

# THE GREEN BOOK



HM TREASURY

**Appraisal and  
Evaluation in  
Central  
Government**

**ANNEXES**

*Draft  
under  
consultation*

**DRAFT UNDER CONSULTATION**

**'THE GREEN BOOK'**

July 2002

Treasury Guidance

**APPRAISAL AND EVALUATION IN CENTRAL GOVERNMENT  
ANNEXES**

<b>ANNEX 1</b>	<b>The Assessment Cycle and Conducting Research.....</b>	<b>5</b>
	1. The Policy, Programme and Project Assessment Cycle (ROAMEF).....	6
	2. Conducting Research.....	8
<b>ANNEX 2</b>	<b>Government Intervention.....</b>	<b>10</b>
	1. Economic Efficiency.....	11
	2. Equity.....	13
	3. Additionality.....	13
<b>ANNEX 3</b>	<b>Valuing Non-Market Impacts.....</b>	<b>18</b>
	1. Valuing Time.....	19
	2. Valuing Health Benefits.....	21
	3. The Value of a Prevented Fatality or Prevented Injury.....	22
	4. Valuing Environmental Impacts.....	24
<b>ANNEX 4</b>	<b>Land and Buildings.....</b>	<b>27</b>
	1. Acquisition and Use of Property.....	28
	2. Leases and Rents.....	31
	3. Disposal of Property.....	31
	4. Cost-effective Land Use.....	32

**DRAFT UNDER CONSULTATION**

<b>ANNEX 5 Risk and Uncertainty.....</b>	<b>38</b>
1. Risk and Uncertainty.....	39
2. Optimism Bias.....	39
3. Specific Information on Risks.....	40
4. Irreversible Risks.....	40
5. The Cost of Variability.....	40
6. Responding to Uncertainty.....	42
<b>ANNEX 6 Distributional Impacts.....</b>	<b>44</b>
1. Marginal Utility.....	45
2. Reducing Social Inequalities.....	48
3. Discrimination.....	49
<b>ANNEX 7 Discount Rate.....</b>	<b>50</b>
1. Social Time Preference Rate.....	51
2. Exceptions to the Standard Discount Rate.....	53
<b>ANNEX 8 Procurement Choices and Project Implementation.....</b>	<b>55</b>
1. Procurement Choices.....	56
2. Project Implementation.....	60
3. Programme and Project Management.....	62
4. Related Processes.....	65

**DRAFT UNDER CONSULTATION**

## **INTRODUCTION**

---

1. The Green Book is a best practice guide to HM Treasury's policy for economic appraisals and evaluations for all central departments, executive agencies and devolved administrations. It sets out the principles which ensure a robust process, and offers straightforward guidance on the steps involved, techniques which may be needed along the way and advice on how to use them. Departments and agencies develop their own manuals or guidelines consistent with these principles to address their more specialised businesses.
2. The Green Book also signposts when more detailed analysis or technical advice may be needed and this advice is contained in these Annexes.
3. The Annexes focus on some of the more challenging aspects of economic appraisal and evaluation which are likely to arise in very complex situations and provide comprehensive advice on how to deal with them. They also contain links to other resources within government which may be useful during an appraisal or evaluation and, for the technically minded, the analytical foundations for the approach adopted in the Green Book.

# THE GREEN BOOK

## Appraisal and Evaluation in Central Government

# ANNEX I

## The Assessment Cycle Conducting Research

*Draft  
under  
consultation*



HM TREASURY

DRAFT UNDER CONSULTATION

## Annex 1

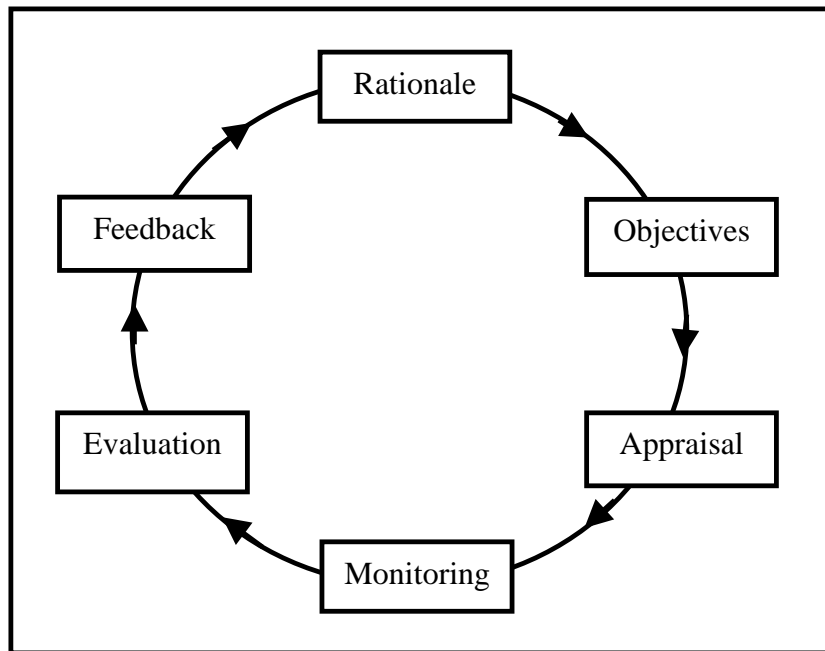
# THE ASSESSMENT CYCLE/ CONDUCTING RESEARCH

---

## 1 THE POLICY, PROGRAMME AND PROJECT ASSESSMENT CYCLE (ROAMEF)

The assessment cycle describes the stages that policies, programmes and projects go through during their lifetime.

Figure 1 ROAMEF Cycle



### 1.1 Rationale

1. Within the public sector, establishing a rationale for intervention will typically involve justifying an activity in terms of its expected impact on economic performance, or in terms of some other stated objective (e.g. social objectives) of government policy, or some combination of the two. Annex 2 discusses the most common rationales for government intervention.

2. To provide a rationale for intervention it will be necessary for a department or agency to show how the project:

*DRAFT UNDER CONSULTATION*

- Fits in with the stated aims and objectives of the department or agency;
- Complements other interventions by the department or agency;
- Interacts with interventions by other departments or agencies.

## **1.2 Objectives**

Objectives should state what the project is designed to achieve and be consistent with the rationale. It is sometimes useful to identify a hierarchy of objectives: for example, the Department for Education and Employment (DfEE) distinguishes between ultimate, intermediate, and immediate objectives. The Department for International Development (DfID) distinguishes between wider objectives, immediate objectives, outputs, and inputs.

## **1.3 Appraisal**

Appraisal is intended to determine which of a set of options will best achieve the stated objectives. Appraisal should be thought of as a continuous process since it is likely that the appraisal process will be revised, or possibly repeated as circumstances change, and as additional information becomes available. Nevertheless, a particularly important step in the appraisal process will occur prior to the commitment of resources or the signing of contracts. The appraisal report is often combined with details of project financing and project management to form a business plan. The appraisal must be grounded in a robust evidence base, reflecting systematic research techniques, some suggestions as to which are discussed in Part 2 of this annex.

## **1.4 Monitoring**

Monitoring is the systematic collection of financial and management information during implementation. It provides an essential source of information, indicating the extent to which objectives are being attained, and giving an early warning of potential problems. Monitoring also provides information for input into the evaluation stage. To be fully effective, plans for monitoring should form part of the initial planning of a project, and it may be necessary to set up monitoring systems needed specifically for evaluation purposes.

## **1.5 Evaluation**

1. Evaluation is the process of assessing the impact of a project while it is in operation, or after it has come to an end. It involves consideration of the economy, efficiency and effectiveness of the project to determine the value for money obtained from intervention, how well it achieved its objectives and whether there were any unintended outcomes.

2. Evaluation brings to the fore the lessons to be learnt for the future which can in turn be fed into future decision taking. Plans for evaluation should form part of the initial planning of a project. To ensure that evaluation is consistently applied it is important for a department or agency to maintain a clear requirement, endorsed by senior management, that evaluation should be applied, with a senior official having specific responsibility and funding for monitoring and progressing the evaluation programme. It is important to ensure that evaluation results are available in good time to inform future decision-making. However,

*DRAFT UNDER CONSULTATION*

policies and interventions do not always have an immediate impact and it is important to ensure that evaluations take account of longer-term impacts.

## **1.6 Feedback**

1. Evaluation reports should reach senior management, and all results of substance should be widely disseminated to staff concerned with future project design, planning, development and management.

## **2 CONDUCTING RESEARCH**

1. Well-conducted research will help to develop a full list of options for possible government intervention. The research is an important step in the ultimate development of evidence-based policies, programmes and projects. It should be as systematic as possible, using electronic sources (i.e. various research databases) and print media (journals and textbooks), including the 'grey' literature (research in progress, but not in print).

2. Sources to help with research include:

- Registers of research councils, research charities, government departments, and funding sources;
- Reference lists of textbooks, existing systematic research reviews and evidence on policy issues;
- Range of electronic databases, including work in progress, (e.g. SIGLE, DISSABS), conference proceedings and technical reports; and,
- Specialist registers of research in a policy or research area.

3. This can be supplemented by communication with key players, expert committees, professional associations, and proven authorities in a policy or topic area. Information found must be assessed critically, for example for the quality of its methodology.

4. Ideally, a synthesis of research findings should be compiled. The methodology of research synthesis (including meta-analysis) is a relatively recent development (Hunter and Schmidt, 1990; Cook, et al, 1992; Cooper and Hedges, 1994; Cochrane Collaboration, 1999) and the task is made significantly easier by the emergence of organisations which do systematic searching, critical appraisal, and provide summary conclusions on a full-time basis. These organisations publish high quality information in electronic and print form, and include:

- Cochrane Collaboration (<http://www.cochrane.co.uk>) and the NHS Centre for Reviews and Dissemination (<http://www.york.ac.uk/inst/crd>) in health care;
- Campbell Collaboration (<http://www.campbell.gse.upenn.edu>) in education, criminal justice, and social work and welfare;
- ESRC Centre for Evidence-Based Policy and Practice (<http://www.politics.qmw.ac.uk>) for a wide range of social science and public policy topics;
- A free database service containing information on social science research funded by the Economic and Social Research Council is available at <http://www.regard.ac.uk/>;
- Information on the use of scientific advice in the development of policy is contained in <http://www.dti.gov.uk/ostbusiness/index.htm>.

*DRAFT UNDER CONSULTATION*

5. A major source of bias in policy evaluation is 'publication bias' which arises from selective use of evidence, searching only readily available journals, textbooks and reports, or English literature, and not work in progress.
6. Publication bias is also a result of some journals favouring publication of studies with positive findings, and other journals favouring studies with negative findings. Bias can be avoided or minimised by systematically searching for research in the relevant policy area.

# THE GREEN BOOK

## Appraisal and Evaluation in Central Government

### ANNEX 2

#### Government Intervention



HM TREASURY

*Draft  
under  
consultation*

*DRAFT UNDER CONSULTATION*

## **Annex 2**

# **GOVERNMENT INTERVENTION**

---

This Annex discusses the rationale for government intervention, i.e., the circumstances which must exist to justify action by the government. Government intervention is not justifiable as an objective in its own right. It must be underpinned by broader objectives, which are essentially twofold:

- The enhancement of economic efficiency by addressing problems with the operation of markets and institutions; and,
- The achievement of a social objective, such as promoting equity.

## **1 ECONOMIC EFFICIENCY**

Economic efficiency is achieved when no-one can be made better off without someone else being made worse off. Such efficiency enhances economic growth by ensuring that resources are allocated in the most productive manner possible. One way of achieving efficiency is to ensure that the private returns which an individual or firm receives from carrying out a particular action equal the returns to society as a whole. Market failure is an imperfection in the market mechanism that prevents the achievement of economic efficiency and can occur for a number of reasons, which are briefly discussed below.

### **1.1 Public Goods**

1. The market may have difficulty allocating certain types of products and services, such as 'public goods', an example of which is defence. Public goods are those that are 'non-rival' and 'non-excludable' when used or 'consumed'.

- 'Non-rival' means that the consumption of the good by one person does not prevent someone else using or consuming that good. Clean air is an example of a non-rival good.
- 'Non-excludable' means that if a public good is made available to one consumer, it is effectively made available to everyone. National defence is an example of a non-excludable good.

2. Non-excludability can give rise to a problem known as 'free-riding'. This is when some consumers fail to pay for the provision of the public good because they expect others will do so.

### **1.2 Externalities**

'Externalities' result when a particular activity produces benefits or costs for other activities that are not directly priced into the market. Externalities are associated with, for example, research and development spill-overs, and environmental impacts, such as pollution. A firm might keep down its own costs by not investing in water pollution controls, but in so doing

DRAFT UNDER CONSULTATION

would raise the costs of those firms and individuals relying on using clean water. The polluter accordingly imposes an external cost on other users, or alternatively, a reduction in pollution confers an external benefit upon these other users.

### 1.3 Imperfect Information

1. Information is needed for a market to operate efficiently. Buyers need to know the quality of the good or service to judge the value of the benefit it can provide. Sellers, lenders and investors need to know the reliability of a buyer, borrower or entrepreneur.
2. This information must be available fully to both sides of the market, and where it is not, market failure may result. This is known as 'asymmetry of information' which can arise in situations where, for example, sellers have information that buyers don't (or vice versa) about some aspect of product or service quality. This is known as 'adverse selection'. Another possible situation is where a contract or relationship places incentives upon one party to take (or not take) unobservable steps which are prejudicial to another party. This is known as 'moral hazard', an example of which is the tendency of people with insurance to reduce the care they take to avoid or reduce insured losses.
3. Imperfect information can give rise to 'principal/agent problems'. Where government buys services on behalf of the public from suppliers and sets standards for those services, it is acting as the agent of service users. Provision of the wrong service, or type and level of service can sometimes be attributed to a lack of incentives within government to reward efficiency, quality and innovation among its service providers.
4. The issue then becomes how the government agent can be motivated to provide proper and effective services to the public (its 'principal'). Incentive pay structures in the private sector are sometimes used to address this issue. However, establishing a similar regime of incentives can become complex within government. These problems may arise whether the government directly procures services or acts as a quality regulator.

***Principal/ agent problems***

*The principal /agent problem refers to the general problem of motivating one person or an organisation to act on behalf of another. An organisation can be both a principal and an agent in its relationships with other entities.*

### 1.4 Market Power

1. Market power can arise as a result of insufficient actual or potential competition to ensure that the market continues to operate efficiently.
2. 'Sunk costs' (costs that cannot be recovered) can deter entry by competitors in the first place, and therefore create market power. This situation may be exacerbated through organisations acting strategically to protect their position in the market. Examples of this are when an organisation invests in any excess capacity available in the market, or engages in a practice known as 'predatory pricing', by, for example, setting prices for its goods below the marginal cost of their production, or otherwise pricing with a view to driving out competitors and then raising prices once they have left.

DRAFT UNDER CONSULTATION

## 2 EQUITY

1. If a proposal is concerned with implementing a government social objective (for example, local or regional regeneration) it is necessary to assess the extent of any inequity and the reasons for it.
2. Where the government is directly involved in an attempt to improve social outcomes, there may also be a need to address the following issues:
  - Lack of incentives, (such as linking pay to an adequate measure of performance) which, if present, would result in an appropriate level of service; and the extent to which any weak incentives could be improved.
  - The possibility that government may possess information which is not widely known and which would position it to provide more equitable services. An example of this would be if the government were in possession of data on child poverty in a locality which was not generally known and which would help to focus remedial action.
3. An assessment should also be made of the extent to which government provision of services could result in dependency.

## 3 ADDITIONALITY

### 3.1 Assessing Additionality

1. The success of government intervention in terms of increasing output or employment in a given target area is usually assessed in terms of its 'additionality'. This is its net, rather than its gross, impact after making allowances for what would have happened in the absence of the intervention. Additionality can also be referred to as a 'supply side' or 'structural' impact, which operates by altering both the real income generating capacity of the economy, and the rate of unemployment that is consistent with a stable inflation rate (the 'Non-Accelerating Inflation Rate of Unemployment' – NAIRU). Examples of government intervention that promote supply-side benefits include improving the working of markets and economic institutions, strengthening capabilities, and facilitating greater participation in the workforce. The extent to which a proposal may produce a supply side benefit is an essential component of an appraisal.
2. In assessing whether there are any supply side benefits arising from a proposal, the default assumption should be that any increase in government expenditure would result in a matching decrease in private expenditure and hence jobs, (known as 'crowding out' of private expenditure). The result is a loss of jobs elsewhere in the economy to match any increase in employment arising from the proposal. If, however, the supply-side impact of a proposal is expected to be positive (for example, a net increase in jobs – a supply side benefit) the net additional impact on economic welfare will need to be measured. This is usually done in terms of additional employment or output.

