Learning and Skills Council

Guide to Investment Appraisal for Further Education
Capital Projects

August 2008
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1. Introduction

This guide describes the principles and approach to Cost Benefit Analysis (CBA) adapted by the LSC based on the HM Treasury (HMT) Green Book. It should be read in conjunction with the Model User Guide for the Capital Investment Appraisal model. The Model User Guide describes the model functionality, how to use the model and the specific inputs required.

This guide examines in turn:

- The investment appraisal cycle for Further Education (FE) capital projects.
- The benefits that are considered within the CBA.
- The costs that are considered within the CBA.
- The fit with the financial case.
- The outputs of the investment appraisal model.
- Investment appraisal decision making.
2. The Investment Appraisal Cycle For Further Education Capital Projects

The approach to capital investment appraisal for FE capital projects is based on HMT Green Book. The Green Book sets the framework and the principles that should be applied to investment appraisal within the UK public sector. Following the Green Book helps ensure that resources are directed towards their most appropriate use and that investment decisions are made on a sound basis.

**Key steps in the investment appraisal cycle**

The key steps in the investment appraisal cycle are as follows:

- To frame formally the project objectives to be tested in the appraisal in terms of how they deliver policy objectives.
- To define the outline strategic case and a wider range of options with a recommendation for the options to be appraised in detail at the Approval in Principle (AiP) stage.
- Setting out the rationale for selecting an option for detailed appraisal as well as reasons for rejecting long listed options.
- Setting out the proposed scope of appraisal clearly at the AiP stage.
- The economic case (CBA) including the social case needs to be weighted against the financial case (affordability).

The investment appraisal cycle can be described as taking place in the eight stages described below.

**Stage 0: Implementation strategy for national policies**

Any investment appraisal at initiation level will benefit from being determined in the clear context of relevant economic appraisal of national and regional policies and any Value for Money (VfM) appraisal of national programmes. Such analysis should provide the grounding for overall national and regional capital plans against which specific projects will be assessed.
Stage 1: The strategic case prepared by the institution

The strategic case will define the rationale(s) for a project and refine it (them) into a set of objectives against which options will be appraised. The rationales will primarily be around securing the benefits that flow from enhanced educational outcomes (the education case). The context for institutions will usually be a capital building project\(^1\) and thus the property strategy will be a material element of the overall strategic case. Broadly the case for capital projects will be driven by one or more of the following:

- A change in the absolute, or the mix of, demand for places.
- A need to enhance teaching and learning by providing more suitable accommodation (eg the use of Information Communication Technology (ICT), provision for specialist subjects etc).
- A need to improve the condition of premises.

Broadly the impacts and thus the objectives are likely to relate to:

- Increasing participation, particularly with a view to improving social inclusion. This includes both the initial recruitment of learners and their retention to complete courses.
- Increasing attainment through a better learning and social environment.
- Meeting the evolving skills need of the economy.

An indicative framework for the strategic case could look like:

- **Educational policy objectives**
  - Increase learner places to deliver enhanced participation (capacity).
  - Enhance ‘inclusion’.
  - Improve attainment (for ‘existing’ and additional learners).
  - Improve retention.
  - Improve social outcomes (reduced crime, increased family stability etc).
  - Improve attendance.
  - Change course mix.
  - Addressing skills gaps in the marketplace.

\(^1\)Although the principles apply to any decision materially affecting the activities and resources consumed.
Operational objectives

- Improve delivery methods (ICT, virtual networks, lecture style).
- Reduce whole life costs.
- Health and safety.

Wider policy objectives

- Use of sustainable materials.
- Reduce carbon footprint.
- Local regeneration.

Stage 2: Identifying options undertaken by the institution

The identification and appraisal of options is a crucial part of the investment appraisal process - typical options to consider will include do nothing, do minimum and do something (with more than one ‘do something’ option). Examining the different options should be tackled rigorously so that the full implications of different courses of action are recognised. This process provides confidence that when the preferred option is selected it is the correct course of action - as the alternatives have been thoroughly assessed.

