of current costs (i.e. \$ of the day).

The analysis is carried out for a period of twenty years, with this time frame being a minimum life for the collection centre sites. A discount rate of 4% was applied.

The basic analysis shows that:

- the collection centre system has completely paid for itself by Year # 19 and thereafter, a net benefit is realized by the county

- Were the analysis to continue for an additional ten years, the county would realise \$887,000 in net benefit though some of the net benefits of Years #20 through #30 may be offset by a potential need to invest in new capital equipment and increased staff due to population pressures.

3.2.5 Sensitivity Analyses (four scenarios)

The basic variables (population, disposal fees, and percent recycled) were conservatively estimated in the initial spreadsheet. As a reference point, a sensitivity analysis was performed on each variable, as well as for the discount rate. The results were as follows:

- Population: Waste generation increases at same rate as population. The 1990 census predicts a 1.3% annual growth for Chatham County, and this figure is used in the initial spreadsheet. However, judging from much higher growth in the past decades and planning for many new road projects, it seems very likely that population growth in Chatham County will increase at a rate close to 2.0% annually. A spreadsheet using 2% annual growth shows that under this scenario, the collection centre system pays for itself by Year #18, one earlier than the standard spreadsheet analysis.
- Disposal Fee: A \$42 dollars per ton fee used in the standard spreadsheet is a minimum estimate for the future. Using \$60 per ton as a possible future disposal rate causes the collection centre system to pay for itself by Year #13, a very significant difference from the standard spreadsheet.
- Percent of Waste Stream Recycled: In the standard spreadsheet scenario, it is assumed the recycling levels off at 40%. However, this percentage only meets North Carolina state requirements. A more ambitious recycling program could recycle a much greater percentage of the waste stream. If a 50% recycling rate is used, then the collection centre system pays for itself in Year #16, four years earlier than in the standard spreadsheet.
- Discount Rate: It is possible that a lower discount rate could be justified. If a discount rate of 3.8% is used, it does not seem to have a large impact during the twenty year time frame. However, over a longer period of time, the small change in the discount rate becomes a more significant parameter.
- Best Case Scenario: Should each of the above four scenarios occur, the collection centre system pays for itself by Year #11.

3.2.6 Conclusions

The analysis concludes as follows:

- In examination of the spreadsheets, clearly the benefits for the county to convert to a staffed collection centre system outweigh the costs. Under a conservative scenario, the county has completely paid off all of its capital expenditure after nineteen years, and begins to realize a high annual net benefit. According to sensitivity analyses, the county may pay off the collection centre system as early as Year #11. Also, once the capital costs are paid monetary benefits to the county rise quickly. Furthermore, the value of the collection centres increases over time as the rising population generates increasing amounts of household waste and as disposal fees climb.

Should Chatham County retain its dumpster collection system, many of the problems associated with that system will be exacerbated over time.

- The non-monetary benefits of the staffed collection centre system should not be overlooked. Whereas the disadvantages of the collection centres are for the most part short term, lasting only until residents become comfortable with the new system, many of the non-monetary advantages provide long term benefits. Examples include: (1) better control over materials that enter the waste stream,(2) greater public awareness of environmental issue through participation in recycling, (3) greater flexibility in future solid waste management options, as well as many other benefits..
- Although there will be short run costs both in terms of initial monetary commitments and residents willingness to accept a new system, the benefits far outweigh the costs in the long run. As Chatham County chooses its course for its future solid waste management collection program, the commissioners should commit all the necessary resources to establish a network of staffed collection centres. Can the county afford otherwise?

Looking at the results dispassionately, the conclusions do not seem to be so clear cut. Although the pay-back period is reasonable, the wider CBA outcomes are not reassuring (see Table 2):

- The NPV is a mere \$103,000 on a capital expenditure of \$1.108 million (assuming a very low 4% discount rate)
- The Cost-Benefit Ratio is only a whisker over 1.00, at 1.02
- The Internal Rate of Return is only 4.73%.

It clearly matters then how things are written up! The good point though is that the assumptions in the CBA are totally transparent and the results are readily amenable to re-interpretation.

And, it seems that the policy issues are not so clear cut either! For readers that are interested, Dewees (2002) provides a very interesting review of waste management policies in North America that also assesses the scaling and impact of user charges. (Dewees, D.N., (2002), Pricing Municipal Services: the Economics of User Fees, University of Toronto, Department of Economics Paper, available at: www.ctf.ca/pdf/ctjpdf/2002ctj2_dewees.pdf).