*Additionality:*

*An impact arising from an intervention is additional if it would not have occurred in the absence of the intervention.*

DRAFT UNDER CONSULTATION

3. Estimating this type of additionality will normally require an analysis of the product, labour, and in some cases, capital markets which would be affected by the intervention. For example, when assessing the level of displacement of an employment creation programme or the impact of recruitment and redundancy decisions on a particular local area, it is necessary to examine the characteristics of the jobs created, or protected, in relation to the characteristics of the local labour market. They must then be compared with similar jobs in other local areas which are not subject to the policy. Such a comparison establishes a 'base case': what would have happened if the intervention had not gone ahead.

4. In some cases, the best source of information for assessing additionality can be from those who clearly have an interest in the outcome of the decision. In these circumstances, the information and forecasts should be confirmed by an independent source. For example, the implied growth in demand for services might be compared to other forecasts for the same region, and contrasted with past performance. Sensitivity analysis should also be carried out, using alternative values for the key variables.

*Additionality in this context is assessed by measuring the gross output associated with an intervention and netting off the impact of any factors which would have occurred despite the intervention.*

5. After developing a base case, the next step is to assess the net impact or benefit for government of these different options. This net benefit is the 'additionality' of the option. Additionality must, however, be calculated net of 'leakage', 'deadweight', 'displacement' and 'substitution' effects. These are explained below.

- 'Leakage' effects benefit those outside of the spatial area or group which the intervention is intended to benefit.
- 'Deadweight' refers to outcomes which would have occurred without intervention. Its scale can be estimated by assessing what would have happened in the base or 'do minimum' case, ensuring that due allowance is made for the other impacts which impact on net additionality.
- 'Displacement' and 'substitution' impacts are closely related. They measure the extent to which the benefits of a project are offset by reductions of output or employment elsewhere in the target area.

*For example, a project may attract scarce skills, or investment, which would otherwise have gone to other parts of the country; or, if the policy involves support for local businesses, these may compete for resources and/ or market share with non-assisted businesses.*

6. The appropriate area for analysis of displacement effects will depend on the type of project. In the case of employment displacement, the area considered should usually approximate the local labour market. In some cases, the DWP's Travel to Work Areas published through DTI may be useful (figure 2).

DRAFT UNDER CONSULTATION

Figure 2 Available Guidance

*Detailed guidance on methodologies for assessing displacement effects on non-assisted businesses is available from the Department of Trade and Industry's Central Evaluation Team web site at <http://www.DTI.gov.uk/about/evaluation>; the recent DTI/ SBS evaluation of 'Smart', available on the same web site, provides an applied example.*

*Links between effects at the level of the firm, and effects at the national level have been analysed by a number of academic researchers using longitudinal micro-data derived from the Annual Business Inquiry.*

Relevant research carried out for DTI is available at:

[http://www.dur.ac.uk/richard.harris/DTI\\_A.pdf](http://www.dur.ac.uk/richard.harris/DTI_A.pdf) and

[http://www.dur.ac.uk/richard.harris/DTI\\_B.pdf](http://www.dur.ac.uk/richard.harris/DTI_B.pdf).

7. The effect on net employment and output is likely to be very much smaller than the direct employment and output effects of the project. Evidence should support the assessment of the scale and importance of the net employment and output benefits, taking account of multiplier effects. A multiplier measures further economic activity, (whether output or jobs), which is associated with the creation of additional local economic activity. There are two types of multiplier: income and supply. Where it is considered appropriate to calculate multipliers, guidance is available from English Partnerships and the Regional Development Agencies<sup>1</sup>.

*The net benefit of an intervention equals the gross benefits less the benefits that would have occurred under the base case (the 'deadweight') less the negative impacts elsewhere (including 'displacement' of activity), plus multiplier effects.*

8. If there is no improvement in national economic efficiency, local employment and output effects, net of any local displacement effects, may be considered in parts of the appraisal where the project has a strong distributional rationale. For example, a policy may aim to reduce the rate of unemployment in a particular deprived area, as opposed to reducing the rate of unemployment overall (see section 3.2 Regeneration).

9. Where potentially large changes to employment, (either as a result of employment creation, protection or redundancy) are concerned, assessment will normally require a thorough analysis of the local labour market. This should cover the age, skills and experience of those whose jobs are at stake, and how these compare with the characteristics of the unemployed and those who have recently found employment. The analysis might also assess the likelihood of new investment in the region in the event that these job losses occurred.

### 3.2. Regeneration

Specific issues arise in the appraisal and evaluation of regeneration projects that have a rationale defined both in terms of their impact on efficiency and equity. In many cases, these

<sup>1</sup> For example, see 'Additionality: A Full Guide' (English Partnerships, 2001)

*DRAFT UNDER CONSULTATION*

projects are aimed at the regeneration of local areas, although some are targeted at entire regions. The issues are discussed in more detail in 'A Framework for the Evaluation of Regeneration Projects and Programmes', HM Treasury, 1995 (currently under revision).

### **3.2.1. Regeneration Issues**

1. When considering a regeneration proposal the following issues should be addressed:
  - The rationale.  
This needs to make clear:
    - Who the intended beneficiaries of the project are;
    - How they will be reached;
    - What structural benefits are expected as a result of the project; and,
    - The means by which these will be achieved.
  - The objectives.  
The objectives of regeneration programmes are likely to include improvements in one or more of the following:
    - labour supply and skills;
    - quality of life;
    - physical environment; and,
    - local business opportunities.
  - Outputs.  
These should be identified with respect to the relevant intermediate objectives. Regeneration outputs might include:
    - Reductions in crime,
    - Improvements in the capacity of community organisations, or,
    - Increases in local incomes and employment.
  - Partnerships:  
Partnerships between the local community, business and government are important for the sustainability of regeneration projects and the well being of local communities. Most local regeneration projects involve partnerships, and are likely to have some effect on existing institutional relationships. An appraisal should include a description of the partnership and, where possible, its expected impact on the area.

### **3.2.2 Employment Impacts and Regeneration**

1. Government intervention in the economy is sometimes undertaken with an employment objective in mind. In other cases, although employment is often retained as a principal objective, the justification for intervention is more far-reaching and the objectives tend to be more broadly cast. This is typical of regeneration projects.
2. Where programmes have multiple objectives, such as environmental improvements, these other additional benefits (and any associated costs) should be covered in the appraisal, together with employment impacts. The geographical focus of regeneration projects means that it is particularly important to assess displacement effects at both the local and national levels, particularly if the programme or project is substantial.

*DRAFT UNDER CONSULTATION*

**3.2.3 Capital Grants**

1. For schemes which make capital grants to companies, the assumption is that a project will fully displace other projects that would have been undertaken by that firm or would have taken place elsewhere in the economy.
2. A technique for estimating the net impact on productive capacity of a grant supported project is to calculate the Net Present Value (NPV) of the project using a discount rate that reflects the real average marginal rate of return on capital investment projects in the UK. In practice, a proxy for this rate can be obtained from ONS data on real rates of return on capital employed. However, a discount rate of 3.5%, (more closely reflecting social time preference), should be used for calculating the NPV of grants and of any wider costs and benefits of the project.
3. For capital grants, the effort used to appraise additionality should be appropriate to both the level of expenditure and the timescale of the project. A value based on direct questioning of the applicant for the grant may be sufficient to assess project additionality where small sums are involved, or it may be possible to define the qualifying conditions for assistance in a way that ensures that any accepted proposal is, in fact, additional. For larger projects, an in-depth analysis of the applicant's business may reveal useful information on the additionality of the assistance sought.
4. Private enterprises often require investment projects to achieve minimum internal rates of return (or 'hurdle rates'). These rates usually reflect the perceived riskiness of the investment. Firms claiming hurdle rates should be required to justify their use, and to demonstrate that the rates claimed are used properly. In particular, the assessment of additionality in cases where grants are paid should not be based on unsubstantiated claims by applicant firms. Where the firm maintains that an alternative location is being considered, sound evidence to support the claim should be provided, normally in the form of detailed investment appraisals for each alternative.
5. Where a programme involves the provision of assistance (e.g. grant) to private sector firms, it is necessary to assess the viability of the project, since it is not appropriate for public money to be invested in a project that is not commercially viable. If assistance is granted, it should be sufficient to enable the project cash flows, plus subsidy, to satisfy commercial investment criteria.
6. Assistance should be granted only to firms which are themselves considered to be viable. The quality of management is very important, both in general, and with specific regard to those charged with the responsibility of carrying out the proposal. The track record of the business may help to inform a judgement on viability.
7. The expenditure of public funds on policies, programmes or projects must ensure that the supported activity will actually take place. Where a grant is paid, arrangements to secure repayment in the event of premature closure, or failure to deliver the promised outputs, may help to ensure this additionality.

# THE GREEN BOOK

## Appraisal and Evaluation in Central Government

### ANNEX 3

#### Valuing Non-Market Impacts



HM TREASURY

*Draft  
under  
consultation*

DRAFT UNDER CONSULTATION

## Annex 3

# VALUING NON-MARKET IMPACTS

---

1. This Annex provides techniques for attributing valuations where there is no readily available data, for example, impacts which are not traded in a market. Attributing values is an essential component of Cost Benefit Analysis (CBA), and should be attempted wherever feasible. This Annex provides information on how to value non-market impacts, such as timesavings, health and the environment, which can be more complex but which are equally as important as market impacts.
2. Where valuation is not feasible, the appraisal should focus on comparing the cost-effectiveness with which outcomes can be achieved.
3. Section 4.5.2 of the Green Book *'The Main Stages in Monetary Valuation of Impacts'* discusses a range of techniques which are available to determine values for non-market impacts. These techniques are discussed in more detail below and examples are provided of how they can operate in practice.

## 1 VALUING TIME

1. Within central government, the Department for Transport's (DfT) approach to valuing time for appraising road schemes and other transport projects is well established. This requires that different values are used for 'employers' time' and 'own' time (or working and non-working time).
2. The value of employees' time-savings is the opportunity cost of the time to the employer. This will be equal at the margin to the cost of labour to the employer: the gross wage rate plus non-wage labour costs such as national insurance, pensions and other costs that vary with hours worked. Journeys to and from work (commuting journeys) are included in non-working time.
3. Estimates of the value of non-work time-savings are generally obtained by using stated preference techniques<sup>2</sup>.
4. The values for working time which are used in the appraisal and modelling of transport projects and policies are based on the mileage weighted labour costs of users of each mode of transport. The National Travel Survey (NTS) contains detailed information on the distance and amount of time spent in travel by individuals in each earnings band to provide the appropriate weights for each mode. The New Earnings Survey provides estimates of the earnings of drivers of commercial and public service vehicles. In theory, it would be possible to collect local data on the earnings of those who would use the project being appraised, although in practice this is rarely practical.

---

<sup>2</sup> Guidance on commissioning work employing stated preference techniques is available from Department for Transport at [www.dft.gov.uk](http://www.dft.gov.uk) (<http://www.dft.gov.uk/about/economics/index.htm>)

DRAFT UNDER CONSULTATION

5. A national average standard value of non-working time for all modes of transport is generally used for appraisal purposes. It has long been the practice to use this standard value, often referred to as the equity value of time-savings, for all non-working time-savings.
6. There is evidence from observed behaviour and survey data that people place a higher value on saving walking or waiting time than on saving time spent in a vehicle. This evidence suggests that walking and waiting time should be valued at double that used for in-vehicle time. In addition, time spent in overcrowded conditions on public transport also carries a higher weight, the value being determined by the severity of the overcrowding. Unreliability, measured in terms of deviations around the expected journey time, can also carry an additional penalty. Time-savings are valued at the same rate per minute or part thereof, whatever the extent of the saving or duration of the journey. An average value may be the best approximation in practice.
7. For transport appraisals, the value of savings in travel time for work is assumed to rise with the passage of the years in proportion to expected increases in GDP per head. For non-work time, this assumption balances a number of factors that might either tend to increase or decrease the value of time-savings relative to income. These might include a decline in the marginal utility of money as incomes increase, changes in the length of the working week and changes in the quality of travelling conditions.
8. The use of a project-specific value of non-working time might be preferable to using the national average or equity value in cases where time-savings can be captured through revenue from fares. These will often form part of a commercial decision by, for example, a train operator assessing the case for accelerating a service.
9. Using the estimated average values of travel time-savings from previous projects or proposals may not be appropriate if the characteristics of the client group are not similar to those of transport users, or if the circumstances differ significantly. Nevertheless, the estimates may serve as orders of magnitude.

**Figure 3 Valuing Time**

*Valuation of time-savings is a vital part of transport and other appraisals. Time is valued differently across modes of transport. .*

*Differences in the value of time across modes are due to the differences in average income on each mode, and differing preferences revealed by passengers on those modes in travel surveys. For road travel, time is valued according to survey data on income distribution and passenger numbers in cars. Working time is valued at gross wage rate plus employer overheads (approximately 24%). Standard rates are £17.44/hour for car drivers, £20.45/hour per car, and £25.17/hour for rail passengers.*

*Non-work time, which includes commuting trips, is valued at a standard rate across all modes of £3.74/hour per person, giving £5.98/hour per car (all 1998 values). The value of non-working time spent waiting for public transport, walking and cycling is valued at double these rates.*

DRAFT UNDER CONSULTATION

## 2 VALUING HEALTH BENEFITS

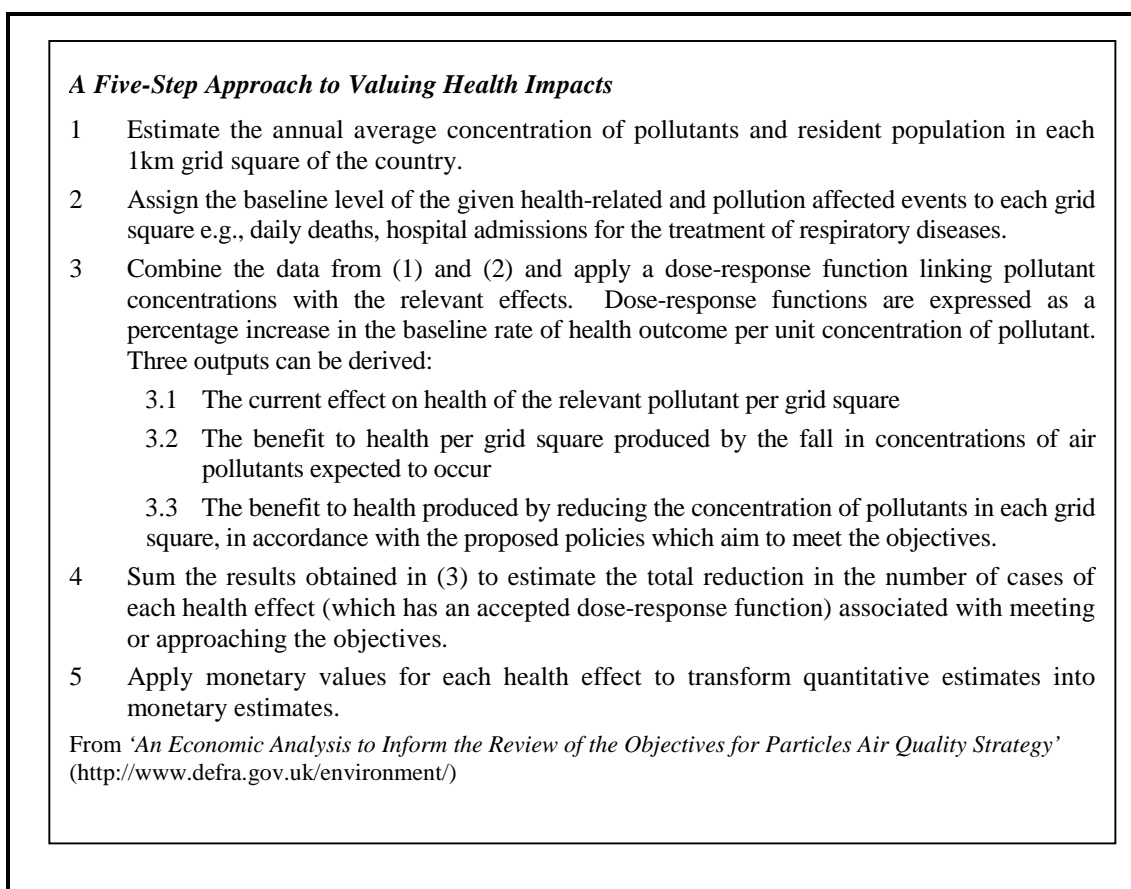
1. Health impacts are rarely a question simply of lives lost or saved. In policy areas which mainly affect health, an alternative approach is often used, to take account of changes in life expectancy (including expected life years where lives are lost or saved) and, wherever possible, changes in the quality of life. This approach is known as the quality-adjusted life year (QALY).
2. The EuroQol instrument provides a simple and consistent framework for measuring general health and deriving QALY values and is the most commonly used measure of health benefits in Europe. It weights life expectancy for health-related quality of life over time.
3. The comparison of health interventions may reveal the impact of different factors on clinical effects. For example, working out the relationship between dosage and response of a particular medicine is a necessary prior step to properly valuing a policy for the provision of that medicine. In some cases, such as when the benefits of an intervention are measured in 'natural' units, (for example, reduction in the incidence of disease or lowering of blood pressure rates) it may be appropriate to undertake an appraisal of an intervention proposal on the basis of its cost effectiveness (rather than its cost benefit). It may be possible to appraise a proposal on the basis of its 'cost utility' if there is an appropriate measure of the benefit of an intervention in terms of human welfare.
4. These assessments cannot determine whether a programme *should* be funded, nor how large it should be, unless the further step is taken of estimating the 'Willingness to Pay' (WTP) value for the health gains envisaged. Applying monetary valuation techniques in these types of circumstances allows comparison of the marginal cost of an intervention against any marginal benefits.
5. A monetary value must be attributed to health impacts where they are to be weighed against non-health impacts. There are a number of techniques available to do this, which include undertaking a survey to estimate an individual's WTP for certain health benefits. The interim Interdepartmental Group on Costs and Benefits (IGCB's) report, '*An Economic Analysis of the National Air Quality Strategy Objectives*'<sup>3</sup> provides a good example of how to conduct an economic analysis which includes health benefits, although, because of the current uncertainty over the values to attach to the health impacts, the IGCB does not at present value health impacts in monetary terms. An example of taking a broad approach to estimating acute health impacts is set out in figure 4.