The first step in identifying options involves preparing a list of possible actions (the so-called ‘long list’) that could be taken to achieve certain objectives. The rationale behind selecting a number of options for appraisal is that it helps identify the potential range of action that could possibly be taken to achieve an objective. That is, it forces alternative approaches to be considered that may otherwise have been omitted. The minimum number of options should cover do nothing, do minimum and do something. However, it is important that as wide a range of options as possible is considered at the initial stage even if only at least three options, including the do nothing/minimum option, are taken forward for detailed appraisal. Generic options that may be considered include:

- Extension.
- New build.
- Refurbishment.
- Temporary accommodation.
- Outsource.
- Lease.
- PFI/PPP.
- Phasing/deferral.
Options for an FE college capital project might include:

- Varying the time scale of the project.
- Moving the college to a new location.
- Considering different sizes of building and the associated number of learners that could be accommodated.
- Repairing existing buildings rather than replacing.
- Considering different build designs – this might include considerations that higher quality build with higher upfront costs could lead to lower running costs through efficiency savings.
- Merging or co-locating with another college to meet curriculum requirements not met by current buildings (possibly in terms of Information Technology infrastructure).
- Renting space rather than building or owning the premises.
- Flexibility options - either (a) structuring projects incrementally so options to vary the final solution are built into the design and/or programme of works, or (b) designing flexibility of use into the building either to maximise the ability to adapt educational use or to allow ultimately for alternative use of the buildings in the case of reduced demand in the medium to long term.

At the AiP stage the outline strategic case and a wider range of options with a recommendation for the options to be appraised in detail should be presented. This should also be prepared in short form for projects where funding of <£10m are proposed in certain cases. For example, this would include the size of project in relation to the institution, whether there are likely to be a stream of <£10m projects and whether the project is ‘strategic’ in relation to educational delivery.

The reasons for rejecting long listed options should be recorded as part of the appraisal process as well as the rationale for taking an option forward to detailed appraisal. The evaluation criteria should be based on a high level assessment of the strategic case, policy etc. This could take the form of a simple table, for example:

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Stage 3: Determining the scope of the appraisal (in consultation with the LSC and according to size bands)

In addition it is important to consider that the scale of the appraisal and the level of modelling / analysis need to be commensurate with the nature and value of the project. The degree of detail and effort required for an appraisal must be commensurate with the impact it has on the quality and robustness of the decision making process.

The scope of an appraisal is fairly clear where there is a complete rebuild (a whole institution appraisal would be required) or a discrete building for a new activity (a stand alone appraisal would suffice) but in between the decision as to whether or not to model the whole institution will depend on the extent of the impact of a project on the use of premises and how they are managed as a whole.

What is important is to capture the incremental changes to benefits and costs arising from a project. It is recommended that this is achieved by comparing options holistically rather than simply analysing incremental elements. This will be a matter of judgement ultimately but the proposed scope of appraisal should be clearly set out in the AiP.

The Green Book states that “Costs and benefits considered should normally be extended to cover the period of the useful lifetime of the assets encompassed by the options under consideration.” Therefore, the investment appraisal will need to consider a period of time appropriate for the useful economic life of the FE project. The general view is that 25 years is a realistic time horizon for the purposes of an FE capital project. This balances a sufficiently long operational time horizon with the concern that it is very difficult to assess how a building will be used in 25 years time. The appraisal model therefore covers a 25 year time frame.

Stage 4: The economic case – cost benefit analysis

The Green Book recommends CBA be used in undertaking appraisals. The guidance indicates that, where it is feasible, all of the costs and benefits associated with a project should be monetised and factored into the appraisal of a project (for example in calculating the project Net Present Value (NPV – see Stage 7 below) from the discounted costs and benefits over the evaluation period of the project). The economic case essentially demonstrates VfM. See Sections 3 and 4 for more detail.

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2 Green Book, paragraph 5.1
Stage 5: The financial case – affordability analysis

The financial case demonstrates that the project is affordable to the college based on an acceptable risk profile. The main element of the financial case will be a financial forecast which should show that the institution can deal with the immediate cashflow implications of the project and demonstrate financial health clearly at the point of project delivery and that its long term financial position is robust. This is formally assessed by the LSC using the financial plan, although the model includes a cashflow analysis tool to facilitate options analysis. See Section 5 for more detail.

Stage 6: The commercial case – determining the procurement approach

The commercial case should set out the proposed approach to procurement. The issues that might need to be dealt with include:

- Land and property issues.
- How whole life costs can be reduced - eg should hard facilities management (FM) services be procured at the same time as construction works.
- Whether Private Finance Initiative (PFI) should be considered - for new build projects with a value of >£20m PFI might provide VfM.

Whilst the commercial case will need to be worked up in more detail for the preferred option, consideration of these issues should take place in respect of each option under appraisal.

Stage 7: Selecting the preferred option

Appraising options

Options appraisal is described as the 'essential technique' of undertaking CBA which should always include the 'do minimum' option against which to compare more interventionist actions. Analysing different options helps decision makers understand the impacts of a range of different decisions that could be made when undertaking project appraisal.