Table 3 Table 4: Basic / 'Standard' CBA for the Chatham County Project

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
COSTS																				
Land Purchase	8,000	32,000	40,000	8,000																
Site Development	92,746	370,984	463,730	92,746																
Roll-off Trucks		62,500	62,500								62,500	62,500								
Operations Costs	18,274	109,641	274,103	383,744	402,017	402,017	402,017	402,017	402,017	402,017	402,017	402,017	402,017	402,017	402,017	402,017	402,017	402,017	402,017	402,017
Centre Manager wage	18,274	23,097	23,097	23,097	23,097	23,097	23,097	23,097	23,097	23,097	23,097	23,097	23,097	23,097	23,097	23,097	23,097	23,097	23,097	23,097
TOTAL COSTS	137,294	598,222	863,430	507,587	425,114	425,114	425,114	425,114	425,114	425,114	487,614	487,614	425,114	425,114	425,114	425,114	425,114	425,114	425,114	425,114
BENEFITS																				
Reduced Collection Staff			38,033	90,147	106,354	106,354	106,354	106,354	106,354	106,354	106,354	106,354	106,354	106,354	106,354	106,354	106,354	106,354	106,354	106,354
Reduced Admin Staff				26,172	26,172	26,172	26,172	26,172	26,172	26,172	26,172	26,172	26,172	26,172	26,172	26,172	26,172	26,172	26,172	26,172
Reduced Maintenance Costs	2,045	12,270	30,675	42,945	44,990	44,990	44,990	44,990	44,990	44,990	44,990	44,990	44,990	44,990	44,990	44,990	44,990	44,990	44,990	44,990
Savings - fuel, oil, tyres	545	3,270	8,175	11,445	11,900	11,900	11,900	11,900	11,900	11,900	11,900	11,900	11,900	11,900	11,900	11,900	11,900	11,900	11,900	11,900
Reduced Disposal Costs	6,545	39,783	100,751	160,031	188,028	274,188	302,260	331,015	335,318	339,678	344,093	348,567	353,098	357,688	362,338	367,049	371,820	378,654	381,550	386,510
Savings on unstaffed sites				2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Sale of recyclables	1,636	9,818	24,545	38,487	44,640	48,960	53,280	57,600	57,600	57,600	57,600	57,600	57,600	57,600	57,600	57,600	57,600	57,600	57,600	57,600
TOTAL BENEFITS	10,771	65,141	202,179	343,055	424,084	514,564	546,956	580,031	584,334	588,694	593,109	597,583	602,114	606,704	611,354	616,065	620,836	627,670	630,566	635,526
NET BENEFITS	-126,523	-533,081	-661,251	-164,532	-1,030	89,450	121,842	154,917	159,220	163,580	105,495	109,969	177,000	181,590	186,240	190,951	195,722	202,556	205,452	210,412
PRESENT VALUE COSTS	6,200,532																			
PRESENT VALUE BENEFITS	6,303,280																			
NET PRESENT VALUE	102,749																			
COST-BENEFIT RATIO	1.02																			
INTERNAL RATE OF RETURN	4.73%																			

Source: Chatham County Project / NZIER

4. Costs and benefits – charging and cost recovery

4.1 Overview

This section sketches in some of the possible relationships between cost-benefit analysis and the design, appraisal and impact of alternative charging and cost recovery regimes. Clearly, cost-benefit analysis and charge / cost recovery analysis may have different viewpoints in terms of their accounting. More often than not, a CBA will take an economic stance that considers the wider effects of an investment on society.

On the other hand, issues involving costing and charging are predominantly financial concerns (or ‘fiscal’ concerns if they impact on budgets). Generally then the two forms of analysis – CBA and charge / cost recovery analysis - proceed in tandem. If an economically viable project or scheme is to stand on its own feet from a financial point of view, it must have both a positive economic NPV and a positive discounted Net Cash Flow.

Having said that, many complex instances can arise in practice that require contributions from skilled economists and business case analysts. Some broad comments are made on the following cases:

- highway investment , tolling and traffic demand management;
- environmental protection;
- operation of local monopoly Local Authority Trading Enterprises / utilities.

4.2 Highway investment, tolling and traffic demand management

Consider a simple case of a new road that reduces the distance between two destinations, speeds traffic flows and reduces accident risks by segregating traffic. Broadly, highway investments in New Zealand are appraised in terms of the benefits that they create from:

- reductions in vehicle operating costs (mainly petrol / diesel but also car wear and tear)
- reductions in travel times (for business travellers / commuters, these are usually valued at a traveller’s gross wage rate before tax)
- reductions in the costs associated with accidents (including the costs of hospitalisation and rehabilitation and some estimate of the Value of Statistical Life in the case of deaths).

These benefit streams are all valued in terms of their contribution to national welfare.

Next consider what happens if a toll is placed on the new road. If the new road is uncongested in the absence of a toll, a toll that is sufficiently high to reduce demand / usage, will also lead to a net loss of economic welfare. This will happen because the toll will reduce the level of net savings / benefits from reductions in vehicle operating costs and travel times.

The toll will therefore have to be justified in terms of its fiscal / financial contribution to cost recovery – and the presence or absence of alternative sources of funding. Even if the toll allows a road investment to rise in priority in terms of funding, this does not mean that its economic ranking has changed. The analyst therefore has two distinct tasks to perform:

- assessment of the cost-benefit relationships for the project (in economic welfare terms)
- assessment of the justification for tolling in terms of its fiscal / financial impacts (in budgeting terms).

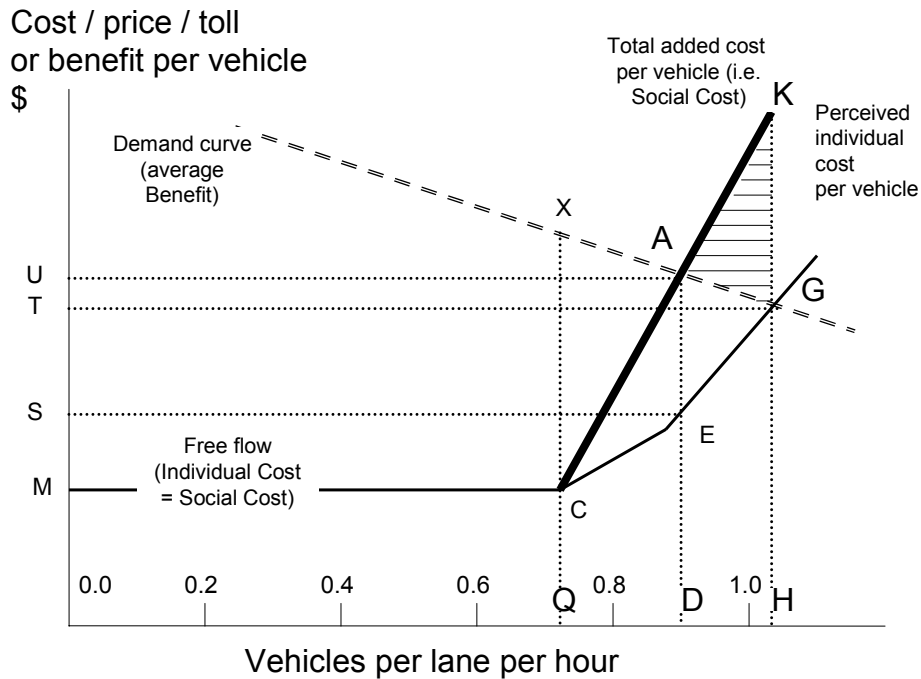
A different situation arises when a road or network of roads is nearing capacity usage. In this case, tolling may be considered for Traffic Demand Management purposes (e.g. to try to encourage off-peak usage). In this instance, tolling may produce positive economic benefits as it reduces overall vehicle operating costs and improves travel times. A cost-benefit analysis may therefore be a useful tool in this instance. Each case must be taken on its merits.