---

<sup>3</sup> DETR (1999) <http://www.defra.gov.uk/environment/>

DRAFT UNDER CONSULTATION

**Figure 4 Measuring Short Term Health Benefits Associated With Reductions In Air Pollution:**



6. The approach adopted for non-health benefits, e.g. reductions in noise, damage to buildings, crops, commercial forests etc, is similar to that set out in figure 4. Further guidance on the assessment and valuation of health impacts is given in the Department of Health's (DH) 'Guidance on Policy Appraisal and Health' (1995) and 'Evaluation of Health Technologies for Use in the NHS: Good Practice Guidelines' (1999). HSE guidance on the evaluation of health impacts is included in GAP23, 'HSE guidance to Regulatory Impact Assessments'.

### **3 THE VALUE OF A PREVENTED FATALITY OR PREVENTED INJURY**

1. In order to assess proposals to devote resources to the prevention of fatalities or injuries, it is necessary to place a value on a prevented fatality (VPF) or a prevented injury.
2. The appropriate starting point for valuing reductions in the risk of death or injury is a measure of the individual's WTP for a reduction in risk of death or injury (or, where valuing the introduction of a new hazard, their willingness to accept increased risk).
3. The willingness of an individual to pay for small changes in their own or their household's risk of loss of life or injury is then extrapolated to arrive at a VPF. Similar calculations are done for non-fatal injuries. The changes in the probabilities of premature

DRAFT UNDER CONSULTATION

death or of serious injury used in WTP studies are generally very small. If individuals systematically undervalue small risks<sup>4</sup>, this approach may introduce a downward bias in estimating VPF.

4. In the UK, the VPF includes the 'extra' value placed on relatives and friends, and any further value placed by society at large on avoiding the premature death of individuals. Accordingly, any addition of WTP for the safety of others may lead to double counting.<sup>5</sup>

5. A lower bound on the value of a prevented fatality may be determined by revealed preference and stated preference studies. This lower bound is useful for determining a threshold of value for money for safety expenditure and also for comparing proposals concerning increased safety.<sup>6</sup>

6. Revealed preference studies derive individual WTP for risk reduction from, for example, the size of wage differentials for more or less risky occupations; or price versus safety trade-offs in choosing transport modes; or WTP for safety devices such as smoke alarms or car air bags. However, in practice, these estimates of the revealed value of a prevented fatality are not precise.

7. Stated preference approaches attempt to provide estimates of the value of avoided fatality through questionnaires. For additional information, refer to HSE (2000a), '*Valuation of Benefits of Health and Safety Control, Final Report*', which describes an approach which was used to update the DETR value for reduction in risk of a fatality.

8. For the UK, the Department of Transport (DfT) values the reduction of the risk of death in the context of road transport at about £1.145m per fatal casualty prevented (in 2000 prices)<sup>7</sup>. In addition to the WTP measures, these estimates include gross lost output, medical and ambulance costs. Values are updated in line with assumed changes in GDP per head.

9. DfT and HSE also use explicit monetary values for non-fatal casualties, based on a WTP approach. Serious and slight casualties are valued separately and the values are updated in line with changes in GDP per head. Values currently in use for preventing a serious and slight road injury are £128,650 and £9,920 respectively (at 2000 prices). Costs of police, insurance and property damage are added to these casualty values to obtain values for the prevention of road accidents. The HSE tariff of monetary values for pain, grief and suffering begins at £150 for the most minor non-reportable injury.<sup>8</sup>

---

<sup>4</sup> It is plausible that, in paying for safety, failure, for example, to grasp the significance of small risks, leads to an underestimation of the costs of loss. On systematic underestimation of small risks, see Franklin (2000), ch.7.

<sup>5</sup> If people are concerned, and therefore willing to pay, for other people's safety, it might be supposed that such WTP should be added to 'own' WTP for 'own' safety. However, this augmentation of the 'own' WTP-based figure is legitimate only if the concern for others' safety takes the form of so-called 'safety-focused altruism' in which, while people are concerned for others' safety, they are indifferent to other determinants of their overall well-being. If, by contrast, altruism takes the 'pure' form in which people's altruistic concern respects other people's preferences, the addition of WTP for others' safety to the 'own' WTP for 'own' safety entails a form of double-counting and is not appropriate. For cases that are intermediate between safety-focused and pure altruism some, but not full, augmentation of the 'own' WTP-based figure is justifiable. (M W Jones-Lee, 1992)

<sup>6</sup> While there are unfunded proposals that would save lives for less than the estimated minimum VPF, there is reason to question expenditure on safety schemes with higher costs per prevented fatality. (Notably, local road safety schemes are believed to offer life savings for one tenth of the estimated VPF. (See Evans (2000)).

<sup>7</sup> DfT 2000. Highways Economic Note No 1. 2000) 'Valuation of The Benefits of Prevention of Road Accidents And Casualties'. <http://www.roads.dft.gov.uk/roadsafety/hen2000/index.htm>.

<sup>8</sup> These values for avoidance of premature death and cost of injuries in road safety applications may not be directly applicable to other programmes in contexts substantially different from those in which they were derived.

*DRAFT UNDER CONSULTATION*

10. There is clear evidence that individuals are not indifferent to the incidence of injury or fatality, reflecting differences in the value placed on avoiding premature death, or differences in the degree of control they or others have over their own safety. For example, in their estimate of benefits from asbestos proposals, HSE currently doubles the VPF figure to allow for individual aversion to dying from cancer, and the additional associated personal and medical costs<sup>9</sup>. Further information on which is available from HSE. However, risks on different transport modes are not valued differently in any significant way<sup>10</sup>.

#### **4. VALUING ENVIRONMENTAL IMPACTS**

1. Environmental impacts can arise from a variety of government decisions (whether large infrastructure projects or new policy measures). They can be positive or negative, may range from local to global, and may include, for example, effects on air and water quality, noise levels, or visual enhancement or intrusion. This section provides general guidance relevant to the valuation of these impacts.

2. Environmental impacts are typically not priced because property rights are ill-defined, or because the relevant good is effectively owned by a large group of people or society at large (common goods). An example of an adverse environmental impact stemming from deficient property rights is over-fishing of waters that nobody (or everybody) owns. With effective property rights the owners would have an incentive to maintain the value of their asset (fishing rights) to prevent any over-exploitation.

3. Some impacts, such as changes to landscapes, have the characteristics of public goods, being to a large extent 'non-rival' and 'non-excludable'. One person's enjoyment of a non-rival good does not detract from another's, and if a non-excludable good is made available to one individual it is automatically made available to all. Non-excludability makes pricing impossible and non-rivalry renders it undesirable. These factors, among others, contribute to the market failing to match the supply of, and demand for, environmental quality.

4. An environmental asset can have several types of economic value which together constitute its 'Total Economic Value'. This is a concept used primarily in environmental economics. One of the types of economic value is known as 'use value', which, in principle, can be measured by the WTP of the people who 'consume' an environmental asset, for example by visiting it, or their willingness to accept a reduction in quality or quantity of benefits from it. Use values can be estimated using either stated preference techniques (questionnaire based) or revealed preference techniques (using observed prices or behaviour). Non-use values can only be estimated through stated preference surveys.

5. One form of use value is 'option value', which may arise from the knowledge that an option retains an environmental asset to use in the future, even if it is not used now. Non-use values stem from the value placed on an asset by people who make no direct use of it. A particular case of this is 'existence value', which stems from knowing that, for example, a site or species is being preserved, even when people have no intention of ever 'using' it. 'Bequest value' is the desire to pass benefits or options to future generations, and may result from either use value or non-use/ existence value. Empirical evidence suggests that existence values and option values can be important for unique amenities, such as historic sites and

---

<sup>9</sup> HSE (2000 b) pp. 119/120, para B25 and B28, <http://www.hse.gov.uk/condocs/closed/cd159.pdf>

<sup>10</sup> See Jones-Lee and Loomes (2001).

DRAFT UNDER CONSULTATION

buildings, species and habitats. Appraisal of these unique amenities may require adjustments to benefits or costs to take account of existence and option values.

6. Some environmental impacts are, for all practical purposes, irreversible. The valuation of such impacts should take into account the possibility that future events may lead to a higher or lower valuation than one based on current circumstances.

**Figure 5 Aggregates Study**

<p>1. The former DETR commissioned a study (London Economics (1999) <i>The External Costs and Benefits of the Supply of Aggregates: Phase II. Report for DETR.</i> (www.planning.odpm.gov.uk/ecb). The purpose of the study was to inform a decision on whether to impose a tax on aggregates and, if so, at what level. This estimated how much people valued avoiding the adverse environmental effects of quarrying for construction aggregates, such as crushed rock, sand and gravel, both in their locality and in landscapes of national importance.</p> <p>2. Ten thousand respondents were picked at random from areas surrounding 21 sample quarries and other extraction sites. They were asked how much they would be willing to pay, in the form of increased taxes over a five year period, for the local quarry to be shut down, assuming that the site is restored in keeping with the surrounding landscape, and that the workers find new employment.</p> <p>3. A further 1,000 respondents, chosen at random from 21 English postcodes not near aggregates production sites, were asked what they would be willing to pay to close a quarry in a National Park (the Peak District and the Yorkshire Dales were used as examples). These results in respect of National Parks show the value attributed to the environmental damages of quarrying by people not themselves directly affected. The environmental effects which people were asked to value included:</p> <ul style="list-style-type: none"> <li>• Adverse effects on nature, such as loss of biodiversity;</li> <li>• Noise from quarry transport and blasting;</li> <li>• Traffic and dust levels; and,</li> <li>• Visual intrusion.</li> </ul> <p>4. From the results of the surveys, national estimates were calculated for the average amount that people are willing to pay for the environmental benefits obtained from early closure of a quarry. These are shown below for each category of sample site:</p> <p><u>'Willingness to Pay' estimates:</u></p> <table border="0"> <tr> <td>Case Study Sites</td> <td>£/tonne</td> </tr> <tr> <td>Hard rock</td> <td>0.34</td> </tr> <tr> <td>Sand and Gravel</td> <td>1.96</td> </tr> <tr> <td>Quarries in National Parks</td> <td>10.52</td> </tr> </table> <p>5. The national average amount which individuals were willing to pay for the closure of all types of quarry sites, weighted by the type of output, was calculated to be £1.80 per tonne.</p>	Case Study Sites	£/tonne	Hard rock	0.34	Sand and Gravel	1.96	Quarries in National Parks	10.52
Case Study Sites	£/tonne							
Hard rock	0.34							
Sand and Gravel	1.96							
Quarries in National Parks	10.52							

7. Techniques based on market prices include that of 'replacement cost', which uses an estimate of the cost of restoration to original state. The replacement cost technique should only be used in contexts where agreed standards must be met. Where different levels of pollution are possible, a dose-response function may be used to estimate the environmental impact of different 'doses' of pollution, and market prices can be used to place a value on these impacts where they cause changes in a marketed output (for instance, agricultural crops).

DRAFT UNDER CONSULTATION

8. When a programme has multiple outputs, or outputs with different dimensions, they should be added up with weights reflecting marginal valuations or marginal WTP, in order to compare different options.

9. Sometimes a number of outputs can be combined into a single overall measure, in advance of valuation in money terms. For example, individual noise events over a series of days and/ or nights may be aggregated using the equivalent continuous sound level, dBA Leq. This metric, which has effectively supplanted the noise and number index (NNI) formerly used for aircraft noise, is increasingly used world-wide to summarise noise exposure, and has been found to correlate well with subjective ratings of annoyance due to daytime noise, at community level.

**Figure 6 Valuation of Environmental Benefits Using Contingent Valuation**

For many kinds of environmental good, such as landscape, biodiversity, public access and enjoyment, and cultural heritage there is a complete, or virtually complete, absence of any kind of market. Eliciting values which can be used in appraisals is therefore problematic. A number of techniques have been adopted to address this problem but the most generally applicable and widely used approaches are contingent valuation (CV) methods. These rely on constructed, hypothetical markets to elicit monetary estimates of value, expressed either as a 'willingness to pay' (WTP) to acquire or safeguard the environmental good in question or a 'willingness to accept' (WTA) compensation for its loss. The technique has been used in a wide variety of contexts to obtain valuations of environmental assets or the benefits associated with environmental protection. A large number of studies have indicated that the public values the features associated with certain types of 'traditional' farmed landscape features which are not associated with modern farming practices and which there may be little or no incentive for farmers or landowners to provide in the absence of any policy intervention<sup>1</sup>.

An example is the Forestry Commission study of the amenity and recreational values of three community forests, including the Forest of Mercia. The timber revenues from the forests were insufficient for their development to be financially profitable. The objective of the study was to establish whether such development was nonetheless desirable, once estimates of the value of the likely non-market benefits of forest development were included.

A key part of the study, undertaken in 1992, was a CV survey which involved interviews with individuals living within and up to five miles outside the forest areas. Informants were asked about their existing use of the area, their likely use of the proposed forest development, and their WTP for the development. Estimates of the likely number of visits were grossed up to take account of local population numbers.

It was estimated that if the development went ahead, the Forest of Mercia would receive 20 million visits each year, with annual benefits derived from the reported WTP of £10 million. The resource cost-benefit analysis was undertaken under low, medium and high scenarios. For Mercia, the three net present values of benefits, spanning a wide range, were £34 million, £68 million and £119 million.

<sup>1</sup> 'Economic valuation of the agri-environment schemes in the United Kingdom' (1997), Stewart L; Hanley N; and Simpson I. Research Report for MAFF and HM Treasury.  
'Estimating the Value of Environmental Features', (1999) Stage 1 and Stage II Reports to MAFF, Institute of Ecology and Resource Management University of Edinburgh and Scottish Agricultural College Edinburgh (<http://www.defra.gov.uk/esg/econwork/>)

# THE GREEN BOOK

## Appraisal and Evaluation in Central Government

### ANNEX 4 Land and Buildings

*Draft  
under  
consultation*



HM TREASURY

DRAFT UNDER CONSULTATION

## Annex 4

# LAND AND BUILDINGS

---

This annex contains sections on the valuation of land and buildings. It discusses how the value of property rights are to be taken into account when calculating Exchequer Funding requirements, and provides a worked example to show how the techniques discussed apply.

## 1 ACQUISITION AND USE OF PROPERTY

### 1.1 Valuing Property Rights

1. Calculating the Exchequer Funding requirements for projects involving interests in land and buildings is complicated by the longevity of the freehold and leasehold interests and the durability of the assets. This section discusses these issues.
2. Many appraisals involve considering the optimisation of Government interests in land and buildings. The appraisals will involve interests in leasehold and freehold properties, PFI/ PPP arrangements where property forms a part, and direct investment in construction<sup>11</sup>.
3. Securing value for money from existing investments, as well as new public infrastructure requires careful consideration. With existing assets, consideration needs to be given as to whether these can be surrendered, merged or modified to release value. With newly built assets, consideration has to be given to design, whole life costs, fitness for purpose, operational efficiency, and end of life costs as well as the initial impact of the capital payment.
4. If a proposal involves the acquisition, management or disposal of legal rights in land and buildings, the value of those property rights needs to be taken into account, whether these interests are freehold, leasehold, a licence, or subsumed within a PPP/ PFI contract. With new construction, the initial cost, lifetime costs and residual value will need to be considered.
5. Property interests are costed in terms of capital value, or rental value. Some leasehold interests, where the rental is different from the market value, may also have a capital value. Appraisals normally use capital values when appraising freehold property, properties with development value, and longer leasehold interests. As for other appraisals, this is done by bringing the cashflows to a net present value or net present cost.

### 1.2 The Basis Of Valuation

The valuation of a site in an appraisal should be based on the most valuable possible use, rather than the highest value that could be obtained for its current use. The valuation should include an assessment of the social costs and benefits of alternative uses of a site, not just the market value.