There is no prescriptive mechanistic guidance in terms of exactly how to choose between options. The key element is to undertake the process rigorously and then take an informed decision about which option should become the preferred option. This decision will be formed by a range of factors, not simply an NPV, although this will be a critical element. NPV calculations are useful to help decide between projects but it is not the only metric that should be used for examining the relative merits of projects.
Net present value

NPV is an evaluation technique that identifies costs and benefits coming out of a project and discounts these costs and benefits according to how far in the future they arise to take account of ‘social time preference’. The discount rate used in the investment appraisal model is that specified by HMT, 3.5%.

NPV and NPV ratios are the recommended value metrics for assessing the economic value of projects for the purpose of deciding between options. The Green Book does not stipulate that a project must generate a positive NPV, but rather it focuses on the need for an effective analytical and decision making process to demonstrate that a preferred investment option leads to the most economic practical outcome based on a range of factors. Thus non-cash benefits (and costs) may be included, either expressed in monetary terms if possible with proportionate effort or through weighting and scoring.

Comparing options – the decision rules

Options should be compared in a systematic fashion but there is no single way for choosing which option is the preferred option since there will always be a mix of direct quantified and monetised benefits and additional wider benefits which will have a bearing on which option is nominated as the preferred option. Judgement is required to choose the preferred option once the appraisal process has been completed and sensitivity analysis undertaken. Ultimately the option selected will be the one that best meets the rationale and objectives set at the beginning in the most cost effective way. Any decision will be subject to the ultimate constraint of a robust affordability position. The model includes a cashflow tool to facilitate options analysis although affordability is formally assessed by the LSC through the financial plan.

The relationship between the economic case, the financial case and the commercial case

In arriving at a preferred option, consideration needs to be given to the economic case, the financial case and the commercial case. CBA to assess what one should do and affordability to assess what one can do financially. Therefore the strategic economic case (CBA) needs to be assessed against the financial case (affordability). The practicability of realising the project needs to be confirmed in the commercial case. Together with the overall strategic rationale (the education case), these three elements will together form the basis for justifying the selection of the preferred option and subsequent development of the more detailed case for the preferred option.

Stage 8: Implementation and post project review

It is a Green Book requirement that proper procedures are put in place to monitor implementation and operation of projects. This process should be planned when the preferred option is selected and it is important that the evaluation is used to improve future projects.
The eight stages and how they fit with the LSC process are illustrated in Diagram 2.1:

**Diagram 2.1: The investment appraisal cycle**

- **Stage 0: Consider National Context**
  - National Capital Strategy
  - Regional Capital Strategy
  - Local Capital Plan
  - Agreed Provider Strategy (3 yr basis)
  - Capital Application

- **Stage 1: The Strategic Case**
  - Education
  - Sustainability
  - Finance
  - Property

- **Stage 2: Identify Options**
  - Long List
  - Short List

- **Stage 3: Determine Stages of Appraisal**
  - Feasibility Study

- **Stage 4, 5 & 6: Determine Economic, Financial & Commercial Case**
  - Investment Appraisal
  - Updated Financial Plan
  - Capital Handbook Forms

- **Stage 7: Select Preferred Option**

- **Stage 8: Implementation and Post Project Review**

This section considers CBA, in terms of assessing the benefits of LSC funded FE sector projects.

The Green Book recommends that CBA be used in undertaking appraisals. The Green Book indicates that, where it is feasible, all of the costs and benefits associated with a project should be monetised and factored into the appraisal of a project (for example by calculating the project NPV from the discounted costs and benefits over the evaluation period of the project). The economic case essentially demonstrates VfM.

The LSC’s role in providing funding for and approving capital investment in FE is to promote and deliver government policy - thus the relevant basis for CBA is assessment of the impact on the national economy and national policy objectives. Therefore the investment appraisal adopts a ‘UK plc’ perspective on CBA as opposed to a narrower institutional perspective ie costs and benefits that accrue to society as a whole (‘UK plc’) need to be measured even where they do not specifically accrue to the relevant FE college.

**Economic benefits**

Green Book guidance indicates that “benefits should be valued unless it is clearly not practicable to do so”\(^3\), and that these should be based, as far as possible, on real or estimated market prices.

The economic benefits of education are measured in terms of the additional income earned by individuals as a result of them being better qualified. This approach is based on findings from a wide range of research studies\(^4\). This is calculated on the basis of the following methodology:

- Additional income from education per learner is equal to the lifetime earnings premium by level of qualification attained.