The basic economics of peak hour traffic and peak-hour pricing under congested and uncongested conditions is illustrated in Figure 1 below, drawing on Downs (2004)¹.

The demand curve shown in Figure 1 illustrates the average amount that motorists would be willing to pay for the use of a highway. As the number of vehicles per lane per hour rises (horizontal axis), the average benefit declines because of increased congestion (i.e. the demand curve is downward sloping with respect to the costs imposed by congestion).

¹ Downs, A., (2004), 'Still Stuck in Traffic – Coping with peak-hour Traffic Congestion', The Brookings Institution

Figure 1 Economics of peak hour traffic and pricing



Source: Downs (2004) / NZIER

The solid line MC shows the marginal private costs incurred by motorists in using the highway. In free-flow conditions, the cost remains constant. However, beyond Q, congestion reduces average speeds and the costs incurred by individual drivers rise along the trajectory CEG. However, the costs contributed by each additional driver are greater than the costs born by the individual, such that total costs per vehicle (i.e. social costs) rise on the trajectory CAK – that is private and social costs diverge.

The social optimum occurs therefore where marginal social costs meet average benefits (i.e. point A on the demand curve). On the other hand, the private optimum occurs at much higher traffic densities (i.e. the point G on the demand curve).

To stop traffic rising beyond the social optimum (i.e. D), it is necessary to impose a toll equivalent to AE (or SU).

The social costs (net welfare loss) associated with not imposing a peak hour toll, are given by the area of the shaded triangle GAK. This is defined by the intersections of the marginal social (point A) and marginal private costs (point G) with the average benefit curve, and the slope of the marginal social cost curve. The maximum loss on the last entrants into the road (i.e. the maximum difference between social and private social costs before further additions to traffic are deterred by excessive congestion) is defined by KG.

Taking the basic argument further, transport charges can also be used to address additional externalities relating to such areas as accident risks, air quality, noise, visual intrusion, damage to natural ecosystems etc. This is a driver for more advanced proposals for segment / trip-specific ‘disaggregate charging’.

As previously noted, when road facilities become more crowded private costs rise due to delays. These delays are typically associated with increased vehicle operating costs, trip time costs etc. However, society also faces the cost (possibly over the longer term) of the accident and environmental externalities that result from a given amount of private transportation. As travel increases social benefits at first rise, and then moderate and fall, as congestion leads to accumulating associated environmental damage.

Once again the individual’s viewpoint and society’s viewpoint may diverge. The individual may not be concerned about the environmental damage that arises from his or her road use. However, society may seek to use disaggregate charging to further moderate road use (and the demand for road investment). This can attempt to ensure that social (including environmental) costs do not exceed social benefits.

In the analysis and policy formulation, it will therefore be important to determine what level of economic externality is being reflected in the charging system – and be aware of the policy options / frameworks that underpin different approaches to charging.

4.3 Targeted Charging for environmental protection

There is a good deal of ongoing interest in the possible application of ‘Economic Instruments for Environmental Protection’. Basically, this involves changing the charging system to make it more closely reflect, overall, the positive and negative externalities that arise from production and consumption. One current example is the introduction of tradable carbon emissions permits – and their application to power stations. Within a tradable emissions system, the operators of a coal-fired power station may choose to purchase emissions rights from, say a company that is reforesting a piece of bare land. Others potentially more relevant to local government are the uses of tradable permits or charges for nutrient discharges into streams, and tradable development rights on land conversions to urban uses.

A cost-benefit analysis of such a scheme would need to compare it against feasible alternatives – both non-charge options for achieving the same level of environmental protection and the option of no change from the existing state. It would need make allowances for how environmentally damaging behaviour is likely to change in the face of the new charge, as well as covering all the costs of implementing and enforcing the scheme.

Arrangements would also need to be put in place to provide proper accounting for the revenues earned. However, it has to be borne in mind that such charge instruments are not solely or even primarily intended to raise revenue – they target

changing behaviour. And if they are successful in changing behaviour, revenue will decline. This means that there may not necessarily be a positive return over costs in financial terms and that there may be no presumption in policy terms that environmental damage charging will ‘break-even’.

In appraising decisions of this type, it is important to remember that the user charges are not solely designed to recover direct costs. They are also intended to recover indirect costs and influence behaviour.

Of course, politics also have a role to play here. Many politicians may be less than impressed by the merits of a tradable emissions system when they have to defend their support for the system as a whole by ignoring the complaints of local residents / constituents who live near the coal-fired power station and who may be forced to continue to endure smoky air, blackened hedges and sooty laundry!