---

<sup>11</sup> New orders obtained by contractors from the public sector totaled £6,176 million in 2000 (Construction Statistics Annual 2000 DTI, Table 1.1, pg. 16 and Table 1.4, page 20).

DRAFT UNDER CONSULTATION

### 1.3 Obtaining Valuations

1. An assessment of the value of a site in the most valuable alternative use should be based on the advice of suitably qualified and experienced valuation surveyor<sup>12</sup>. Either in-house valuers or external experts can be commissioned to carry out the valuation.
2. Valuations should be based on the definitions of 'market value' (MV) or 'open market value' (OMV) used in the '*RICS Appraisal and Valuation Manual*'. Valuations should take into consideration the prospects for development and the presence of any purchaser with a special interest, insofar as the market would do so. To take into account such potential purchasers, it may be necessary in instructing the valuer to adapt the RICS definition of MV/OMV.

### 1.4 Common Issues In Valuation

1. The value of an interest in property depends on the use for which it is being valued (e.g. as residences, shops or offices), the physical state of the asset, the duration of the legal interest, and obligations such as rents and repairs, etc.
2. Normally in government appraisals, the alternative use with the highest market value should be considered. To assess the highest value reasonably obtainable, the valuer must consider the market demand for that use together with the planning situation.
3. Where the development property has planning consent for a more valuable use, the valuation should reflect the market demand for that use. If the appraiser believes that there is the prospect of planning consent for an even more valuable use than that previously obtained, and that there is a real economic demand for that use, then the appraisal should ignore both the existing use of the building and the existing planning consent. Instead, it should normally reflect the best use and highest value of the site, in the way that the market would do.
4. If there is no planning approval, the potential for obtaining such approval should be estimated, and reflected in the valuation. Alternatively, the value of a property may be depressed by restrictions on development. It should be considered whether or not these can be lifted (and at what cost), and the result of this should be reflected in the valuation. In all cases the prospect for obtaining a higher planning consent should be considered by the appraiser and his professional property advisor.
5. Valuations based on market prices reflect private, rather than social, costs and benefits. Accordingly, they will not always take into full account the actual or potential amenity value, or environmental impact, of a particular land use. Generally, where there is such an impact (for example along the route of a proposed new road), land should be valued at its market price in the assessment of Net Exchequer Funding. Environmental costs or benefits of a change of use that are not captured in the market price, should be included in the reckoning of non-Exchequer net benefits.
6. Where the current use of land is subsidised, it is sometimes necessary to adjust market prices to reflect the impact of the subsidy. In particular, when considering transferring land from agricultural use, it will generally be appropriate to make a downward adjustment to the

---

<sup>12</sup> For instance, a corporate member of the Royal Institution of Chartered Surveyors or the Institute of Revenues, Rating and Values.

*DRAFT UNDER CONSULTATION*

market price of the land to reflect the capitalised impact of expected future UK and EU subsidies: i.e. the land should be priced net of the impact of such subsidies.

7. As these adjustments reflect avoided future costs to taxpayers, it is the adjusted sum that should be included in the assessment of Exchequer Funding.

8. Assessing the value of buildings in their most profitable use is fairly straightforward where the building can be readily adapted to different user requirements, such as standard office accommodation. However, many public sector buildings (such as prisons and hospitals) may not be so easily adaptable to other purposes.

9. Even if there is no developed market for a particular type of property, there may be relevant market information. Such evidence might come from market transactions from the sale, or lettings of buildings or part of buildings such as in the private hospital sector, letting of accommodation for tribunals, etc. It is desirable for the appraiser to keep his evidence of value as close to objective market transactions evidence as possible. However, there are some public sector buildings (such as prisons and defence installations) that may not be easily adaptable to other purposes.

10. If there is no alternative use for the buildings the property should be valued as the higher of:

- The value of the site, cleared of buildings and contamination and ready for redevelopment; or
- The value of the site and buildings in its current use.

## **1.5 Valuations Where There Is No Market**

1. The valuation of a specialised building for which there is no market is problematic for valuers and appraisers. The RICS *Appraisal and Valuation Manual* suggests using the 'Depreciated Replacement Cost' basis of valuation.

2. Depreciated Replacement Cost (DRC) comprises the 'open market value' of the land in the present use, plus the current gross replacement cost of the buildings and their site works. The buildings costs are depreciated by an allowance to reflect their condition and age, and their functional, economic and environmental obsolescence. These factors render the existing property less valuable than a new replacement.

3. Valuers have two approaches to depreciated replacement cost. One involves envisaging an exact replacement of the existing building, (which can be artificial if the skills and materials do not actually exist to replicate that building). The second approach is to imagine a modern building that is a functional substitute, even if it is smaller, or differently configured to reflect modern circumstances.

4. DRC valuations are relatively specialised and advice should be sought from a professional property consultant. DRC figures are subjective figures, which reflect the value to the owner, rather than objective, transaction based opportunity cost. They tend to be on the high side and require careful handling. DRC should only be used where there is a continuing operational need for the property (or the stream of services derived from it) over the period of the appraisal.

*DRAFT UNDER CONSULTATION*

## **2 LEASES AND RENTS**

1. Sometimes the actual rent paid on leasehold property (the 'passing rent') will vary from the market rent. This most often occurs in older long leases with unusual rent review patterns. In longer leases with infrequent rent reviews the market rent can substantially exceed the passing rent and this difference is known as a 'profit rent'. This lasts until the next rent review or the lease end. This can give the lease a capital value in its own right and such leases are sold from time to time. In a depressed market the passing rent can exceed the market rent so that the property is described as 'over-rented'. Such leases usually contain upward only rent review clauses (UORR) so that if a rent is set at the top of a property cycle this may persist over one or more rent review periods. The appraiser has to reflect that in his appraisal.

2. Appraisers use the 'market rent', which is the estimated amount for which a property would lease at the date of the appraisal between a willing lessor and a willing lessee operating at arms length, after proper marketing, with proper market knowledge, prudently and without compulsion.

3. The passing rental value (and thus the capitalised rental value) on physically similar properties may be quite different. This may reflect the fact that the lease of one office block may be on full repairing and ensuring terms where the tenant pays for all repairs and insurance. A physically identical office block may have an entirely different lease but with the landlord responsible for insurance and repairs. It is important for the appraiser to remember that what is being valued is the legal interest in a property rather than the physical property itself.

## **3 DISPOSAL OF PROPERTY**

1. Departments have a duty to dispose of property surplus to requirements within three years and should not hold land speculatively. They are encouraged to obtain professional, specialist advice when doing this. Appraisers should note that the sale of freehold property, or the assignment or subletting of leasehold property, is likely to involve significant costs, (e.g. legal fees, marketing costs and removal costs). Situations can be complex where there is more than one occupier.

2. The main question to consider is what should be done to a surplus property prior to putting it on the market. Initiatives to improve its marketability would include:

- Refurbishment
- Applying for a different outline (or detailed) planning consent. However, sometimes it is not clear what is the best alternative use, in which case properties could be put on the market 'subject to planning permission'.
- Consulting other public sector bodies about their property requirements. The OGC maintains a register of property surpluses and requirements.

DRAFT UNDER CONSULTATION

3. More detailed advice on property disposals can be obtained from the Office of Government Commerce (OGC) and from 'Government Accounting'<sup>13</sup>, particularly Chapter 24, Disposal of Assets.

## 4 COST-EFFECTIVE LAND USE

1. The plots of land which are available for new developments may not precisely match requirements, but where a plot exceeds requirements, the surplus should be disposed of as soon as possible.

2. An exception to this rule is in cases where future expansion is anticipated, (for example within a phased development), and where the extra land may not be available later. Efforts should still be made to secure some return from land than needs to be retained, but which is temporarily surplus, (for example by short term letting).

3. Including the value of land already owned means that an appraisal must also include the costs of retaining vacant land. It is sometimes argued that vacant land on government sites could not be used for any other purpose because of the demands of security, and so the opportunity cost of this land is zero. However, it is generally possible, by the re-organisation of a land portfolio taken as a whole, to release land elsewhere. In practice, land that can be used for a public sector project nearly always has an opportunity cost.

### Figure 7 Land and Buildings Worked Example

The purpose of this example is to introduce basic concepts regarding typical accommodation appraisals and/ or evaluations; some are specific to land and property valuation, and others apply more generally.

#### Context

A government department (A) owns the freehold of a 2000 m<sup>2</sup>, 1960's office block on the outskirts of the city. It lets 500 m<sup>2</sup> to another government department (B) under a memorandum of terms. Department B continues to occupy the premises, with Department A's permission, although the current memorandum of terms has expired. Department A occupies the remainder.

Enquiries of the local authority have confirmed that planning consent for conversions of the buildings for high density, high quality residential development would be granted. The current accommodation is poor; a staff survey has revealed widespread dissatisfaction with its facilities. Managers are now exploring the options for providing future accommodation needs.

#### Objectives

The main aim of the Department is to provide modern office accommodation for its staff in a manner which represents value for money.

<sup>13</sup> <http://msnetoasis/fmra-toa/website/treasuryoffice/govt.htm> -

DRAFT UNDER CONSULTATION

**Land and Buildings Worked Example (cont'd)**

**Options**

A number of options are being considered, including relocating the activities of this branch to the Department's head office. For this example, only three will be considered in detail.

*Option 1 'Do Minimum':*

This entails refurbishing the current property at a cost of £1 million. Department B has expressed an interest in taking a new lease after refurbishment for 15 years, with 5 yearly upwards-only rent reviews at a rent of £60,000 per annum, effectively on full repairing and insuring terms, which represents the current open market rental value.

It is likely that there will be a need for a further minor refurbishment of the building in 10 year's time at a cost of £0.5 million, but it is anticipated that this will help maintain the open market rental value of the property in real terms, with only a slight decline.

*Option 2 New office block*

Department A moves into 1500m<sup>2</sup> of a new city centre office block, to be completed in the near future, situated next door to a rail and bus terminus. The location is seen as one that will improve markedly over the next couple of years or so and consequently, rental values are expected to grow faster than the rate of inflation over this period.

The developer would be prepared to accept a fifteen-year full repairing and insuring lease for the property, with a tenant's option to break at the end of the 10th year, without penalty. The initial rent can be agreed today at £240,000 per annum subject to upwards-only rent reviews every 5 years. Department A's consultant surveyors have confirmed that the rent and other terms generally reflect current market conditions.

*Option 3 Re-use existing vacant government office space*

Department A moves to a vacant office property currently leased to another department and surplus to their requirements.

The property, known as Crown Building, comprises a 1500m<sup>2</sup> modern city center office block. The location is similar to that of the new city centre property outlined in Option 2 above. The passing rent is lower at £200,000 as it is a second hand building with a more basic specification, but growth assumptions are similar.

The existing 15 years' lease has 5 years left to run and can be renewed under the Security of Tenure provisions of the Landlord and Tenant Act. The Owing Department's agents advise that the cost of disposal or surrender will be equivalent to the rent and running costs for the remaining period of the lease.

**Assumptions**

The detailed assumptions are shown in the notes to the tables of calculations.

*Option appraisal*

The Department initially performs a cost-effectiveness analysis on the two options. Table 1 shows the results of this analysis.

*Initial appraisal findings (table 1)*

The cost effectiveness analysis shows that the reuse option provided significantly better value.

*Valuing benefits (table 2)*

Managers want to investigate the differences between the options further. Models are developed of the benefits that accrue from each option. There are some additional non-Exchequer benefits in moving to the new, more accessible site. These are times-savings for the public who use the site regularly, accruing from the more central location.

*DRAFT UNDER CONSULTATION*

**Land and Buildings Worked Example (cont'd)**

**Conclusion**

In this example, cost effectiveness analysis is sufficient to make an appropriate choice. Valuing its additional benefits further improves the case for developing a solution based on Option 3.

This example illustrates some specific aspects of accommodation appraisals, as well as introducing benefits valuation in the appraisal process, which is considered in more detail in Annex 3.

DRAFT UNDER CONSULTATION

Land and Buildings Worked Example: Table 1. COST EFFECTIVENESS ANALYSIS

Ref to Notes	Option 1 Do minimum - refurbish	TOTAL	Year															
			0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	<b>Option 1 Do minimum - refurbish</b>																	
	<i>Property/capital costs</i>																	
1	Rent received (nominal terms)		0.0	30.0	60.0	60.0	60.0	60.0	67.1	67.1	67.1	67.1	67.1	75.9	75.9	75.9	75.9	75.9
2 & 3	Rent received (real terms - year 0 prices)		0.0	29.6	57.8	56.4	55.0	53.7	58.5	57.1	55.7	54.4	53.0	58.5	57.1	55.7	54.4	53.0
4	Site value		-3,500															
5	Refurbishment costs		-1,000									-500						
6	<i>Running costs</i>																	
	Rates (real terms)			-103	-105	-108	-110	-113	-116	-119	-122	-125	-128	-131	-134	-138	-141	-145
	Maintenance/repairs			-30	-30	-30	-30	-30	-30	-30	-30	-30	-30	-30	-30	-30	-30	-30
7	Utilities/Other			75	-100	-100	-100	-100	-100	-100	-100	-100	-100	-100	-100	-100	-100	-100
8	Costs of holding Crown Building vacant			-295	-290	-286	-281	-277	0	0	0	0	0	0	0	0	0	0
9	Tenants' service charge contribution			12	12	12	12	12	12	12	12	12	12	95	12	12	12	12
	<i>Business costs</i>																	
	Business travel and courier costs			-130	-130	-130	-130	-130	-130	-130	-130	-130	-130	-130	-130	-130	-130	-130
	<b>CASHFLOW</b>		-4,500	-441	-585	-585	-584	-584	-305	-310	-314	-319	-823	-238	-325	-330	-335	2,860
10	Net present cost @ 3.5%	<b>-7,692</b>	-4,500	-433	-556	-537	-518	-501	-253	-248	-243	-238	-594	-166	-219	-215	-211	1,737
	<b>Option 2 New City Centre Block</b>																	
	<i>Property/capital costs</i>																	
11	Rent paid (nominal terms)			-180	-240	-240	-240	-240	-313	-313	-313	-313	-313	-354	-354	-354	-354	-354
11 & 12	Rent paid (real terms - year 0 prices)			-178	-231	-226	-220	-215	-273	-266	-260	-254	-247	-273	-266	-260	-254	-247
	Fitting out, telecoms, removals			-250														
13	Tenants' compensation			-120														
	Dilapidations on lease expiry																	
	<i>Running costs</i>																	
	Rates			-128	-131	-135	-138	-141	-145	-149	-152	-156	-160	-164	-168	-172	-177	-181
	Maintenance/repairs			-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20
	Utilities/Other (cleaning/security)			-85	-85	-85	-85	-85	-85	-85	-85	-85	-85	-85	-85	-85	-85	-85
	Costs of holding Crown Building vacant			-295	-290	-286	-281	-277	0	0	0	0	0	0	0	0	0	0
	<i>Business costs</i>																	
	Business travel and courier costs			-90	-90	-90	-90	-90	-90	-90	-90	-90	-90	-90	-90	-90	-90	-90
	<b>CASHFLOW</b>		-370	-796	-848	-841	-834	-828	-613	-610	-607	-605	-602	-632	-629	-627	-625	-873
	Net present cost @ 3.5%	<b>-8,723</b>	-370	-782	-805	-772	-739	-709	-507	-488	-469	-451	-434	-440	-424	-408	-393	-530
	<b>Option 3 Reuse Crown Building</b>																	
	<i>Property/capital costs</i>																	
11	Rent paid (nominal terms)			-200	-200	-200	-200	-200	-261	-261	-261	-261	-261	-295	295	295	295	295
11 & 12	Rent paid (real terms - year 0 prices)			-198	-193	-188	-183	-179	-228	-222	-217	-211	-206	-228	222	217	211	206
	Fitting out, telecoms, removals			-750														
13	Tenants' compensation			-120														
	Dilapidations on lease expiry																	
	<i>Running costs</i>																	
	Rates			-103	-105	-108	-110	-113	-116	-119	-122	-125	-128	-131	-134	-138	-141	-145
	Maintenance/repairs			-25	-25	-25	-25	-25	-25	-25	-25	-25	-25	-25	-25	-25	-25	-25
	Utilities/Other (cleaning/security)			-85	-85	-85	-85	-85	-85	-85	-85	-85	-85	-85	-85	-85	-85	-85
	<i>Business costs</i>																	
	Business travel and courier costs			25	-90	-90	-90	-90	-90	-90	-90	-90	-90	-90	-90	-90	-90	-90
	<b>CASHFLOW</b>		-870	-500	-498	-496	-494	-492	-543	-541	-538	-536	-534	-559	-113	-121	-130	-389
	Net present cost @ 3.5%	<b>-6,094</b>	-870	-492	-473	-455	-438	-422	-450	-432	-416	-400	-385	-389	-76	-79	-82	-236
			0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