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\(^3\) Green Book, paragraph 5.2.4

Further, the aggregate benefit is derived by applying to the individual level of benefit the forecast rate of employment for such individuals.

Also that a factor is applied in relation to attainment to capture the ratio of learners completing courses to the initial intake.

That the wages (and thus productivity) foregone by learners whilst in education needs to be deducted from the value of education benefits to derive a net direct benefit of education.

That a differential in participation levels (both attracting and retaining learners) and in attainment levels arising from capital investment should be quantified.

Where additional learners are attracted to a college, additional benefit will only accrue if (i) they would not have attended college anyway, or (ii) they would perform better (specifically secure better employment outcomes) in the new college place than in an alternative.

**Incorporating economic benefits of education within the appraisal**

On this basis, the aggregate economic benefits of education are measured primarily on the relationship between higher levels of qualifications and their impact on earnings and employment outcomes. The approach used in the model quantifies, in monetary terms, the additional economic contribution that results from the higher levels of qualifications that FE colleges provide to more learners. This is measured in terms of increased participation and of both the 'earnings premia' (higher levels of qualifications lead to higher earnings) and the increased likelihood of being in employment.

In simple terms, the model compares the investment in education (which is considered to be the earnings foregone while studying and the cost of providing the courses – and offsets these against the economic benefits (which is earnings premia that the more highly qualified individuals generate throughout their careers) to derive a net economic benefit of education.

The data the model uses is from the Labour Force Survey. The current data (as per the 2006 Labour Force Survey) is shown at Appendix 1. This identifies the average earnings levels and employment rates for individuals with different levels of qualification, the scale of this benefit can be quantified in relation to the proposed capital project and then factored into the investment appraisal model. The data is input and fixed nationally; it is not an input that individual colleges are required to make.

The model assumes that learners are moving up the scale of qualifications ie that a learner that is studying for a Level 2 qualification was previously qualified at Level 1. In other words the model assumes that no learners are studying for equivalent or lower qualifications. Whilst in reality this is unlikely to be precisely the case, it is expected to be the most realistic assumption. Furthermore, as the assumption does not vary between options it will not generally affect the comparison of the differing options.
The remaining working life of the learners is fixed at 30 years. Although in practice this will vary according to the specific learner population, for example if there is a high proportion of adult learners, the 30 year assumption is in line with standard practice and deviations may represent a spurious impression of accuracy. Furthermore, as the assumption does not vary between options it will not generally affect the comparison of the differing options.

The percentage of foregone earnings that the model assumes is fixed at 75%. This is in line with research findings and again, as the assumption does not vary between options it will not generally affect the relative appraisal of the differing options.

**National vs regional wages**

The model uses the UK average wages rather than the regional wages. This approach is adopted for both theoretical and practical reasons, even though the level of wages differs considerably by region.

In practical terms, the introduction of regional-specific average wages would clearly complicate the input side of the model but, most importantly, it would make it difficult to compare and interpret outputs across regions. It will also not be particularly relevant for most appraisals as most investment appraisals are conducted with all of the options in the same region.

There are also strong theoretical reasons why it would not be appropriate to include regional wages:

- The original academic estimates of the increase in average wages as a result of better qualifications are based on UK average wages figures and so will not apply at the regional level. For example, it may be the case that better qualifications may have a disproportionately higher impact on areas with a lower starting wage or indeed the opposite effect where wages are generally high reflecting greater demand.

- The labour market is very mobile. A significant proportion of individuals are likely to move from region to region over the course of their lifetime of working, so the concept of using wages which are above or below the UK average for the calculation of benefits is problematic and is best disregarded in the context of choosing between options.

- The regional allocation of capital as a policy may be considered by other approaches (e.g., relative deprivation) on an inter-regional basis.

**The impact of capital expenditure on education outcomes**

Although a less well researched subject area, more recent studies have examined the linkages between capital expenditure and learner attainment and participation\(^5\). These

\(^5\) Frontier Economics “Evaluating the Impact of Capital Expenditure” and PwC “Building Better Performance”.

studies suggest that capital expenditure leads to higher levels of attainment and participation. Therefore in addition to the contribution of capital expenditure in providing additional places, capital expenditure can also improve the quality of learning (by providing more suitable premises) and the rate of participation (by providing a more congenial and attractive environment).

Thus, a differential in participation levels (both attracting and retaining learners) and in attainment levels should be quantified. The quantification will be based on judgements around individual institutional circumstances but should be consistent with the academic research and with realistic assessments of the scope of improvement that a particular institution might achieve. In contrast if the institution does nothing then it is likely at some point that the building will not become useable and the number of learners will decline as they go elsewhere. Therefore, the model has the functionality to reflect declining learners.