4.4 Charging by local monopoly LATEs / utilities

As Local Authorities are area-based agents that provide public goods (like drinking water and sewage treatment) for distinct communities, the facilities that they provide often have natural monopolies. In such cases, private enterprise has no motivation to provide alternative facilities on a competitive basis. This means that, in theory, a Local Authority could charge a monopoly price – and reduce consumption below basic needs levels for poor or distant consumers.

More generally, Local Authorities charge social prices that are close to the average cost of providing the service.

In considering movements towards a ‘user pays’ environment that emphasises cost-recovery, it may be tempting for Local Authorities to consider using – or abusing – their monopoly power. Of course, any attempt to take this course of action risks voter back-lash and may encourage outward migration and enterprise relocation and deter investment. Clearly then, careful consideration will also need to be given to equity and stakeholder response issues in evaluating options for setting charges.

5. A worked example of Demand Management – piped water provision

5.1 Background

The following example looks at relationships between increasing prices, moderating / managing demand, water demanded, reducing capital expenditure – by allowing the postponement of future expansion, and avoiding the need to subsidize publicly provided services from general revenue sources.

The example is derived from the Asian Development Bank’s Guidelines for the Economic Analysis of Projects (Appendix 22) which can be consulted directly at:

The reader is urged to bear in mind that the Guidelines are a useful point of reference on a wide range of issues relating to the application of Cost Benefit Analysis and is urged to consult the original text to supplement the material that has been provided below.

However, the reader should start by noting that the ADB example draws a distinction between ‘financial’ prices’ and ‘economic prices’ that has particular relevance to the economies of Developing Countries. In Developing Countries exchange rate distortions, market interventions, and rigidities in the availability of labour and resources create wedges between what people actually pay (the financial price) and what resource use actually costs the economy (the economic price).

Distortions of this type are largely absent in the case of New Zealand – an economy that has been deliberately deregulated, liberalized and opened to international trade. References in the original ADB document to distinctions between ‘economic’ and ‘financial’ prices can therefore be set aside with respect to the application of pricing principles to projects undertaken by Local Authorities in New Zealand.

5.2 Advantages of Demand Management

Providing piped water at prices below the cost of supply results in:

- the need for subsidies from other sources of revenue (e.g. rates, central government contributions etc.)
- consumption that is relatively unconstrained
- pressure for excessive capital investment to meet needs.

However, effective pricing provides a means of managing demand. Depending on the price elasticity of demand, increasing the price of water will:

- decrease the quantity of water demanded
- increase sales revenue
- cut back operating costs
- reduce capital expenditure – by allowing the postponement of future expansion.

5.3 Initial project design, pricing and appraisal

The example compares the benefits and costs of supply expansion for the hypothetical project, with and without demand management. The basic components of the Cost Benefit Analysis, in the absence of Demand Management, are summarized in Table 1.

The project invests 2.393m (one can visualize this as \$2.393m) to provide 1,000 thousand cubic meters of water (i.e. 1 million m³) of what from year 1 onwards (from a small dam). The quantity demanded is assumed to grow at an annual rate of 5%. The initial capacity is sufficient to meet projected demand (with a price of \$0.40/m³) up to and including year 6. Reticulation costs grow in line with increases in demand. Operations and Maintenance costs are assumed as 3.5% of investments costs in Year 1, growing at 4 percent per year. Due to increasing demand, further capital works are required in Year 5, costing \$701,000.

Table 5 Investment, cash flows and net benefits without demand management
(Quantities in '000s)

YEAR	Price	Quantity Demanded	Revenue	Capital Costs CAPEX	Operating Costs OPEX	Total Costs	NET COSTS	
0	0.40			2393.00		2393.00	-2393.00	
1	0.40	1,000	400.00		87.00	87.00	313.00	
2	0.40	1,050	420.00		91.00	91.00	329.00	
3	0.40	1,103	441.20		94.00	94.00	347.20	
4	0.40	1,158	463.20		98.00	98.00	365.20	
5	0.40	1,216	486.40	774.00	102.00	876.00	-389.60	
6	0.40	1,276	510.40		140.00	140.00	370.40	
7	0.40	1,340	536.00		146.00	146.00	390.00	
8	0.40	1,407	562.80		152.00	152.00	410.80	
9	0.40	1,477	590.80		158.00	158.00	432.80	
10	0.40	1,551	620.40		164.00	164.00	456.40	
TOTALS	undiscounted		12578	5031	3167	1232	4399	632
	discounted @							
	12%		6794	2718	2754	645	3399	-679
NET EFFECT	of discounting per m ³			0.41	0.10	0.51	-0.11	

Notes: (1) Totals may not sum consistently due to rounding

Source: ADB / NZIER

The figures in Table 5 indicate that revenues of \$5.031m will be generated over 10 years, compared to expenditures totalling \$4.399m (\$3.167m CAPEX and \$1.232m OPEX). This suggests that revenues will cover costs.

Compiling a basic CBA is a relatively simple matter. Of course, the main difference between this and the straightforward cash balance that is presented above, is the consideration of the time value of money. This reflects the fact that payments that are due at some point in the future are worth less than payments made today, simply because any payments received now can be re-invested to generate income. Similarly, payments due at some point in the future, are less onerous than payments due today because any money that is currently on hand can be put to work to earn interest.

The time value of money is reflected in discounting over time. The discount rate chosen for this CBA is 12%.

Table 5 also shows what happens when discounting is applied. Because of the heavy upfront cost of capital expenditures and the lag in revenue generation as demand develops, discounted revenues totalling \$2.718m will be generated over 10 years, compared to expenditures totalling \$3.399m (\$2.754m CAPEX and \$0.645m OPEX). This suggests that revenues will not actually cover costs and that there will be a shortfall of about \$0.680m. This is equivalent to a loss of around \$0.11 per m³ that would require subsidization

5.4 Project re-design and appraisal with Demand Management

Having conducted a conventional CBA, the potential for cutting investment requirements and increasing revenues to cover costs through demand management must then be considered. This could involve estimating the impact of price increases on demand and then re-designing the project to ensure that it will break-even in terms of discounted revenues matching discounted costs.