DRAFT UNDER CONSULTATION

**Notes to Table 1 – Explanations and Assumptions**

1. 'Passing' rent (nominal) and real rental values ('market rent'). In this example, rent is reviewed every five 5 years. This means that the real rent level is eroded by inflation between rent reviews; inflation is assumed to be 2.5%, as is the market rental growth rate (i.e. rents rise in line with inflation). For example, in year 6, actual rent (the passing rent) catches up with the market rent (the calculation is  $60,000 * 1.025^{4.5} = 67,052$ ).  
There are two main methods to deal with rental cash flows – (a) convert the nominal cash flow into the real terms by deflating the rent by the rate of inflation and then discount at the appropriate discount rate, or (b) discount the nominal cash flow at the 'double discount' rate, which is derived by multiplying the discount rate with the inflation rate. The Treasury's preferred method (as shown in this example) is (a), which is more explicit, allowing all the cash flows to be gathered together and expressed under a common term. However, the results produced are identical.
2. Rental growth is assumed to be 2.5% for Option 1: no higher than inflation.
3. Rent-free period: The tenant will enjoy a rent-free period of 6 months in Year 1 (as part of the terms negotiated for the new lease).
4. Site value. This is the opportunity cost of not selling the site at its open market value in the best alternative use (i.e. for residential accommodation).
5. Running costs inflate annually and therefore can be expressed in real terms relating to year 1.
6. Utilities costs reduce in real terms from Option 1 to 2 because of energy and environmental efficiencies of the new building.
7. Other costs also reduce in real terms from Option 1 to 2 because of other efficiencies (location and scale).
8. Tenants contribution: tenants will contribute towards some of the cost of the ten-year refurbishment.
9. Business travel costs reduce from Option 1 to 2 because of the more accessible location of the new building.
10. Cash flows and net present costs. The net present costs for two discount rates are shown, the current 6.5% and the proposed 3.5%.
11. Rental growth = 10% during the first two years, 2.5% thereafter; this is only realised at the rent reviews. For example in year 6, the calculation for the rent paid is  $240,000 * 1.1^2 * 1.025^3$ .
12. Initial rent free period of 3 months.
13. Tenants' compensation under the Landlord and Tenants Act 1954 is based upon twice the rateable value on the assumption that there has been continued occupation of the existing premises for more than 14 years.
14. Timing of cash flows: all cash flows are to the midpoint of the year.
15. Decanting costs have not been included for option 1 for the sake of simplicity.
16. Costs of holding Crown Building vacant rent and running costs until lease expiry. Rent passing £200,000. Running costs when vacant £100,000
17. Costs of fitout/telecoms/removals to move to Crown Buildings estimated at £750,000
18. The costs of holding Crown Buildings vacant must be shown in Options 1 and 2 as the investment appraisal must account for costs to the Exchequer overall not just to the individual Department

DRAFT UNDER CONSULTATION

Land and Buildings Worked Example

Table 2. COSTS AND BENEFITS ANALYSIS

<b>Option 2 New City Centre Block</b>		<b>TOTAL</b>	<b>Year</b>															
			0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Costs		-370	-796	-848	-841	-834	-828	-613	-610	-607	-605	-602	-632	-629	-627	-625	-873
	<i>Additional Non-Exchequer Benefits</i>																	
1	Improved disabled access			10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
2	Reducing commuting time (visitors)			30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
	Net cost		-370	-756	-808	-801	-794	-788	-573	-570	-567	-565	-562	-592	-589	-587	-585	-833
3	NPV (3.5%)	<b>-8,255</b>	-370	-743	-767	-735	-704	-675	-474	-456	-438	-421	-406	-413	-397	-382	-368	-506
<b>Option 3 Reuse Crown Building</b>																		
	Costs		-870	-500	-498	-496	-494	-492	-543	-541	-538	-536	-534	-559	-113	-121	-130	-389
	<i>Additional Non-Exchequer Benefits</i>																	
	Improved disabled access			10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	Reducing commuting time (visitors)			30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
	Net cost		-870	-460	-458	-456	-454	-452	-503	-501	-498	-496	-494	-519	-73	-81	-90	-349
	NPV (3.5%)	<b>-5,625</b>	-870	-452	-435	-418	-402	-387	-417	-400	-385	-370	-356	-361	-49	-53	-57	-212

Notes to table 2

1. Calculated assuming that additional value is attached to these benefits.
2. Assumes that it is a public building.
3. Standard NPV calculation.

# THE GREEN BOOK



HM TREASURY

## Appraisal and Evaluation in Central Government

# ANNEX 5

## Risk and Uncertainty

*Draft  
under  
consultation*

DRAFT UNDER CONSULTATION

## Annex 5

# RISK AND UNCERTAINTY

---

This Annex describes how to take account of risks and uncertainties when conducting an appraisal or an evaluation. It is structured as follows:

- Definition of risk and how risk differs from uncertainty.
- Discussion of optimism bias – the most common type of risk to occur in appraisal.
- When information for specific risks should be used.
- How to handle irreversible risks in appraisals.
- How to calculate the cost of risk.
- The use of sensitivity and scenario analyses to handle uncertainty.
- The example of climate change.

## 1 RISK AND UNCERTAINTY

1. Risk can be defined as uncertainty of outcome (whether positive opportunity or negative threat). The difference with uncertainty is that risk can be measured by calculating the probabilities of certain outcomes, while in uncertainty the probability or likelihood of an outcome is not known. Risk management is an important aspect of best practice in project appraisal and implementation: it involves having processes in place to monitor risks; access to reliable up-to-date information about risks; the right balance of control in place to deal with those risks and decision-making processes supported by a framework of risk analysis and evaluation.<sup>14</sup>

2. The distribution of the probabilities which distinguish risk from uncertainty define the scale of any risk exposure. The greater the dispersion of probabilities around the mean the higher is the risk, for any given outcome.

## 2 OPTIMISM BIAS

1. Optimism bias is the term used to describe the demonstrated systematic tendency for appraisals to under-estimate the costs of projects, and time taken to implement them, and overstate their benefits. Optimism bias should therefore be recognised explicitly and be incorporated into the appraisal process. This should be done by pursuing best practice and applying evidence-based uplifts to appraisal options.

2. [Information and potential guidance on the calculation and application of Optimism bias estimates in appraisals is available from a research study: *Review of Large Public*

---

<sup>14</sup> Draft Guidelines on Managing Risk 2002 page 1  
[http://www.ogc.gov.uk/embedded\\_object.asp?docid=1988](http://www.ogc.gov.uk/embedded_object.asp?docid=1988)

*DRAFT UNDER CONSULTATION*

*Procurement in the UK*, published in July 2002. This is available at: <http://www.hm-treasury.gsi.gov.uk/>.]

### **3 SPECIFIC INFORMATION ON RISKS**

1. If the risk adjustment for optimism bias is significant in determining whether a project should go ahead or not, a more thorough project or policy-specific allowance for risk should be estimated. In some projects, the probabilities of different outcomes can be estimated objectively by statistical techniques, if the relevant data exists and is available and can be used to derive expected values. Examples are the risk of floods in flood protection schemes, or the risk of accidents or fires.
2. Some past data are usually available to allow at least a broadly informed judgement for an expected value to be estimated. There may be, for example, records on the accuracy of forecasts of demand for relevant services which can be taken into account in estimating the expected benefits from a service. Commercial insurance premia can sometimes be a helpful guide to probabilities. Employing subjective probabilities is better than ignoring important risks altogether.

### **4 IRREVERSIBLE RISKS**

1. Irreversibility occurs where implementation of a proposal might rule out later investment opportunities or alternative uses of resources. It is particularly important to make a full assessment of the costs of any irreversible damage that may arise from a proposal.
2. Irreversibility is often associated with facilities on which people place 'option values' (the value of knowing a facility is available to enjoy, if they wish to do so). This is also linked to 'existence values' (the value of knowing that something continues to exist, even if the respondent does not expect to make any practical use of it).
3. Where lead options involve irreversible damage, assessment should include the consideration of options which involve delay, allowing more time for investigation of alternative less damaging ways to achieve stated objectives. Appraisal of different proposals should not ignore the 'option' value of avoiding or delaying irreversible actions, and the benefits of ensuring flexibility to respond to future changed conditions. Decision sequencing analysis may be helpful in this context, as may sensitivity analysis and Real Option Theory.

## **5 THE COST OF VARIABILITY**

### **5.1. Recognising The Impact And Cost Of Variability**

1. Approaches to risk can range from those which favour the taking of risk, to those which are risk neutral and those which are risk averse. 'Risk neutrality' is the willingness to accept a 'fair gamble'; an uncertain prospect with a zero expected value, where the chances of loss multiplied by the impact of loss is exactly offset by the product of the chances of gain and the impact of the associated benefits.

DRAFT UNDER CONSULTATION

2. 'Risk aversion' is a willingness to decline some gambles with positive expected values, and to pay for certainty (e.g. buying insurance). A risk averse person values *increases* in income less than equivalent *declines* in income.
3. Risk aversion entails consideration of both the dispersion or variability of outcomes, as well as their expected values, and a willingness to pay a price in exchange for certainty (or a willingness to put up with variability or uncertainty on receipt of compensation). This compensation is the cost of variability. Technically, the fraction of income worth paying for certainty is one half of the squared coefficient of variation<sup>15</sup> of that income which is uncertain. (The greater the uncertainty, the greater is the portion of income worth paying for insurance.) Where the cost of variability is insignificant, risk aversion is probably not appropriate. However, there may still be a need to consider how the existence of variability may make managing a project more complex and lead to an increase in costs.
4. A project with a wide spread of possible outcomes and associated cash flows may be more difficult to manage and plan, especially where the project represents a large proportion of a fixed budget. The expected quantity of these extra managerial costs should be included in the appraisal (generally, as a component of net Exchequer funding costs). In some circumstances, the cost of variability may be reflected directly in the estimates of value of a harm or of a benefit.
5. Equivalently, the cost of variability for a project is roughly one half of the variance divided by the mean income, including the expected project income. This implies that someone would sacrifice a 50% chance of an income of £200 per week for a certain income of £50 per week. However, if they were already in receipt of a certain income of £100 p.w., they would only sacrifice a 50% chance of an additional £200 p.w. for a certain additional £75 p.w. The cost of variability is readily calculated as long as the variability of outcomes and the income of the beneficiaries can be estimated.
6. For projects in which costs and benefits are spread across citizens other than in proportion to their incomes, an adjustment to this calculation is required to reflect the fact that, (due to unevenness in the distribution of incomes), the average marginal utility of income is around one-third greater than the marginal utility of average income (see below, and discussion of distributional adjustment).
7. An uplift of one-third to the cost of variability (estimated as half-variance-divided-by-expected-income) is appropriate in this situation. More realistically however, the distributional analysis indicates that average marginal utility of income is some one-third greater than the marginal utility of average income. Accordingly, a one-third uplift to the cost of variability indicated in the equation above is appropriate where the benefits from a project are distributed roughly evenly across the population.

## 5.2 When To Calculate The Cost Of Variability

Given the size of national income relative to the scale of most individual projects, the cost of variability for projects for the benefit of the whole community is usually negligible. Hence, adjusting for the impact of variability will be unnecessary for the majority of appraisals. The cost of variability is more likely to be significant where:

---

<sup>15</sup> A coefficient of variation is the standard deviation of a variable divided by its expected value.

*DRAFT UNDER CONSULTATION*

- (a) Risks are large relative to the income of the section of the population that must bear them (and this will include very large risks borne by the whole population);
- (b) Risk is both large and systematic. Variability that is correlated with income is known as 'systematic variability' or 'systematic risk'.

## **6 RESPONDING TO UNCERTAINTY**

### **6.1. Sensitivity Analysis**

1 The major parameters which quantify costs and benefits in appraisal will be affected by uncertainty to some extent. This is usually addressed in appraisals by using, in the base case, values for parameters which are thought to be the most plausible ones available. The purpose of sensitivity analysis is to assess the impact which changing the values of parameters will have on the net benefits of a proposal. Its application requires judgement about the weight to give to alternative assumptions. Grouping together variables in the sensitivity analysis by setting up 'pessimistic' and 'optimistic' assumptions can assist this task.

2 There are three ways in which sensitivities can be appraised. Firstly, there is partial sensitivity analysis: how does the NPV of a proposal change in response to a variation in one assumption only? This should be applied to the analysis of the most important and uncertain assumptions in an appraisal. Secondly, there is appraisal involving calculation of the net benefits of the worst and best case scenarios, alongside the base case. Finally, there is Monte Carlo sensitivity analysis which is used to provide information on the probability distributions, and therefore the riskiness, of the net benefits.

3 If enough data is available to allow the calculation of an expected (risk-adjusted or unbiased) estimate of particular costs or benefits, it is not usually necessary to conduct sensitivity analysis on those items as well.

### **6.2. Scenario Planning**

1 When there are decisions to be made affecting the commitment of significant resources or involving major policy issues, it can be helpful to consider the use of various scenarios which look at the impacts which differing states of the world might have on them. Scenario planning is used as a supplement to sensitivity analysis and describes alternative future economic and political environments and outcomes. Scenarios are often useful for planning an investment programme and may also be justified for exceptionally large and complicated projects, or for policies and programmes that are very sensitive to the external environment.

2 Scenarios should be chosen to draw attention to the major technical economic and political uncertainties upon which the success of an option or strategy depends. Generally, the best approach is to set up two, or possibly three, scenarios. If three are chosen, they should differ in dimensions so that no one scenario is seen as central or the most likely. The expected NPV can be calculated, and it may be helpful to undertake some sensitivity analysis for each scenario.

3 Scenario planning is sometimes associated with the decision criteria of 'maximin-returns' (the option which offers the least bad 'worst possible' outcome) or, more often, 'minimax-regret' (the option which offers the least potential cause for regret). These criteria can be

DRAFT UNDER CONSULTATION

helpful in a presentational sense, but give no more than a partial picture of how the options compare. The maximin approach is appropriate only where there is a significant chance of a disastrous outcome, and is then equivalent to invocation of the Precautionary Principle.

### 6.3. Climate Change

1. Climate change is likely to be a key source of uncertainty in some appraisals. Taking account of the possible sensitivity of a proposal to changing weather patterns will be necessary in these cases, both when defining a base case (the 'policy off' or 'business as usual' scenarios) and when forecasting options.
2. The consequences of climate change may need to be worked out in detail for each context, and this may add extra uncertainty to any forecast of demand or supply. Climate forecasts are often subject to uncertainty or wide margins of error, and sensitivity analyses using different scenarios may be appropriate.
3. Climate change is more likely to be significant for policies, programmes or projects with longer lifetimes (e.g., estimating the demand for public services or to designing buildings or infrastructure). Forecasting the provision of public services may need to reflect different long run demand or supply assumptions with regard to human behaviour, leisure or travel patterns, energy use etc. The provision of infrastructure may need to entail designs which are more robust to increased wear and tear from the weather.
4. It may be necessary to distinguish between trend changes and a higher incidence of severe events. For example, higher (or lower) average rainfall may affect broad outcomes such as land use decisions. However, a change in the expected frequency of severe weather events may produce different conclusions: it may not be cost effective to build a road or a bridge to withstand storms expected once in a hundred years, but if similar storms are expected more frequently, the balance of costs and benefits may change.
5. When handling significant climate change influences, the impact of advancing or delaying the implementation of options on their appraisal ranking should be investigated. It will also be important to reassess existing infrastructure in terms of its ability to withstand more frequent or more severe weather events than were envisaged when it was designed. Such appraisals may require cooperation with natural scientists, civil engineers and others who contribute to the design of buildings and structures who can advise on appropriate actions.
6. The most up-to-date information on future UK climate predictions is available from the UK's *Climate Impacts Programme (UKCIP)*.<sup>16</sup> This site provides a range of national climate change scenarios, as well as guidance to decision-makers on costing the impacts of climate change and dealing with the risk and uncertainty involved in decision-making. DEFRA guidance on factoring climate change assumptions into infrastructure and investment appraisal decisions is to be issued in 2002, with revised climate change scenarios for the United Kingdom.

---

<sup>16</sup> <http://www.ukcip.org.uk/ukcip.html>.

# THE GREEN BOOK

## Appraisal and Evaluation in Central Government

### ANNEX 6 Distributional Impacts

*Draft  
under  
consultation*



HM TREASURY

DRAFT UNDER CONSULTATION

## Annex 6

### **DISTRIBUTIONAL IMPACTS**

---

1. This annex discusses 'Distributional impacts': a term used to describe the distribution of the costs or benefits of interventions in society. It is necessary to take these explicitly into account when appraising the overall impact of government action because of differences in income levels.
2. One way to do this is to apply different weights to monetary benefits and costs according to differences in the incomes of affected groups. Even where there is little direct information about the income distribution of those suffering gains or losses from a proposal, other information may be available, perhaps regarding their gender or ethnic group, to inform a distributional adjustment.