**Additionality**

The key step in any economic appraisal under Green Book methodology is the assessment of additionality. This involves comparing the net outputs of a do something scenario against the net outputs of a do nothing (or base) case.

The net outputs for both the base and do something cases are determined by starting with the total (or so-called gross) outputs and then taking into account:

- **Displacement** - captures the fact that some of the benefits will not be truly additional but simply displaced from elsewhere. For example if the number of learners at a college increases by 500 as a result of a project but 200 of those learners have simply switched from a neighbouring college - then the project has displacement of 200 learners.

- **Leakage** - captures the fact that some of the benefit of a project will accrue outside the economy. For instance if a material number of learners are likely to end up employed (and spending their earnings) abroad an adjustment may be required.

- **Deadweight** - captures the fact that some benefits would have occurred without the project. The benefits that occur without the project is ‘deadweight’ and should therefore not be included as a benefit of the project. For example some proportion of growth in learner numbers at a college after a refurbishment might have happened, even in the absence of the refurbishment (this will be reflected by reflecting such growth in the base case).

- **Substitution** - outputs or activities which are substituted to take advantage of public intervention. For example this would be the case where the funding being sought from the LSC for a capital project was being brought forward at the expense of another project (which would not have attracted public funding) ie the LSC funded project may simply be substituting for another project which would have gone ahead in the absence of the public funding.
**Multiplier impacts** - further activity takes place as a result of the additional impact of the net impact. In addition to the expenditures that can be directly attributable to an FE college, there will be additional economic activity generated through 'multiplier effects'. These multiplier effects capture the fact that the original expenditure associated with the college is recycled in the economy - for example a proportion of the expenditure on staff salaries is spent elsewhere in the local economy, supporting further jobs.

**Displacement**

Displacement is likely to be the most significant of the issues set out above to examine in any cost benefit of a FE college. Displacement is the extent to which additional learners attracted to a specific college, as a result of an investment in a new facility, result in lower learner numbers at other existing colleges in the region or the rest of the UK. This is a real possibility where different colleges are clustered together in close proximity but it reduces in impact the further away the college is from its competitors in terms of distance or in the type of courses it offers, or the extent to which a new facility is associated with initiatives to raise participation in general.

However if, for example, because of availability of a more suitable course or better attainment due to more suitable premises ‘displaced’ learners succeed in qualifying and gaining employment when they might not have done had they been enrolled elsewhere, then there is additional benefit. As such the number of truly ‘displaced’ learners is those that would have studied at another college **AND** would have succeeded in qualifying at that college.

In the appraisal, only additional learners who secure employment from increases in participation levels or improved success rates should be included, rather than existing learners which have been diverted from existing colleges. This will be difficult for the college to estimate. It may be possible to estimate the figures for the first year as learners could be interviewed or surveyed. But, to estimate the proportion of additional learners in the future (eg in five or ten years) who would have otherwise gone to a competitor college if the investment in the FE college did not take place is difficult. Moreover, such a subjective measure would best be considered at a regional rather than college level.

The model has the facility to account for displacement through an adjustment but it is proposed that this is generally only used in consultation with the LSC regionally. Any effects of displacement to be modelled must be agreed with the LSC after an examination of the projections of learner numbers under the various options and moderating them to take into account the effects of displacement.

A worked example of displacement is illustrated at Appendix 2.

**Leakage, deadweight, substitution and multiplier impacts**

A full economic appraisal study should only be undertaken for large projects (ie greater than £20 million in total capital investment and where the impacts of wider economic...
consequences are likely to be material to the choice between options). Otherwise the costs of doing so would not be proportionate. Such a detailed appraisal should consider leakage, substitution and multiplier impacts and the calculation of such impacts would be effected through specific studies. Where funding from other sources such as an RDA and/or a local authority is being accessed this may be required anyway.

It is recommended that discussions are held with the LSC at an early stage to determine the scope of the appraisal.

For projects which have a smaller capital investment value, these issues may generally be ignored. Substitution is often very subjective and difficult to determine with any degree of accuracy and leakage at the UK economy level would only be a significant issue where a college has a high level of foreign learners who would not subsequently work in the UK.

Residual values

The Green Book states that the residual value of the asset should be considered in the investment appraisal. The residual value will be the economic value of an asset at the end of the period which has been explicitly modelled in the investment appraisal. Generally this will relate to the value of land and buildings. In the case that other assets can be identified a value should be placed on these also. In the case of the LSC appraisal model there are two classes of residual value:

- the value of educational benefits beyond the model period. This is calculated by the model based on the remaining working life of the relevant learners at the end of the model period; and
- the value of operational assets (land and buildings etc). This is considered to represent the "unconsumed" cost at the end of the modelling period and thus is dealt with in Section 4.