From Table 5, we know that the total amount of water that is expected to be demanded over the 10 year project period, assuming a price of \$0.40 per cubic metre, is 12.578 million m³.

We can now derive new demand estimates on the basis of price elasticities that embody a representative consumer's cut-backs in usage in response to progressively higher prices. In this instance, for a price of \$0.51 per cubic metre, we re-assess demand over the 10 year project period at 11.400 million m³.

The challenge is then to redesign the project so that it meets demand and recovers its costs.

As shown in Table 6, this is possible with a scaled down project that costs \$2.870 million in capital expenditure and \$1.115 million in operating expenses over the 10 year period. The total cost of \$3.985 million represents a saving of \$0.414 million over the previous design.

Table 6 With demand management – investment, cash flows and net benefits
(Quantities in '000s)

YEAR	Price	Quantity Demanded	Revenue	Capital Costs	Operating Costs	Total Costs	NET COSTS
0	0.51			2169.00		2169.00	-2169.00
1	0.51	905	462.06		79.00	79.00	383.06
2	0.51	952	485.52		82.00	82.00	403.52

	3	0.51	999	509.49		85.00	85.00	424.49
	4	0.51	1,049	534.99		89.00	89.00	445.99
	5	0.51	1,102	562.02	701.00	92.00	793.00	-230.98
	6	0.51	1,157	590.07		127.00	127.00	463.07
	7	0.51	1,215	619.65		132.00	132.00	487.65
	8	0.51	1,275	650.25		137.00	137.00	513.25
	9	0.51	1,339	682.89		143.00	143.00	539.89
	10	0.51	1,406	717.06		149.00	149.00	568.06
TOTALS	undiscounted		11400	5814	2870	1115	3985	1829
	discounted @							
	12%		6157	3140	2495	584	3079	-10
NET EFFECT	of discounting per m3				0.41	0.09	0.50	0.00

Notes: (1) Totals may not sum consistently due to rounding

Source: ADB / NZIER

Somewhat fortuitously in the case of the example, this is also consistent with full cost recovery with a water price of \$0.52 per cubic metre (given a 12% discount rate). In practice of course, a number of iterations would be necessary before the scale – price trade-offs were resolved (and there would, like as not, be steps or ‘lumpiness’ in the capital cost of the water facilities stemming from technological constraints that would preclude totally smooth trade-offs across the spectrum of possible scales of the water plant).

5.5 Conclusion

The example illustrates clearly how manipulating water prices can:

- decrease the quantity of water demanded
- increase sales revenue
- cut back operating costs
- reduce capital expenditure – by allowing the postponement of future expansion.

This in turn means that:

- contributions from other sources of revenue can be eliminated or reduced (e.g. rates, central government subsidies etc.)
- public resources can be diverted to other uses (including reductions in the rating burdens borne by businesses and householders)
- potential environmental benefits can be realized from managing demand and moderating pressure on natural water sources.

6. Good practice in charge setting

6.1 Overview

In reality, economic efficiency and financial viability play important but not necessarily dominant roles in setting charges and defining levels of cost recovery. Issues such as compliance and administrative burdens, equity concerns and political and community acceptability must also be borne in mind.

There are a number of guidelines / commentaries on good practice in charge setting that are available on the Internet. These include:

- New Zealand Treasury, (2002), *Guidelines for Setting Charges in the Public Sector*, Wellington – available at:

<http://www.treasury.govt.nz/publications/guidance/finmgmt-reporting/charges>

- OECD Public Management Service, (1998), *Best Practice Guidelines for User Charging for Government Service*, Paris – available at:

<http://www.oecd.org/puma/mgmtres/budget/index>

Brief reviews of these sources are provided below.

6.2 The NZ Treasury Guidelines

6.2.1 Basics

The NZ Treasury Guidelines are obviously highly relevant and should be regarded as a major source and reference document.

The Guidelines start by observing that many existing users charges in New Zealand have been:

- formulated on an ad-hoc basis; and
- involve the recovery of excessive / unjustified costs or capital requirements.

The Treasury notes that public sector agencies provide a range of services to individuals and private businesses for which there is often no alternative supplier. Where an agency seeks to recover some or all of the costs of service provision from the users or direct beneficiaries of that service, the Government and the public want to be assured that the charges set:

- take proper account of efficiency, equity and fiscal concerns; and
- are not excessive in relation to the costs incurred.

The Treasury prepared and published the Guidelines to assist public sector agencies in:

- considering their charging options, including possible alternatives; and

- setting charges that are appropriate and fair.

6.2.2 Evaluating charging options

The Treasury advises evaluating the options for user charges on the basis of:

- encouraging decisions on the volume and standard of services demanded and supplied that are consistent with:
 - the efficient allocation of resources generally, and also
 - the outcomes the government is seeking in providing the service;
- minimising the cost of supply over the short term, and over the long term when capital costs are significant
- keeping transaction costs low, and evasion at acceptable levels
- reducing reliance on funding from general taxation (with its associated costs)
- dealing equitably with the taxpayer, those who benefit from the output, and/or those whose actions give rise to it; and
- looking for new ways to lower costs and find appropriate providers.

These objectives address efficiency, equity and fiscal issues.