#### **1 MARGINAL UTILITY**

1. The rationale for applying different weights to different income groups stems from the concept of diminishing marginal utility – as income grows, the utility or satisfaction derived from an additional unit of consumption declines.
2. The weights used must be derived from an underlying social welfare function which links personal utility (or satisfaction) to income. The key concept in this context is the way that utility varies with income. This is known formally as the 'elasticity of the marginal utility of consumption', which shows how the value placed on an extra unit of consumption declines as income increases.
3. Broadly, the empirical evidence suggests that as income is doubled, the marginal value of consumption to individuals is halved: the utility of a marginal pound is inversely proportional to the income of the recipient. In other words, an extra £1 of consumption received by someone earning £10,000 a year will be worth twice as much as when it is paid to a person earning £20,000 per annum.<sup>17</sup>

---

<sup>17</sup> Cowell and Gardiner (1999)

DRAFT UNDER CONSULTATION

Figure 8 Use of Distributional Weights

The use of distributional weights follows the recommendation of the Director General of Fair Trading in *Vulnerable Consumers and Financial Services*, Jan 1999, that in assessing consumer detriment and applying cost benefit analysis to policy and regulatory initiatives affecting consumers, greater weight should be given to the detriment suffered by low income consumers. The Office of Fair Trading then commissioned and accepted the review quoted below.

Formally, the elasticity of the marginal utility of consumption is given by  $CU''/U'$ , where C is consumption and U is the utility of consumption. *Welfare Weights*, by Frank Cowell and Karen Gardiner (1999) (also published as OFT Research Paper 20 in Feb 2000) reviews the empirical evidence for the value of this parameter from studies of the inter-temporal elasticity of substitution. They concluded: 'most [studies] imply values of the elasticity of marginal utility of just below or just above one.'<sup>1</sup> Pearce and Ulph (1995), in their survey of the evidence, estimate a range from 0.7 to 1.5, with a value of 1 being 'defensible'.

A value of 1 to the marginal utility of consumption implies a utility function of the form  $U = \log C$ , where C is consumption, yielding a marginal utility of consumption ( $\delta U/\delta C$  or  $U'$ ) of  $1/C$ . If consumption doubles to  $2C$ , the marginal utility of consumption falls to one half of the previous value ( $U''C/U' \equiv$  elasticity of marginal utility of consumption = -1). This central estimate is used in the Green Book for establishing distributional weights, assessing the cost of risk and deriving a social time preference rate.

The aggregate utility function is therefore of the form  $U = \Sigma \log C$ , where C is consumption, and the summation is over individuals. Considerations of social fairness could justify a higher loading to the utility of the less well off in a full social welfare function.

<sup>1</sup> Cowell and Gardiner (1999) page 31

<sup>2</sup> Pearce and Ulph (1995) page 14

4. The aggregate welfare function adopted is simply the sum of all personal utility functions.

The aggregate utility function is of the form  $U = \Sigma \log C$ , where C is consumption, and the summation is over individuals. Considerations of social fairness could justify a higher loading to the utility of the less well off in a full social welfare function.

5. In principle, each non-Exchequer monetary cost and benefit, including costs and benefits that have an impact upon income, should be adjusted according to the relative prosperity of those receiving the benefit or bearing the cost. In many cases adjusting proposals in this way should make a significant contribution to their overall impact. In practice, this information is most unlikely to be available at acceptable cost for many applications. Whether or not an explicit adjustment should be made depends on the:

- Scale of the impact associated with a particular project or proposal;
- Significance of the accuracy of valuation to the decision at hand;
- Likely robustness of any calculation of distributional impacts; and,
- Whether a proposal has an explicit distributional rationale.

6. To make these adjustments in practice will almost always require simplifying

DRAFT UNDER CONSULTATION

assumptions. To assist, the tables below set out the implied weights (far right column) to be applied to marginal costs and benefits to people in households in different income quintiles, using gross and net incomes. (Note, however, that in some circumstances, (particularly for proposals aimed at the alleviation of child poverty, or where gender impacts are important), it should not be assumed that the relative consumption of an individual is determined by that of their household).

7. The relative prosperity of a household affected by a proposal is determined not only by its income but by its size and composition: the table in figure 9 adjusts for the varying costs of living of different households by calculating equivalised income ranges. As couples with children have greater expenses, even a household gross income of £300 per week leaves such a family in the lowest quintile.

8. A monetary benefit for such a family (or a benefit valued as an increment to income) should therefore be adjusted upwards by a factor of 1.8. On the other hand, a similar benefit received by a single non-pensioner also on £300 should be adjusted downwards by a factor of 0.6, as this individual is in the fourth income quintile: he or she is relatively well off and will value the increment to income less highly.

**Figure 9 Income Ranges By Quintile of Equivalised Net Income**

£ per week	Single non-pensioner	Couples no children	Couples with children	One-parent family	Single Pensioners	Pensioner couples	Multiple tax units with or without children	Total	Marginal utility $\approx$ (reciprocal of mean income)	Marginal utility relative to mean
<b>Quintile of Equivalised net income</b>										
1	0 to 130	0 to 210	0 to 310	0 to 210	0 to 130	0 to 210	0 to 310	0 to 200	0.0058	1.8
2	130 to 170	210 to 280	310 to 410	210 to 260	130 to 170	210 to 280	310 to 410	200 to 280	0.0040	1.3
3	170 to 230	280 to 380	410 to 530	260 to 350	170 to 230	280 to 380	410 to 570	280 to 400	0.0028	0.9
4	230 to 320	380 to 530	530 to 730	350 to 510	230 to 320	380 to 530	570 to 800	400 to 580	0.0020	0.6
5	320 plus	530 plus	730 plus	510 plus	320 plus	530 plus	800 plus	580 plus	0.0013	0.4
Average									0.0032	1.0
<b>Source: HM Treasury (2001)</b>										

DRAFT UNDER CONSULTATION

Figure 10 Income Ranges By Quintile of Equivalised Gross Income

£ per week		Single non-pensioner	Couples no children	Couples with children	One-parent family	Single Pensioners	Pensioner couples	Multiple tax units with or without children	Total	
Quintile of Equivalised net income										
1	0 to 130	0 to 230	0 to 350	0 to 220	0 to 120	0 to 200	0 to 340	0 to 210	0.0058	1.8
2	130 to 190	230 to 320	350 to 480	220 to 280	120 to 170	200 to 280	310 to 460	200 to 310	0.0040	1.3
3	19 to 280	320 to 450	480 to 660	280 to 410	170 to 240	280 to 400	460 to 680	310 to 480	0.0028	0.9
4	280 to 430	450 to 690	660 to 970	410 to 640	240 to 370	400 to 610	680 to 1030	480 to 750	0.0020	0.6
5	430 plus	690 plus	970 plus	640 plus	370 plus	610 plus	1030 plus	750 plus	0.0013	0.4
Average									0.0032	1.0
Source: HM Treasury (2001)										

9. It will often be the case that neither net nor gross incomes of those affected by a proposal are known directly, so as to allow the distributional adjustment to be calculated. However, if the family or other circumstances of a group affected are known, an adjustment may be calculable indirectly using whatever is known about the relative incomes of those in the relevant category.

10. Accordingly, it may be that a particular proposal will disproportionately provide additional employment for people on probation in a particular area. If it is known that probationers in that area are predominantly in the lowest income quintile, it will be reasonable to use an adjustment factor of 1.8 (unless there is any reason to believe that proposal will be biased in its impact towards better off probationers).

11. The regional impact of policy may assist the analysis: the income impact of a proposal may be estimated indirectly by determining its geographical impact and taking note of small-area indices of deprivation.<sup>18</sup> However, care must be taken to assess whether the beneficiaries of a proposal are representative of the geographical area from which they come.

12. The distributional adjustment should be applied only to non-Exchequer benefits and costs.

## 2 REDUCING SOCIAL INEQUALITIES

If the objective of a policy is aimed specifically at tackling inequality, the weightings above may need to be increased for the lowest quintiles, or a more steeply declining set of weights may be attached to the income range as a whole. This implies not only that the utility of the

<sup>18</sup> See DETR (1998).

*DRAFT UNDER CONSULTATION*

deprived is more highly valued by society than by the individuals themselves, but also that the utility of the well off is less highly valued.

### **3 DISCRIMINATION**

1. UK discrimination law currently covers sex, marriage, disability and race. In addition, the government is bound by European Commission law, which currently covers discrimination on the grounds of sex, marital status, pregnancy and maternity only, but is likely to be extended, under the Amsterdam treaty.

2. The UK is also a signatory to various international treaties and conventions prohibiting discrimination on other grounds. However, analysis of distributional issues should not be limited to the impacts on the groups recognised in discrimination law. The scope of racial discrimination law in the UK has recently been significantly extended with the Race Relations (Amendment) Act 2000.

3. Information on how the costs and benefits are distributed among different organisations, sectors of the economy or individuals can be central to an appraisal. Distributional issues arise in many central government programmes, for example, between people of different ages, or health states, or skills, or locations. Sometimes these effects are self-evident, but any important distributional effects should be identified and quantified as far as feasible, by breaking down the costs and benefits according to the groups affected.

# THE GREEN BOOK

## Appraisal and Evaluation in Central Government

### ANNEX 7

#### Discount Rate



HM TREASURY

*Draft  
under  
consultation*

DRAFT UNDER CONSULTATION

## Annex 7

# DISCOUNT RATE

---

This Annex shows how the discount rate of 3.5% is derived and the circumstances in which it should be applied

## 1 SOCIAL TIME PREFERENCE RATE

### 1.1. What Is The Social Time Preference Rate?

1. ‘Social Time Preference’ is defined as the value society attaches to present, as opposed to future, consumption. The Social Time Preference Rate (STPR) is a rate used for discounting future benefits and costs, and is based on comparisons of utility across different points in time or different generations. This guidance recommends that the STPR be used as the standard discount rate.

2. The STPR can be derived in two different ways. The first is an assessment made by the government of the relative value of future consumption to current consumption. The second is an assessment of those rates of time preference which are revealed in financial markets for saving and borrowing. When assessing the STPR within government, consideration is given to its three component parts. These are:

- catastrophe risk;
- pure time preference; and,
- the impact of economic growth on the marginal utility of consumption.

3. The first component, catastrophe risk, is the likelihood that there will be some event so devastating that all returns from policies, programmes or projects are eliminated, or at least radically and unpredictably altered (with either positive or negative effect). Examples are technological advancements which lead to premature obsolescence, or natural disasters, major wars etc. The scale of this risk is, by its nature, hard to quantify.

4. The second component, pure time preference is an individual’s preference for consumption now, rather than later, and reflects the fact that for benefits or costs falling in the future, today’s taxpayers and consumers may no longer be alive or may be too infirm to enjoy or suffer them. Although they care about their successors, they care less about them than they do about themselves. The best evidence suggests that the total size of these two components, (catastrophe risk, together with this lesser concern that people perhaps have for the welfare of future generations), indicates a discount rate of around 1.5 per cent a year for the near future<sup>19</sup>.

---

<sup>19</sup> Scott (1977) derives a central estimate value of 1.5 from past long-term returns received by savers in the UK. In 1989, Scott updated this estimate to 1.3 on the basis of United States, as well as UK, evidence.

DRAFT UNDER CONSULTATION

5. The third component of social time preference reflects the impact of economic growth on the marginal utility of consumption. When an individual becomes richer, the additional enjoyment or utility conferred by an increment of consumption is reduced. The extent to which the marginal utility of consumption declines as the level of consumption increases is measured by the concept of the ‘elasticity of the marginal utility of consumption’. This is a negative number, say -b, given by  $CU''/U'$ , where C is consumption and U is utility of consumption. If b is assumed to be broadly constant, the discount factor for year t is

$$d(t) = 1/(1+r)^t = 1 / (1 + a)^t (1 + g)^{bt} \dots\dots (15.1)$$

where a is the rate of discount justified by pure time preference and catastrophe risk, and g is the annual rate of growth of per capita consumption. The annual discount rate r is therefore, for practical purposes,

$$r=a + bg. \dots(15.2)$$

6. The underlying long-term growth rate of GDP per head (g) is estimated to be around 2 per cent per annum.<sup>20</sup> The elasticity of the marginal utility of consumption (b) is estimated to be 1.<sup>21</sup> A figure of 1.0 implies that a marginal increment in consumption to a generation that has twice the consumption of the current generation will have half the utility. So with g=2 per cent, a=1.5 per cent, b=-1.0, then from equation 15.1

$$d= 0.9659 =1/(1+r)$$

or a discount rate r of 3.53 per cent. For comparison, the approximation in equation 15.2,  $r=a+bg$ , yields

$$0.015 +1.*0.02=3.5 \text{ per cent.}$$

7. Adding together catastrophe risk, pure time preference and an allowance for the diminishing marginal utility of consumption, yields a normative prescription of a social rate of time preference to be used as a standard discount rate by government of around 3.5 per cent.

8. Over the very long term, discounting will reduce the present values of costs and benefits occurring far in the future. These values are also likely to be affected by inherent uncertainty. A reduction in the discount rate over the very long term might be the most suitable way of tackling these uncertainties. Decisions should be made on a case-by-case basis.

## 1.2. Financial Markets

1. The 3.5% discount rate based on this analysis needs to be compared with estimates of time preference revealed in savings and investment behaviour.

2. Empirical evidence reveals a wide range of market interest rates at which individuals save, and a much larger range of rates at which people borrow. Theoretically, it would be possible to construct an average personal time preference rate from this data, weighting the different rates by the number of borrowers/ savers.

<sup>20</sup> ‘Trend Growth: Recent Developments and Prospects’ (HM Treasury, 2002) estimates trend growth in labour productivity to be 2% per annum.

<sup>21</sup> See Figure 8, page 46.

*DRAFT UNDER CONSULTATION*

3. A cursory calculation suggests a rate of around 4 per cent from this approach. However, use of the resultant figure to inform estimation of the social time preference rate must be tempered by the following considerations:

- Many individuals are both borrowers and lenders at the same time, and may be driven by factors other than personal time preference, such as liquidity preference and by some of the other benefits of saving.
- Personal time preference rates revealed in market interest rates may understate true time preference rates because of the following asymmetry: any saver finding themselves with a lower personal time preference rate than the market rate would increase savings to the point at which their rate (which is in part determined by their stock of savings) was equal to that available in the market. However, among borrowers, there may be those with higher rates of time preference who are not represented in the market because they have no access to credit.
- The average personal time preference rate might represent an overestimate of the social time preference rate that individuals would wish the government to use. Personal time preference revealed in markets represents individuals’ actual behaviour, rather than the behaviour that is deemed optimal. For example, people commonly save less for old age than is desirable.

4. Empirical evidence, based on finance markets is not, therefore, suitable for determining the discount rate that the public sector should use in policy and project appraisal. However, it is at least plausible that a rate in the region of higher risk free savings rates or lower borrowing rates would reflect private preferences for the social time preference rate. This is consistent with a real rate in the range of 2-5 per cent.

## **2 EXCEPTIONS TO THE STANDARD DISCOUNT RATE**

### **2.1. General Exceptions.**

1. The standard discount rate may not be appropriate in the following circumstances.
  - Proposals where the impacts occur over the long term. A lower discount rate may be appropriate in these circumstances.<sup>22</sup>
  - Where discounting is used to predict financial market responses to public activities, (such as a change in a tax regime or timing of a charge or grant). The appropriate rate is that used by the producer or consumer in the case in hand. This will usually be the body’s post-tax marginal borrowing or lending rate, depending upon exactly which alternatives are being compared. (A 3.5 per cent discount rate is still appropriate for appraising the interest of the taxpayers as opposed to the receiving body.)
  - When undertaking sensitivity analysis.
  - For international development assistance projects, a single discount rate should be used for each recipient country, derived from estimates of the social time preference rate appropriate to the recipient economy.
  - When discounting cash flows that are defined in nominal terms the normal practice should be to convert these nominal flows to real terms. This allows all costs and benefits to be discounted at the same real discount rate.
  - A nominal discount rate may sometimes be required to capitalise nominal cash flows. This nominal rate should be higher than the real rate by an amount equal to the projected

---

<sup>22</sup> See Weitzman (2001)

*DRAFT UNDER CONSULTATION*

- rate of general inflation.
- Where there is a long-term planning horizon for a proposal. An example of this would be a policy for reducing activities which deplete the ozone layer.

## **2.2. Required Rates Of Return**

1. The purpose of having a required rate of return (RRR) for government bodies which operate in commercial markets is to maximise the overall benefit to society of their activities. The RRR is imposed on government bodies which operate in markets through setting prices equal to long run marginal costs.
2. For bodies with high fixed costs relative to their marginal costs, the adoption of marginal pricing in this way would result in the need for a subsidy. This would generate inefficiencies. Accordingly, it may be appropriate to consider an alternative approach of raising funds from users to cover all or some of the fixed costs. This could be done, for example, with a two-part tariff, or a mark-up on long run marginal costs, possibly varying with the price responsiveness of demand for each cost.