Offsetting income

Revenue income that a college receives from the LSC for teaching learners is not classified as a benefit within the CBA (although it is relevant for the cashflow analysis). However, some types of income will be classified as a benefit within the CBA – there are referred to as ‘offsetting income’.

For example a college may receive income from teaching learners that does not benefit UK plc e.g foreign learners who will return to their home countries, leisure courses and ad hoc specialist courses focused on skills enhancement for specific jobs but with no progression between levels. The cash income would be relevant for the cashflow analysis and, to the extent that the related costs formed part of the CBA included in the CBA. This is offsetting income.

Some other income may be classified as offsetting, in that it offsets costs that have been captured as costs in the CBA. For example, an option may have additional costs for having a new canteen built. Some of this cost will be offset by the income received from
selling food and drink etc. The option would be at an unfair disadvantage if the costs of building and running the canteen were contained in the CBA but the income was not. Therefore any such income should be classified as offsetting. This will then flow through to the CBA.

This section considers CBA, in terms of assessing the costs of LSC funded FE sector projects. The Green Book states that the “relevant costs...to government and society...should be valued”. Both direct costs and indirect costs are considered below. Other technical issues relating to tax and inflation are also considered.

Direct costs

Direct costs that are considered within the model are:

- Economic costs.
- Opportunity costs.
- Capital costs.
- Premises costs.
- Operational costs.

Economic costs

The main economic cost that is included in the appraisal is the foregone earnings of learners participating in education (see Section 3). Since the alternative to taking a course at an FE college would be working for some percentage of learners, the earnings foregone while gaining a qualification needs to be treated as a cost. From an individual learner perspective, this cost can be thought of as an investment - learners are incurring a cost now (their foregone earnings) in order to achieve a higher level of earnings and higher prospect of being in employment for the rest of their working lifetime. Presentationally in the model this is netted off against the related economic benefit of education.

6 Green Book, paragraph 5.8
Opportunity costs

It is a fundamental economic principle that opportunity costs are relevant to measuring NPV for investment appraisal. Opportunity costs need to be expressed in terms of the market value foregone. Incorporating opportunity costs into the analysis aims to quantify in monetary terms the next best alternative use for the land/building.

Theoretically the opportunity costs of options for redeveloping a college on its existing site would always be the market value of the land and buildings. However the sale of the land and buildings would not usually be a feasible alternative (as there may be no other location for the college) and therefore this opportunity cost may not be included within the appraisal as it will be the same for all options. Alternatively, sale may not represent an acceptable policy decision as the land may be subject to covenants on its use in which case the practical opportunity may not exist for a sale.

If assets (land, accommodation or equipment) which are owned by the college are required for one or more option but not another then the appraisal should consider an opportunity cost of the assets. This is generally the market value of the asset. This is because the asset could be sold or used for alternative purposes if the option being considered does not happen. The model reverses out the opportunity cost in the last year of the investment appraisal when the asset potentially becomes available for sale or other use. This is because the appraisal is evaluating the cost of using the asset during the appraisal process.

For example, one option could be to rebuild a college on its current site. One of the costs of doing so is the opportunity cost that is foregone from not selling the land and/building and undertaking the project on a different site. Since moving to a new site will incur costs in terms of acquiring land and building premises, not including the opportunity cost of staying on an existing site will underestimate the true costs of remaining at the existing site and thereby skew the true costs associated with each option.

The treatment of opportunity costs can be conceptually difficult and can potentially be approached from different angles. The underlying concept, however, is that, the overall opportunity cost of one option is not carrying out another option (ie it is the comparison that is important). Care should be taken not to ‘double count’ costs.

Opportunity cost: Example 1

A college owns an area of land with a market value of £2 million. Option A is to build a new building on this land (that could otherwise be disposed of) and refurbish the existing building. Option B is to sell the free land and extend the existing campus on the existing site. Other factors may perhaps include extent of disruption, losing some of the recreational outside space etc.

Treatment: Either (i) in Option A include the market value of land as an opportunity cost or (ii) in Option B the disposal proceeds are included in the investment appraisal as a cash inflow. In either case, the market value of the free land is included in Option A as a residual value at the end of the period. Thus, whichever modelling approach is taken,
the opportunity cost will be captured in the appraisal by comparing the realisation of value by a sale now (Option B) to use of the land for the duration of the appraisal period (Option A).