6.2.3 Alternative modes of service delivery

It is important to note that the Treasury insists that User Charges by Local Governments may be only one option in a number of possible service delivery and ownership provisions. These should also be carefully evaluated. They include:

- Alternative public-sector providers (e.g. provision by a Crown entity)
- Improved contestability for private sector providers (e.g. through de-regulation)
- Out-sourcing
- Devolution to the private sector (subject perhaps to Government-imposed standards and audit).

6.2.4 Checklist

The Guide notes that evaluations of options require:

- Clear definition of objectives
- Assessment of trade-offs
- Recognition of legal issues
- Comparisons against the ‘current policy’ / ‘no change’ situations
- Provisions for:
 - Consultation

- Cost control
- Charge review and adjustment.

The Treasury document also provides some very pertinent advice on the economic rationale for charging and the economic impacts of different approaches to charge setting.

6.3 The OECD Guide

The OECD Guide stresses the need for:

Clear legal authority

This authority should be a general framework for the application of user charges and should not set the precise amount of the charges to be applied. This allows the charges to be adjusted without further legislative authorisation.

Consultation with Users

This should communicate to the users the rationale for the charges and seek to avoid misunderstandings. Furthermore, the views of the users can be useful in designing and implementing an effective and efficient charging system.

Prior determination of Full Costs

- This costing should be carried out regardless of whether the intention is to recover fully or only partially the cost of providing the service. If the intention is not to fully recover costs, this information will make transparent the degree of subsidy involved in providing the service
- Full costs include not only the direct costs of the service, but also costs shared with other activities (joint costs) and such non-cash costs as depreciation and cost of capital
- Determining full costs can be complex, especially when joint costs must be allocated. The effort made in costing should be commensurate with the scale of the service being charged for. In the case of small scale services, it may be appropriate to use reasonable estimates for allocating joint costs rather than elaborate cost accounting systems
- Costings should be reviewed periodically to maintain their accuracy.

An effective and efficient Collection System

- Responsibility for collection should rest with the organisation levying the charge. This does not preclude an organisation from contracting with a third party for collection services
- In cases where payment cannot be demanded in advance of, or simultaneously with, the delivery of service, invoices should be sent out in a timely manner with clear deadlines for payment. Invoices should be clear and simple, providing sufficient but not over-detailed information
- Efforts should be made to minimise collection costs and any inconveniences associated with the collection process

- Non-payment of user charges should be followed up immediately. Appropriate enforcement mechanisms should be in place prior to the charge coming into effect. Recourse to these mechanisms needs to be clearly defined and transparent. The level of non-payment of user charges should be transparent. If a user charge is so small that it will not justify collection action, then the magnitude of the charge may need to be re-assessed.

Appropriate Organizational and Management arrangements

- Charging users directly for the services they receive can be a powerful management tool for improving organisational efficiency and service quality. Leadership by top management is required to fully reap these benefits
- Setting specific financial, service quality and other performance targets for organisations, in conjunction with user charging systems, is important. The performance of organisations should be monitored on a regular basis to ensure appropriate levels of efficiency and service quality
- Organisations should regularly and systematically solicit the views of service users in order to better understand their client service requirements
- It should be recognised that user charging may require a new set of skills for many government / local government organisations. This should be recognised and properly planned for.

Proper Accounting for / Recycling of Receipts

- Consideration should be given to the respective organisation retaining the proceeds of any user charges it collects. Such revenue should be classified as offsetting receipts (negative expenditures), as appropriate. This serves to reinforce the notion that users are paying a charge in return for a specific service and that responsibility for revenue management rests with the organisation itself
- Consideration should be given to adopting flexible budgetary arrangements for organisations financed by user charges which would allow them to respond to increased service volume by permitting commensurate increases in expenditure and user charging receipts

Setting Appropriate Pricing Strategies

- Wherever relevant, pricing should be based on competitive market prices
- In other cases, pricing should be based on the principle of full cost recovery for each service unless there is a clear rationale for less than full cost recovery. This serves to enhance an efficient allocation of resources in the economy
- Simplicity in the fee structure is important. If substantially the same service is provided to a group of users, it can be appropriate to charge a uniform fee notwithstanding some variability in the cost of servicing individual users
- If certain services are attributable to a class of users rather than individual users, it may be appropriate to charge each user within that class a fee to recover the costs of those services. It should, however, be recognised that

this may involve the loss of some of the benefits of user charging as the link between the charge and the service provision is less direct

- Consideration should be given to differentiated prices for peak and off-peak periods in order to spread demand for services. Similarly, consideration should be given to offering priority service for a premium price
- Introducing user charging for one service can have a significant impact on the demand for substitute services if they are not subject to a similar charge. Consideration therefore needs to be given to also charging for such substitute services.

Ensuring Competitive Neutrality

- If an organisation is supplying a commercial service in competition with the private sector while retaining a monopoly provision of another service, care needs to be taken to ensure that the monopoly service is not subsidising the commercial service
- When pricing such services, care needs to be taken to ensure that their costing is accurate and that they incorporate all items of cost faced by private sector entities. For example, government organisations may be exempt from various taxes and enjoy free provision of certain support services provided by central agencies.

Recognising Equity Considerations

- Consideration should be given to reduced charges for users where full cost recovery would represent an excessive financial burden on individual users. This may be especially relevant to lower-income individuals, smaller entities, users located in remote areas, and heavy volume users of services. The criteria for applying reduced charges should be clear and explicit
- When a user charge does not represent full cost recovery, the degree of subsidy should be transparent to those providing and monitoring the service
- It should be recognised that, in some instances, measures funded through the tax and benefit system may be a more efficient means of ensuring equity than reduced charges.