# THE GREEN BOOK

## Appraisal and Evaluation in Central Government

### ANNEX 8

#### Procurement Choices and Project Implementation



HM TREASURY

*Draft  
under  
consultation*

DRAFT UNDER CONSULTATION

## Annex 8

# PROCUREMENT CHOICES AND PROJECT IMPLEMENTATION

---

The following sections provide overviews of the achievability and implementation issues likely to be important for major assessments:

## 1 PROCUREMENT CHOICES

### 1.1. Introduction

1. Government procurement policy is to achieve value for money having regard to propriety and regularity. This policy is set out in Chapter 22 of Government Accounting<sup>23</sup> and should be read in conjunction with Annex 22.1 Procurement Policy Guidelines<sup>24</sup>. These guidelines define value for money as:

*A contractor bidding for an average-sized PFI project of NPC of around £50-100m, for instance, will typically incur costs of around £1m by the time they have reached 'preferred bidder' stage.*

*‘the optimum combination of whole-life cost and quality (or fitness for purpose) to meet the user’s requirements’.*<sup>25</sup>

2. Bidding is not a costless exercise and this should be borne in mind by the procuring authority. The complexity of many design and build, or land acquisition and development projects often requires the development of close relations with a contractor<sup>26</sup>.

3. Efforts should be made to keep bidding costs commensurate with the nature and scale of the scheme being procured, (e.g. through standardisation of contracts<sup>27</sup>).

### 1.2. Comparing Privately Financed To Publicly Financed Schemes

1. HM Treasury is committed to ensuring that all proposals, including capital projects, are assessed in an objective way. It regards PFI as an important vehicle for delivering public sector objectives, but does not favour PFI in principle more than other forms of procurement.

---

<sup>23</sup> <http://msnetoasis/fmra-toa/website/treasuryoffice/govt.htm> -

<sup>24</sup> Refer OGC <http://www.ogc.gov.uk/>.

<sup>25</sup> Annex 22.1 Procurement Policy Guidelines. For further information on construction issues, refer to OGC Best Practice Guide ‘Value for Money Evaluation in Complex Procurements’ <http://www.ogc.gov.uk/>

<sup>26</sup> For further information see also ‘Achieving Sustainability in Construction Procurement’ June 2000. <http://www.ogc.gov.uk/>

<sup>27</sup> <http://www.the-stationery-office.co.uk/demo/mad/index.htm>

DRAFT UNDER CONSULTATION

2. It is widely accepted that the financing costs of the private sector are higher than the public sector. In the right circumstances, this difference can be offset by the efficiency gains that can be achieved through private provision of services. Judging the circumstances in which it is correct to finance schemes under PFI can be complex, and guidance on this can be found in the Procurement Policy Guidelines (Annex 22.1) from OGC. <http://www.ogc.gov.uk/>.

### 1.3. Dealing With Risk Through Procurement Choice

All proposals undertaken by government involve risk. Risk assessment involves identifying and valuing all risks and uncertainties affecting an option at a specific time, and balancing these against the benefits which that option is expected to achieve. While valuation of risk has an important role to play in option appraisal, identification of risks is the key issue: without proper identification, any valuation techniques applied are flawed. Figure 11<sup>28</sup> describes the general types of risk which a project manager is likely to encounter.

Figure 11 General Types of Risk

<b>Availability risk</b>	The risk that the quantum of the service provided is less than required under a contract
<b>Business Risk</b>	The risk that an organisation cannot meet its business imperatives.
<b>Construction risk</b>	The risk that the construction of physical assets is not completed on time, to budget and to specification
<b>Decant risk</b>	The risk arising in accommodation projects relating to the need to decant staff/ clients from one site to another.
<b>Demand risk</b>	The risk that demand for a service does not match the levels planned projected or assumed. As the demand for a service may be partially controllable by the government the risk to the public sector may be less than that perceived by the private sector.
<b>Design risk</b>	The risk that design cannot deliver the services at the required performance or quality standards.
<b>Inflation risk</b>	The risk that actual inflation differs from assumed inflation rates.
<b>Legislative risk</b>	The risk that changes in legislation increase costs. This can be sub-divided into general risks such as changes in corporate tax rates and specific ones which may discriminate against PFI.
<b>Maintenance risk</b>	The risk that the costs of keeping the assets in good condition vary from budget.
<b>Occupancy risk</b>	The risk that a property will remain untenanted – a form of demand risk.
<b>Operational risk</b>	The risk that operating costs vary from budget, that performance standards slip or that service cannot be provided.
<b>Planning risk</b>	The risk that the implementation of a project fails to adhere to the terms of planning permission to that detailed planning cannot be obtained or if obtained can only be implemented at costs greater than in the original budget.
<b>Policy risk</b>	The risk of changes of policy direction not involving legislation
<b>Reputational Risk</b>	The risk that there will be an undermining of customer/ media perception of the organisations ability to fulfil its business requirements e.g. adverse publicity concerning an operational problem.
<b>Residual Value risk</b>	The risk relating to the uncertainty of the value of physical assets at the end of the contract.
<b>Technology risk</b>	The risk that changes in technology result in services being provided using non-optimal technology.
<b>Volume risk</b>	The risk that actual usage of the service varies from the level forecast.

<sup>28</sup> Source: OGC <http://www.ogc.gov.uk/>

DRAFT UNDER CONSULTATION

1. The objective is to determine an overall view of the viability of a option, i.e., whether its risk-adjusted benefits exceed its risk-adjusted costs, or whether (in the case of uncertainty) the costs of a possible adverse outcome are so great that precautionary action needs to be introduced to obtain a cost-effective solution.
2. The principle governing risk transfer is that the risk should be allocated to whomever from the public or private sector is best placed to manage it. The optimum allocation of risk, rather than maximising risk transfer, is the objective, and is vital to ensuring that value for money is not diminished. It accordingly depends upon the specific proposal which is being appraised, but it can be influenced by the extent of user involvement in the choice of supplier.

*A risk should be transferred only where the private contractor is better able to assess and to manage it. Risk transfer from the public sector beyond this level will lead to a decline in value for money.*

3. The degree to which risk is transferred will be a matter of negotiation subject to the overriding need to obtain value for money. Successful negotiation requires a clear understanding by the procuring authority of the risks presented by a proposal, the broad impact that these risks may have on the suppliers’ incentives and financing costs, and the limits to risk transfer which might still be considered for value for money.
4. Acquiring more information about risks affecting a proposal through pilots or further research can allow steps to be taken either to:
  - reduce the probability, or mitigate the adverse consequences, of bad outcomes, or,
  - increase the benefits of good outcomes.
5. Reducing uncertainty in these ways can reduce the expected costs (or increase the expected benefits) of a proposal.

**Figure 12 Some Options To Help Manage Risk**

- *Piloting a proposal, to provide experience of, for example, the amount of training required to implement a new IT system, or the responsiveness of clients to changes in incentives;*
  - *Commissioning research to confirm or disprove the reliability of new technology, or to reassess the nature of a hazard;*
  - *In construction projects, undertaking site investigations to reduce risks from unforeseen ground conditions;*
  - *Increasing the flexibility of designs to make proposals robust against changes in future demand and relative prices. For example, different types of fuel can be used in a dual fired boiler, depending on future relative prices of the alternative fuels. Preparatory earthworks, and suitable designs of bridges can reduce the cost of future road widening should it be justified later by growth in traffic. Building in flexibility almost always entails cost.*
- Cost effectiveness of a flexible design should be appraised by estimating the likelihood and impacts of different outcomes, and the costs of adapting to change during the lifetime of the project (should demand or relative prices differ from central expectations); and, staging a project, so that it can be altered at successive review points, at which the project could be stopped or changed.*

DRAFT UNDER CONSULTATION

8. Use of designs of proven flexibility and effectiveness can reduce risks by incorporating the lessons of past experience and by reducing the number of new elements of design.

9. Where the private sector has clear ownership, responsibility and control, it should be encouraged to take all of those risks it can manage more effectively than the procuring authority. If the public body seeks to reserve to itself many of the responsibilities and controls that go hand-in-hand with service delivery and yet still seek to transfer significant risk, the private sector will simply increase its prices (to the detriment of value for money).

10. Appropriate transfer of risk generates incentives for the private sector to supply timely cost effective and more innovative solutions. As a general rule, PPP schemes should transfer to the private sector risks where the supplier can influence the outcome better than the procuring authority is able to. Risks to be considered include:

- design and construction risk: to cost and/or time;
- commissioning and operating risks, including maintenance;
- demand (or volume/ usage) risks;
- residual value risk;
- technology and obsolescence risks;
- regulation and similar risks (including taxation, planning permission); and
- project financing risk.

11. The types of risks relevant to a particular proposal should be summarised and their allocation set out in a table. An example of this is set out in figure 13, which is provided by the OGC at <http://www.ogc.gov.uk/> ‘Annex A Methodology for Quantitative Risk Analysis’.

Figure 13 Example of Risk Allocation Table

Risk/ Principal factor	Borne by Purchaser	Borne by operator
Demand Risk	√	
Third party revenues		√
Design risk		√
Penalties for under-performance		√
Penalties for non-availability		√
Potential changes in relevant costs		√
Obsolescence		√
Residual value	√	

12. Detailed information on the identification and management of risk is available from OGC and includes guidance on the ‘Management of Risk: Guidance for Practitioners’.<sup>29</sup>

## 1.4. Contract Management

1. Once contracts have been let, it will be important to ensure that the respective roles and responsibilities set out in the contract are fully understood and fulfilled to the contracted standard so that value for money is delivered. This is because the likelihood of the benefits being realised will be affected by the contractual terms and any incentives built in to the

<sup>29</sup> <http://www.ogc.gov.uk/ogc/it.nsf/pages/Newguide160344.html>.

*DRAFT UNDER CONSULTATION*

contract. For information on contract management, refer to OGC *Contract Management Guidelines* at [http://www.ogc.gov.uk/sdtoolkit/library/generic.html#cont\\_man](http://www.ogc.gov.uk/sdtoolkit/library/generic.html#cont_man)

2. Where contracted standards are not fulfilled, the contracting authority will apply mechanisms established in the contract to rectify any under-performance. See Treasury Taskforce Technical note No. 6: ‘*How To Manage the Delivery of Long-Term PFI Contracts*’ and [http://www.ogc.gov.uk/pfi/series\\_3/technote6/technote6.pdf](http://www.ogc.gov.uk/pfi/series_3/technote6/technote6.pdf).

## **2 PROJECT IMPLEMENTATION**

### **2.1. Strategic Fit**

1. New proposals may have strategic impacts on the sponsoring organisation(s). They affect the whole or major part of an organisation in a significant way, usually in the medium to long term.

2. These need to be considered, particularly at the preliminary stage of an assessment to answer questions like:

- How well does the strategy reflect the business plan?
- Is the organisation capable of delivering the policy?
- How will the proposal affect the whole organisation?
- What whole organisation benefits can be delivered?

***Key Question:***

*What does the proposal contribute to the organisation’s business strategy and objectives?*

### **2.2. Economic (Or Option Appraisal)**

The conduct of an economic appraisal constitutes the fundamental justification for the investment of funds. It considers how much it is worth spending to achieve the desired outcomes, and expresses this either in terms of CBA, or by measuring the cost-effectiveness of the expected outcomes. This approach to assessing and reviewing the options to achieve desired outcomes is described in section 4 of the Green Book.

### **2.3. Financial**

1. It is important to ensure that sufficient funding is available for the lifetime of the proposal, including contingencies. A budget, including provision for the Resource Accounting and Budgeting Cost of Capital Charge (RAB CCC), should be developed, alongside the economic appraisal, to ensure that the developing options are affordable. A source of funds statement may also be useful where more than one department or organisation is providing resources.

2. Senior management ‘sign off’ on budgets is an important step in agreeing the financing of the overall plan. Regular financial reporting on policies, programmes and projects should be

*DRAFT UNDER CONSULTATION*

performed. Reports may be integrated into the normal reporting cycle of an organisation, or combined with the reporting of progress against plan, benefits etc.

3. Finance reports are likely to show expenditure to date, forecast for the year, and variances against budgets. In large complex projects, the financial reporting is likely to integrate with contract management, with contractors providing regular ‘Work In Progress’ statements. This concerns the continued affordability of a proposal.

## **2.4. Commercial**

1. The government is committed to providing value for money services. In many cases, procuring services from the private sector in an open competition is the best way to ensure that value for money is obtained. The extent of involvement of the private sector is likely to vary from minor elements of a proposal being contracted-out through to full privatisation, with various forms of contracting, outsourcing and PPP's (including PFI) in between. Public bodies need to consider carefully which procurement route is most likely to deliver the benefits required of their scheme most cost-effectively.

2. Investment proposals are made up of estimates that are forecast some time in advance of either the projected costs being incurred or imputed benefits being realised. Any estimate made well in advance may or may not prove to be correct once a project has been implemented. The less well developed the appraisal, the greater the variability there is likely to be between the estimated value attaching to a cost or benefit and the outturn.

3. By transferring risk away from the public sector in different ways, different procurement options provide procuring authorities with choices about how they might manage and mitigate certain risks around estimated costs and benefits. For example, typically PFI contracts transfer to the PFI partner the risk that capital costs will exceed estimates made by the procuring authority in a way that some conventional contracts may not. Equally, a payment mechanism that calibrates payments made under a contract with the delivery of well-defined benefits provides procuring authorities with a way of ensuring that certain costs are incurred only if certain benefits are delivered.

4. Given that it is impractical for procuring authorities to carry out parallel procurement processes, it is clear that the level of confidence that authorities can have that estimated costs and benefits will actually be similar to outturn will vary depending on:

- the length of time between the cost or benefit estimate being made and the date of contract award; and,
- the procurement option chosen.

5. In relation to the latter, it is clear, for example, that costs which are fixed under contract and which become payable against measured milestones of physical progress in construction will have a higher probability of being incurred than costs which, although fixed under contract, are only payable to the extent that defined benefits, outcomes or contractual outputs associated with the contract are delivered. Comparisons between various procurement options need to take account of the impact that different contractual terms have on the likelihood that, in fact, certain costs will be incurred and certain imputed benefits will be realised at the level estimated by the procuring authority.

6. The guidance in section 3 is designed to help procuring authorities decide where better value for money is likely, prima facie, to be secured from transferring responsibility for

*DRAFT UNDER CONSULTATION*

certain elements of a proposal to the private sector. More detailed procurement advice can be obtained from OGC (and Partnerships UK for PPP and PFI projects).

***PFI Projects***

*A project is more likely to be successful and acceptable as a PFI project if the project has:*

- *Clear boundaries, measurable output performance and a substantial operating content;*
- *Any surplus assets intrinsic to the project are included;*
- *There is scope for innovation in design which enables:*
  - *The service provider to design away risks and bring new ideas to the way the service is provided;*
  - *The service provider to find alternative uses for the asset provided; and,*
  - *The risks transferred to the service provider are commercial in nature and controllable;*
  - *Enables the service provider to make a reasonable return on investment whilst providing a value for money deal for the customer.*

### **3 PROGRAMME AND PROJECT MANAGEMENT**

#### **3.1. What Is Programme Management**

1. Programme Management is a structured framework for defining and implementing change within an organisation.
2. It provides a framework for implementing business strategies and initiatives through the coordinated management of a portfolio of projects that change organisations to achieve benefits which are of strategic importance. All large programmes should put in place recognised programme management methodologies. For information on programme management, see <http://www.ogc.gov.uk/sdtoolkit>.

#### **3.2. What Is Project Management**

There should be an agreed approach to the management of projects. Typically, this will involve identifying tasks, and responsibilities and deadlines for completing them, and producing baseline schedules of milestones and activities (often in the form of Gantt charts). Progress against the base schedule should be reported on a regular basis. Guidance on project management is available from OGC<sup>30</sup>. Good programme and project management methodologies encompass the following:

---

<sup>30</sup> <http://www.ogc.gov.uk/sdtoolkit>.

DRAFT UNDER CONSULTATION

**3.2.1 Risk Management**

1. Risk management is a structured approach to identifying, assessing and controlling risks that emerge during the course of the policy, programme or project lifecycle.
2. Its task is to ensure an organisation makes cost-effective use of a risk process that has a series of well-defined steps to support better decision-making through good understanding of the risks inherent in a proposal and their likely impact. Risk management involves having processes in place to monitor risks; access to reliable, up-to-date information about risks; the right balance of control in place to deal with those risks; and decision-making processes supported by a framework of risk analysis and evaluation.

Effective risk management helps to achieve better outcomes by contributing to:

- Effective management of change;
- Efficient use of resources;
- Better project management;
- Minimising waste, fraud and poor value for money; and,
- Supporting innovation.

This leads to an improved chance of achieving the proposal’s objectives. <sup>1</sup>

1. From OGC website: [www.ogc.gov.uk](http://www.ogc.gov.uk)

**Figure 14 Key Elements of Effective Risk Management**

- Organisational risk management policies which are clearly communicated to all staff;
- A risk management framework, approved at senior level, within which risk is to be identified and managed;
- An organisational culture which supports well thought through risk taking and innovation;
- Management of risk is fully embedded in processes and consistently applied;
- Management of risk is closely linked to achievement of objectives;
- Risks are actively monitored and regularly reviewed; and,
- Senior management who support, own and lead on risk management.