Note: if the loss of recreational space was considered important this should be factored into the appraisal too (generally through weighting and scoring – see Section 7).

Opportunity cost: Example 2
A college receives rental income from using its facilities for conferences held by the local community. Under Option A the conference facilities will be unable to be used for a period of six months whilst renovation work is carried out. This means that rental income of approximately £6,000 will be lost during the renovation period. Under Option B the renovation work will not be carried out on the conference facilities and therefore, under this option the college will continue to receive rental income during the whole period.

Treatment: The rental income is treated as a cash inflow in Option B. Under Option A no rental income will be recorded for the six months whilst the renovation is taking place. The difference between the options, and thus the opportunity cost, is shown by the fact that Option B receives £6,000 more, in those six months, than Option A.

Opportunity cost should be considered on a case by case basis as the issues can be complex.

Capital costs
Capital costs are the expenditures on infrastructure and equipment for which the college is seeking funding. They will usually be expressed in outturn prices in real terms and the model allows for this treatment. The residual value of capital expenditure should be considered within the options appraisal.

Residual value
The Green Book notes that an asset may still have some residual value, even at the end of its useful economic life, for example, it may have an alternative use within an organisation, in a second-hand market, or as scrap. In addition to the residual value being included in the investment appraisal model, the Green Book notes that the values should be tested for sensitivity. This recognises and accounts for the fact that it may be difficult to estimate the future residual value of the asset at the time the investment appraisal is undertaken.

The best estimate of the residual value of land will probably be the same as the opportunity cost of land at the commencement of the project. The value may be different where the nature of the development under an option would have an impact on the land value (eg land remediation, change in planning consents etc) in which case advice should be obtained from professional valuers as to both the enhanced and unenhanced value.

There are several accepted ways of calculating residual value of premises and three approaches to modelling residual value can be considered. These are:

- Depreciated replacement cost.
- Value in use.
- Alternative use.

Where a building has no alternative use, other than the provision of education, but is assumed to be likely to continue to be used for educational purposes at the end of the appraisal period then the approach to estimating value may be either depreciated replacement cost or value in use.

**Depreciated replacement cost**

Given the increasing uncertainty over the value to be attributed to educational benefits over time, a more appropriate, and simpler, approach to estimating the residual value might be to calculate the depreciated replacement cost.

The initial building cost will probably provide the best estimate of replacement cost (but care should be taken to exclude “one-off” costs such as ground decontamination etc). At its simplest depreciated replacement cost for a new build college with a 50 years life might be 50% of the initial cost after 25 years of use. In practice regard should be had to the assumptions made on whole life costs which may be prepared on an elemental basis where it is considered that this is material to the comparison between option (ie the mechanical and electrical element may have a shorter life than the building fabric itself).

The impact of the proposed level of planned maintenance and lifecycle expenditure will also impact on residual value and assumptions in this regard should be consistent with remaining life. It should also be noted that where a refurbishment is considered, the value of non refurbished (but subsequently maintained) elements need to accounted for in the residual value.

**Value in use**

This would be the equivalent of the NPV of the estimated benefits less costs to the end of the practical asset life. This might be estimated by calculating the Present Value of an annuity equivalent to the steady state annual value of benefits less costs to the end of the asset life.

**Alternative use**

Where a building has an alternative use (eg a commercial use) it may be more appropriate to use an estimate of market value where this is more than the depreciated replacement cost. This approach may be particularly relevant where flexibility of use has been explicitly factored into the design.

**Residual value within the investment appraisal model**

The model will calculate a crude default residual value based on depreciated replacement cost for Buildings – Purchased, Buildings - New (and additional related costs) and based on the initial value for Land (as land does not generally depreciate). However, the user may overwrite these crude calculations although the assumptions and workings behind this will need to be stated.
Lifecycle costs

Lifecycle costs include the cost of major repairs and refurbishments that are expected to occur over the life of the building, for example, this would include the cost of refurbishing the windows every ten years. The model has a default lifecycle profile of 25% of the capital cost (excluding land) and this expenditure is incurred over the life of the building. However, if this is not appropriate this can be altered to suit the option being appraised.

It will be important in this 25 year model to consider the expected life of existing buildings. Many 1960s and 1970s buildings are reaching the end of their lives and would require either very major refurbishment or complete renewal within the appraisal period.

Operational costs

Operational costs include the cost of utilities such as water, gas and electricity as well as rates and insurance. The costs modelled should capturing running cost efficiencies that can be delivered by a capital project. For example it would be expected that a new building would have lower running costs through higher levels of energy efficiency compared to an older building.