(NZIER comment: Aside from reducing charges for equity purposes, local government revenue instruments provide opportunities for two-part and multi-part charging to reduce the direct impact of charging on users. For instance, certain sporting facilities with a large fixed cost element can be charged both in the form of a property rates component (to reflect the general benefits to the community) and an entry fee. On this basis, individual users who add to the variable (operations and maintenance) costs associated with running the facility pay a user charge / entry fee that only recovers a portion of total costs.

Such combinations of charging mechanisms can be varied to provide a preferred balance between levels of use, revenue receipts, and the servicing of capital (i.e. interest coverage and principal repayment) requirements.)

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Appendix A : Best Practice CBA

This section provides a refresher on CBA Best Practice. It also provides useful guidance for analysts wishing to check their own or someone else's CBA when it is in draft or near completion stage. The material is drawn from Australia, the United Kingdom and Canada.

A.1 A short check-list from Australia

What questions does the study attempt to answer?

What alternative strategies are considered?

- Do you have any comments on the way the options/alternatives have been set out?
- Are there other choices that could (should) have been considered at the same time?

Are you happy with the cost estimates made?

- Are the methods of evaluation satisfactory?
- Are any relevant costs omitted?

Is the study based on reliable evidence?

- What further information would you require?
- Is such information available and, if so, where and from whom?

Are you happy with the method(s) of benefit measurement employed in the study?

- If not, what method or approach would you propose?
- If yes, are you content with the values derived?

Does the study allow for:

- uncertainty (or errors) in the expected costs and benefits?
- the differential timing of costs and benefits?
- If the answer to (a) or (b) is Yes, are the methods used in the study satisfactory?

Finally, assuming you were advising decision makers, what would be your recommendation?

- Would you feel confident in your recommendation?

Source: Department of Finance – Australia, (1991) *Handbook of Cost-Benefit, Analysis. AGPS, Canberra.*

A.2 A Detailed check-list from the UK

A.2.1 Clarity of objectives

Are the detailed objectives consistent with the strategic policy aims as described, for example, in a management or corporate plan?

Are the objectives supported by adequate background information?
For example:

- relevant strategic aims?
- target populations or client groups and their projected needs?
- the factors which have prompted the expenditure proposal?

Are the objectives and constraints adequately defined?

Has the appropriate method of appraisal been employed? For example, is it a cost-effectiveness analysis, a cost-benefit analysis, or an appraisal of financing costs?

A.2.2 Choice and definition of options

Has a sufficiently wide range of options been considered?

Has the do nothing or do minimum option been explicitly considered?

Have any options been ruled out before detailed appraisal on grounds of technical feasibility or other constraints (e.g. legal, political, financial)? If so, are these valid?

Are the options selected for full appraisal consistent with the strategic aims and objectives and constraints?

Can the options be split into independent components for separate appraisal? (An apparently good option may include separable components which provide good value for money, and others which provide poor value for money)

Are there possibly better options which have not been included in the appraisal?
For example:

- Different quantity or quality of output?
- Different timing or phasing?
- Alternative locations?
- Alternative contract or financing strategies?

A.2.3 Estimation of costs and benefits

General

Has account been taken of:

- All relevant capital costs? For example, land, site preparation, construction, fitting out, equipment, vehicles, hardware, design fees and so on
- Capital replacement or refurbishment expected during the appraisal period?

- All relevant running costs? For example staff costs (including overheads), maintenance, power, administration, rates and so on?
- All important costs or benefits to the private sector or other parts of the public sector, e.g., time savings or environmental damage or improvements?

Accuracy and reliability

Are the forecasts of costs and benefits precise enough for the purposes required, and do they reflect lessons learned from earlier post-project evaluations where appropriate?

Valuation

Is the price base for valuation clearly defined?

Have all costs and benefits been expressed in constant prices before discounting at a discount rate (usually 6 per cent) defined in real terms?

Is the price of any particular item of cost or benefit expected to change at a rate other than that of general inflation? If so, have the estimates of costs or benefits been properly adjusted?

Have resource costs been properly estimated? For example:

- Have up to date market values of assets been used? Are assets already owned being treated (incorrectly) as “free goods”?
- Have all “sunk costs” been omitted?
- Have the economic costs of redundancies been valued? If not, the cost of redundancy payments should be recorded elsewhere in the appraisal.
- Have adjustments been made for taxes and subsidies, where appropriate? For example:
 - Indirect taxes such as GST, where such an adjustment may make a material difference to the appraisal outcome.
 - Transfer payments such as social security payments should be recorded separately from resource costs and benefits.

Non-monetary costs and benefits (intangibles)

Have any important costs and benefits (including unquantifiables) been omitted?

Can all costs and benefits be quantified even if they cannot be valued, e.g. levels of activity or service provision, noise or pollution levels?

Have money values been attached to costs or benefits where possible?

A.2.4 Net present value calculation

Is the time period for net present value (NPV) calculations properly related to the likely economic lives of the options?

Is the timing of all costs and benefits clear for each option?

Is the appropriate discount rate used?

Is the base year for discounting clear?

A.2.5 Assessment of risk, uncertainty and other factors

Does the appraisal identify any important risks or uncertainties associated with the options? For example, are outcomes very dependent on the reliability of particular assumptions? Can their reliability be improved and risks reduced?

Could further use be made of risk appraisal techniques, for example, sensitivity analysis?

A.2.6 Presentation of results

Have the results of the appraisal been adequately presented?

Is it clear who will benefit from and who will bear the cost of each option? Do options give rise to significant distributional issues affecting individuals, organisations, other sectors of society, or the economy?

A.2.7 Evaluation

Are proposals included for monitoring and evaluating the project or policy and its performance once implemented?

Source: HM Treasury – UK, *Economic Appraisal in Central Government: A Technical Guide for Government Departments*, HM Treasury ‘Green Book’ April 1991.