3. Acquiring more information about risks affecting a policy, programme or project (through pilots or further research), can allow steps to be taken either to reduce the probability or to mitigate the adverse consequences of negative outcomes, or to increase the benefits of positive outcomes. Reducing uncertainty in these ways can reduce the expected costs or increase the expected benefits of a project.

4. Use of designs of proven flexibility and effectiveness can also effectively reduce risks, by incorporating the lessons of past experience and, reducing the number of new elements of design. However, standardisation must not be allowed to discourage innovation. Additional information can be found at RAMP: ‘Risk Analysis and Management for Projects’ published by Thomas Telford Ltd, 1997.<sup>31</sup>

---

<sup>31</sup> <http://www.ramprisk.com/>.

DRAFT UNDER CONSULTATION

### **3.2.2 Benefits Realisation Management**

1. Benefits realisation management is the identification of potential benefits, their planning, modelling and tracking, the assignment of responsibilities and authorities and their actual realisation.
2. In many cases, benefits realisation management should be carried out as a duty separate from day to day project management. Additional information from OGC on successful benefits management can be found at <http://www.ogc.gov.uk/sdtoolkit/bclifecycle/c/c8.html>.

### **3.3. Information Management And Control**

1. The history of problems with IT related projects in the public sector has led to work to improve their future management.
2. Stemming from the report ‘*Successful IT: Modernising Government in Action*’, an approach to programme and project management of these projects has developed (SPRITE). The report states that ‘*rather than think of IT projects, the public sector needs to think in terms of projects to change the way government works, of which new IT is an important part.*’ The recommendations and subsequent development of approaches to IT projects should be reviewed before launching IT programmes and projects.<sup>32</sup>

### **3.4. Arrangements For Post Implementation Review (Post Project Review)**

1. The arrangements for post implementation review need to be considered before a proposal is launched.
2. In some cases, other parts of the management arrangements will have implicitly covered this; for instance, with clear arrangements for risk, financial and benefits management in place, there is likely to be sufficient information recorded to enable a thorough evaluation.
3. The main issues that evaluation addresses are:
  - Have the expected benefits of the project been realised?
  - Will lessons learned from the project lead to recommendations for improvements?<sup>33</sup>

### **3.5. Other Issues**

#### **3.5.1 Environmental**

Proposals with significant consumption of natural resources, waste products or pollution may require an environmental impact assessment. Further guidance on this is available from DEFRA <sup>34</sup>.

---

<sup>32</sup> <http://www.ogc.gov.uk/ogc/it.nsf/pages/SuccessfulIT.html>.

<sup>33</sup> <http://www.ogc.gov.uk/sdtoolkit> and Gate 5 of the Gateway Review Process.

<sup>34</sup> <http://www.defra.gov.uk/>

*DRAFT UNDER CONSULTATION*

### **3.5.2 Rural**

The government is committed to ensuring that all its policies take account of specific rural circumstances and needs. Appraisers should assess whether proposals are likely to have a different impact in rural areas from elsewhere. Further guidance is available from DEFRA<sup>35</sup>.

### **3.5.3 Equality**

Impacts on various groups in society should be considered. Explicit provision for the effect of proposals on people in different income groups is described in Annex 7.

### **3.5.4 Health**

Health impact assessments are required if policies are likely to have a significant impact or create a significant risk to health, through increasing poverty, unemployment, housing and housing conditions, work and workplace conditions, or have transport impacts.

### **3.5.5 Health and Safety**

The health and safety of people at work or arising from work activity may need to be safeguarded. This is of particular concern in construction.

### **3.5.6 Consumer**

A consumer impact assessment may be required if proposals affect:

- The cost of and quality of goods and services;
- Access to goods and services;
- Choice of goods and services;
- Information about goods and services; and,
- Fairness (see social equality above).

### **3.5.7 European Union.**

It may be important to take account of similar proposals and activities in other European Union countries, as well as specific legislation and regulations.

## **4 RELATED PROCESSES**

### **Economic Appraisal, Gateway And Business Case Development**

1. The following schematic describes the relationship between the approaches taken by the Economic Appraisal, Gateway and Business Case processes. These differences arise from the different emphases inherent in the purpose for which an analysis is being conducted.
2. Accordingly, the steps do not precisely align, but rather form the framework within which the analysis should be conducted.

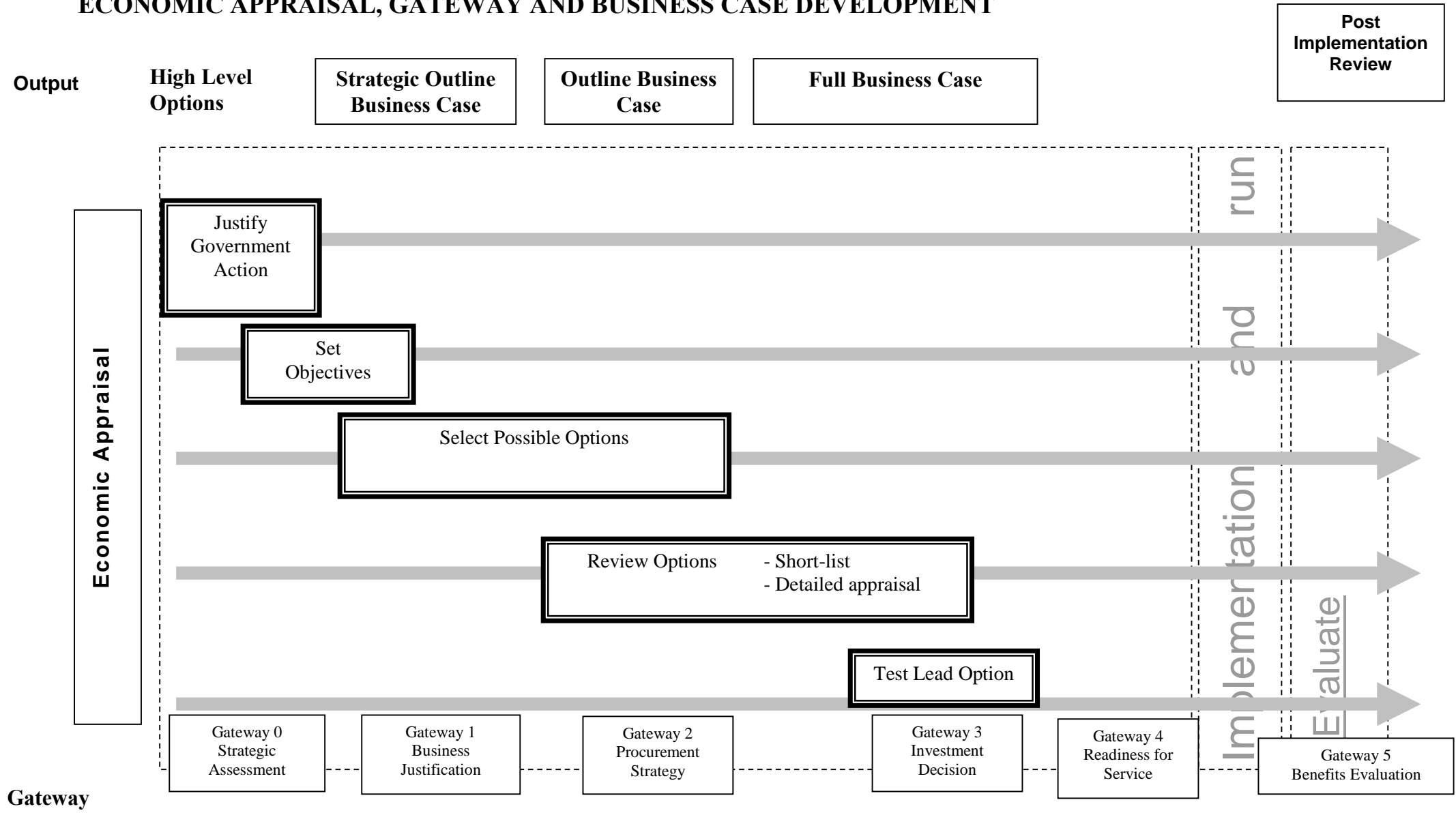
---

<sup>35</sup> <http://www.defra.gov.uk/>.

DRAFT UNDER CONSULTATION

### ANNEX 8

## ECONOMIC APPRAISAL, GATEWAY AND BUSINESS CASE DEVELOPMENT



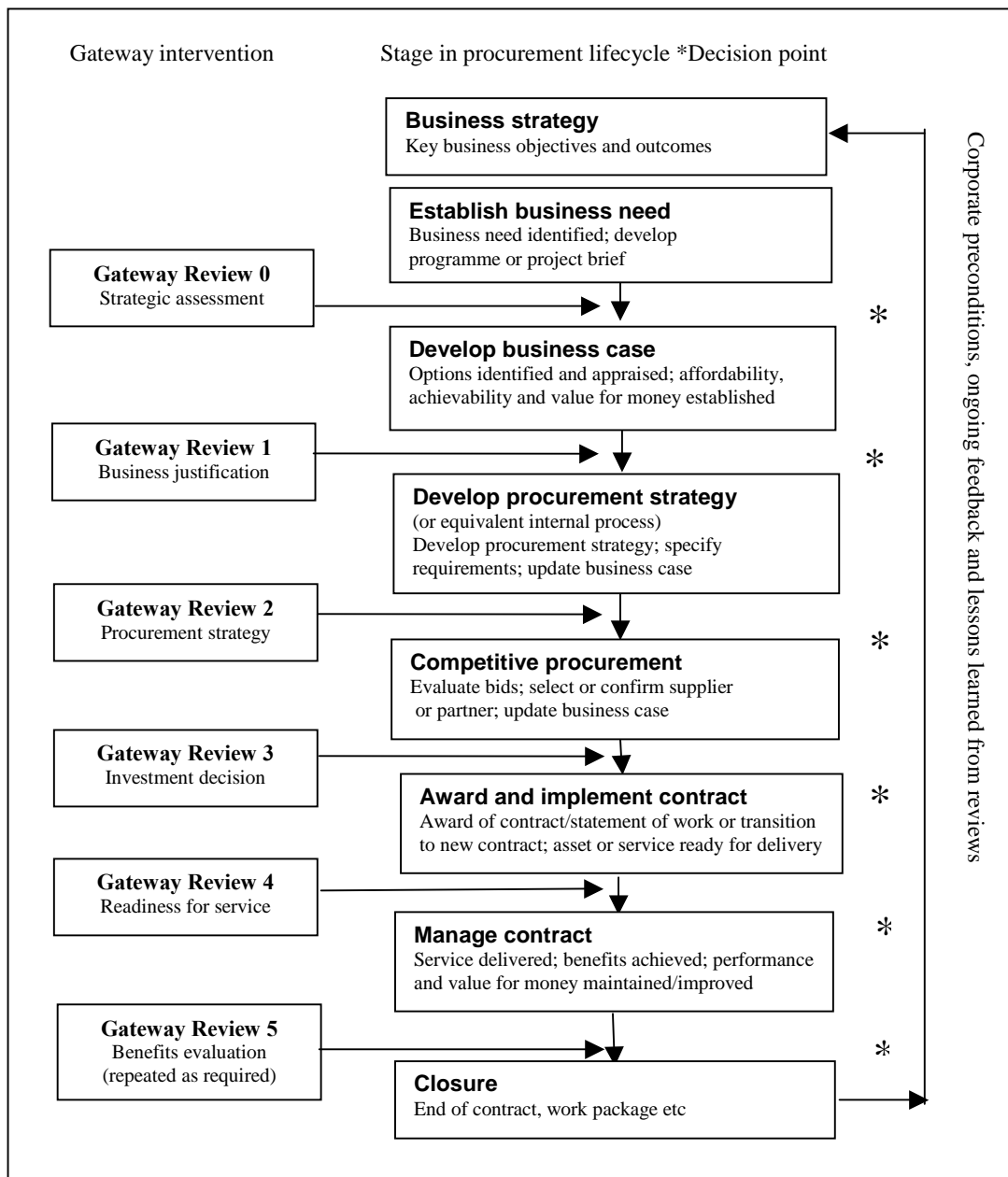
DRAFT UNDER CONSULTATION

# GATEWAY

## OGC BEST PRACTICE

The Gateway process examines a project at critical stages in its lifecycle to provide assurance that it can progress successfully to the next stage. It applies to projects that procure services, construction/property, IT enabled business change projects and procurements utilising framework contracts. The Gateway Process is mandatory for procurement projects conducted within central civil Government i.e. departments, their agencies and NDPBs. Gate 0 applies at both the project and programme level, but in the case of the latter, Gateway involvement is predicated on there being a procurement project within the programme. Detailed information is available from the Office of Government Commerce (website: <http://www.ogc.gov.uk/>).

Figure 15 Gateway Intervention/ Stage in Procurement Lifecycle



*DRAFT UNDER CONSULTATION*

The Gateway Process meets the requirements of the Gershon Report on government procurement and the Cabinet Office report Successful IT: Modernising Government in Action. It is also consistent with Achieving Excellence in Construction.

What is a Gateway Review?

In simple terms, it is a review of a procurement project carried out at a key decision point by a team of experienced people, independent of the project team. Procurements are any finite activity which deliver or which are designed to deliver a government requirement and involving government expenditure.

The Gateway Process is based on well-proven techniques that lead to more effective delivery of benefits together with more predictable costs and outcomes. The process considers the project at critical points in its development. These critical points are identified as Gateways. There are six Gateways during the life cycle of a project, four before contract award and two looking at service implementation and confirmation of the operational benefits. The process emphasises early review for maximum added value.

Gateway 0 may be applied at the start up of a programme or a project. It is expected at the start up of a programme and is recommended practice for a major project that is high risk.

What are the benefits?

The Gateway Process provides assurance and support for Project Owners (PO's) and Senior Responsible Officers (SRO's) in discharging their responsibilities to achieve their business aims:

- The best available skills and experience are deployed on the project
- All the stakeholders covered by the project fully understand the project status and the issues involved
- Assurance that the project can progress to the next stage of development or implementation
- Achievement of more realistic time and cost targets for projects
- Improvement of knowledge and skills among government staff through participation in review teams
- Provision of advice and guidance to project teams by fellow practitioners.

Reports and accountability

The review report is for the PO/ SRO and it will be their decision to authorise project progression or implementation of recommended remedial actions. OGC retains copies of review reports in order to identify and disseminate generic lessons learned.

Review teams

The PO or SRO uses the Project Profile Model to determine the level of risk associated with a project. For large, complex, and other high- risk projects the review team leader is appointed by OGC and leads a review team independent of the department. For medium- risk projects, an independent team leader is appointed by OGC to lead a review team drawn from independent departmental staff. For low- risk projects, departments appoint the independent leader and team members from within the department. The teams vary in size but typically are between three and five people. Each review takes about three to five days, with a complete report being provided to the PO/ SRO before the team leaves the site. The targeted review is designed to avoid any delay to the project.

Supporting guidance and training

Guidance and training is available to support the Gateway Process:

- A leadership guide for managers and practitioners sets out the purpose and criteria for each Gateway. A process model is provided that identifies where reviews should occur during a project lifecycle
- A work book for each Gateway provides questions to support each review
- A Project Profile Model, suitable for projects involving the procurement of services, construction/ property management and IT- enabled business change is available to enable project risk to be assessed before the start of each Gateway review

*DRAFT UNDER CONSULTATION*

- A one- day workshop is available for both review and project teams, covering preparation, planning and carrying out a Gateway review
- A Best Practice Toolkit provides electronic versions of the workbooks and links to relevant sources of best practice, tools and techniques (available on the OGC website and in CD- ROM format).

What should you do next?

- Ensure that PO's and SRO's are aware of the Gateway Process and are using the Project Profile Model to identify the risk level for their projects.
- Ensure that plans are developed to implement the Gateway process for all appropriate projects within your department, its Executive Agencies and NDPB's.
- The application of the Gateway Process to a project that has reached Gateway 3, 4 or 5 without having been through an earlier Gateway Review should be discussed with the OGC Gateway team (tel: 020 7211 1396). Gateway Reviews of non- IT projects at Gateways 3, 4 and 5, and IT projects at Gateways 4 and 5, are only undertaken at the request of the department's Accounting Officer.
- PO's and SRO's need to schedule Gateway Reviews into their project plans and to contact the OGC Gateway team as soon as a requirement for a review is established. A copy of the completed Project Profile Model should be sent to the OGC Gateway team at Gateway. Helpdesk@ogc.gsi.gov.uk. The OGC Gateway team needs 6– 8 weeks' notice of a review in order to undertake the necessary planning and team selection. The Gateway Process incorporates a facilitated planning meeting which takes place before the review and is chargeable to the project owning department. Gateway Reviews are free of charge except Gateway Review 0 for projects.