A.3 Check-lists from Canada

A.3.1 The quickie list

Is the problem or opportunity clearly stated? Is there a compelling rationale for the federal government acting in this situation? Are the objectives clear and coherent?

Is the analysis set out separately from the point of view of each important actor?

Are the alternatives defined in a fair and comparable way? Are the important alternatives analyzed?

Is this an open and transparent analysis? Is each stage of the analysis set out so that you can follow the reasoning and the numbers?

Are the likely incremental effects of the project or program alternatives well analyzed?

Are the costs and benefits of these effects measured well and set out in detail over the full life of the project? Are likely changes in relative prices taken into account or does the analyst take short cuts?

Are inflation adjustments and discounting done separately? Are the price index and discount rate the appropriate ones?

Does the analysis take into account uncertainty in the data and risk in the investment?

Does the analysis describe who pays and who benefits?

Does the analysis make a reasoned recommendation and give a fair showing to the alternatives it does not recommend?

A.3.2 Technical best practices

Best practice - the general cost-benefit model

- Every cost-benefit analysis must state the point of view from which benefits and costs will be assessed
- Although it is potentially legitimate for Local Government's to take an independent view in appraising a project (e.g. by defining a regional / local numeraire, discount rate etc.), in practice, most appraisals will have to be referenced to national parameters that embody national welfare considerations, as determined by the NZ Treasury and other Government Departments
- There is no cookbook for benefit-cost analysis, but a standard set of steps is a useful starting point
- Each benefit-cost analysis should contain a parameter table; an incremental-effects model; a table of costs and benefits over time; a table of possible investment results; and a statistical and graphical analysis of the expected net gain (NPV) and a statement of investment risks.

Best practice - defining fair options

- For all public investments, a full set of the most promising options should be compared
- When a single proposal is being considered, it must be compared with a 'baseline case' and the baseline case must be optimized
- The option to delay a project to wait for better information, or for better starting conditions, can have considerable value
- Each option must be standardized for scale, timing and already-owned components to permit a fair comparison. A fair options diagram can clarify a complex set of investment options.

Best practice - inflation adjustments and discounting

- To ensure that changes in relative prices are properly recognized, tables of costs and benefits should be first constructed in nominal dollars, and cash flows should be set out for each period to the investment horizon. Conversions to constant dollars or to present value dollars should wait until all costs and benefits over time are worked out in nominal dollars
- Adjusting for inflation is not the same thing as discounting to present values, so each should be done independently

- The appropriate discount rate depends on the point of view of the analysis and also on the choice of numeraire.

Best practice - measurement

- The cost-benefit framework can be learned in a short time. In contrast, measurement of costs and benefits is a limitless topic. Other specialists, in addition to the cost-benefit analyst, are generally needed as part of the team.
- When market prices are distorted or do not exist, the main methods for estimating the value of costs and benefits are based on willingness-to-pay.
- Income multipliers should generally be avoided but, when used, must be applied even-handedly to costs as well as benefits.
- The literature can sometimes provide approximate values for such difficult-to-measure items as the value of a clean and natural environment, the value of timesaving for commuters, the value of jobs created, and the value of foreign exchange.

Best practice - decision rules

NPV decision rules are best. Other decision rules should be used with extreme care. The two basic decision rules are the following:

1. Do not undertake projects whose NPV is less than zero, unless you are willing to 'lose money' to achieve a non-financial objective.
2. Given a choice among alternative projects, maximize the total NPV.

[It should be noted here that economists may differ on the precedence accorded to different decision rules. Generally speaking it is sensible to calculate the NPVs, IRRs and C:B Ratios of all projects – and maximize the use of all the information that becomes available from the CBA process].

Best practice - sensitivity analysis

- Sensitivity analysis is a useful technique for finding out how important each variable in the cost-benefit model is
- Sensitivity analysis cannot deal with more than two variables at a time, so it does not tell us much about the project's level of risk. Until all variables are allowed to vary simultaneously, we do not know whether their individual effects on risks are magnified or cancelled out by each other
- Four factors contribute to sensitivity: the responsiveness of the NPV to changes in the variable; the magnitude of the variable's range of plausible values; the volatility of the value of the variable (that is, the probability that the value of the variable will move within that range of plausible values); and degree to which the range or volatility of the value of the variable can be controlled

- The switching value of a risk variable can be an important consideration in an investment decision. It can help the decision maker weigh the risk.

Best practice - equity analysis

Distributional issues may be important at the regional / local levels and should be considered in-depth in some cost-benefit analyses. Even a simple analysis showing who benefits and who pays can often be helpful to decision-makers.

There are no uncontentious ways to combine efficiency and equity objectives in the same set of figures, although attempts have been made to use various types of weights to this end.

Distributional issues should be covered in every cost-benefit analysis but kept separate from the economic-efficiency analysis. If a recommendation to approve a particular alternative hinges on equity objectives, then the net cost of choosing the equity-based recommendation must be made visible to the decision-makers.

A.3.3 A good cost-benefit analysis

A good cost-benefit analysis meets the following criteria:

- the objectives and priorities are clear;
- the best alternative ways of achieving the objectives are identified for analysis;
- the alternatives are defined in a way that enables fair comparison;
- the 'point of view' of the analysis is stated;
- assumptions and calculations are visible to the reader at every stage of analysis;
- benefits and costs are estimated in detail for every time period, without short cuts;
- the technical analysis is well done (in regard to discount rates, inflation adjustments, choice of decision rule, etc);
- uncertainty and risk are carefully considered;
- distribution effects are clearly set out (who pays, who benefits?); and
- the recommendation is well reasoned and gives fair consideration to all alternatives.

Source: Treasury Board of Canada Secretariat (1998), *Benefit-Cost Analysis*, Ottawa