Operational costs also include costs relating to the facilities management of the investment – for example, caretaking and security and grounds maintenance.

Indirect costs

Indirect costs considered are

- **Carbon emissions**

DCSF have prepared energy benchmarks for schools classified as ‘good’, ‘typical’ and ‘poor performing’ from an energy usage perspective. Using data from the Carbon Trust allows the carbon emissions of that energy usage to be calculated. In turn, guidance from HMT and DEFRA allows for the carbon emissions to be quantified in monetary terms and hence a social cost calculated.

In the model the monetised carbon cost is treated in the same way as the other costs. The approach allows for a comparison (in environmental terms) between a college redevelopment and ‘patch and mend’ expenditure. The carbon footprint of a college redevelopment relative to a patch and mend/refurbishment approach will depend on whether the higher upfront costs of the former are offset by decreased ongoing energy usage (and hence lower carbon emissions) for the remainder of the buildings useful lifetime.

To incorporate the cost of carbon into the appraisal, the model allows the user to select a ‘good’, ‘medium’ or ‘poor’ performance from an energy usage perspective. The corresponding monetary cost per meter squared is a fixed input based on HMT guidance. The total carbon cost is then calculated by multiplying the cost per meter squared by the square footage of the gross internal area (which the user must input for each period of the model).
The assumption as to whether an option that is being appraised has a ‘good’, ‘medium’ or ‘poor’ performance from an energy usage perspective is subjective. It is recommended that if the college has no reliable information that suggests otherwise, the default setting for the energy efficiency rating be set to ‘medium’ for all options and throughout the length of the model.

Any changes to the default rating of ‘medium’ should be justified by the college. For example, if the college was demonstrating within the model a significant reduction in energy consumption under one option post construction the ‘good’ option may be selected for the relevant time period (e.g. post construction).

Colleges may want to consider having a BREEAM environmental assessment for their project, particularly if it is a larger scale project. BREEAM assesses buildings against set criteria and provides an overall score which will fall within a band providing either a ‘Pass’, ‘Good’, ‘Very Good’ or ‘Excellent’ rating. If this is undertaken it is recommended that the BREEAM rating be converted to the model ratings as follows:

<table>
<thead>
<tr>
<th>Model rating</th>
<th>BREEAM rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor</td>
<td>Pass (or Pass not achieved)</td>
</tr>
<tr>
<td>Medium</td>
<td>Good</td>
</tr>
<tr>
<td>Good</td>
<td>Very Good or Excellent</td>
</tr>
</tbody>
</table>

For more information on BREEAM visit the website: [http://www.breeam.org/](http://www.breeam.org/).

**Other considerations**

Other considerations include:

- Taxation.
- Relative inflation.
- Optimism bias.

**Taxation**

The Green Book states that "where the tax regimes applying to different options vary substantially, this should not be allowed to distort the option choice….Options attracting different VAT rates, for example, should be compared as if either the same VAT payments or no payment were made in all cases." The rationale for disregarding differential tax costs in public sector investment appraisal (it is of course relevant in private sector appraisal) is that tax is simply a transfer payment when considered from a UK perspective and does not in itself give rise to a true cost.

Irrecoverable VAT is disregarded in the CBA in the model although it remains relevant to cashflow comparisons unless separately funded as it is by DCSF for Voluntary Aided Schools.

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7 Green Book, pg 28, paragraph 5.5
**Relative inflation**

In investment appraisal, the costs and benefits of a project should be expressed in ‘real terms’ or ‘constant real prices’ in order to be Green Book compliant. In other words, the costs and benefits modelled in each period should be expressed at the base date’s general price level, as opposed to ‘nominal terms’ (ie adjusted annually for inflation).

However, the real price will change over time where particular prices are expected to increase at significantly higher or lower rates than general inflation (or strictly the Gross Domestic Product deflator). If this is the case, and the relative price change may be material to an appraisal, then the relative price change should be calculated. Examples, of differential inflation could be, high technology products, the price of which may be expected to fall in real terms and wages, where national productivity growth is expected to lead to wage increases above general inflation.

Therefore the investment appraisal model is calculated on real prices but has been designed to deal with relative price changes (eg differences between general inflation and wage costs, technology costs etc). The cashflow analysis is calculated using nominal prices.

**Optimism bias**

The Green Book highlights the fact that ‘there is a demonstrated, systematic, tendency for project appraisers to be overly optimistic’ within both the public and private sectors. This tendency is known as ‘optimism bias’. Guidance from HMT highlights the fact that it is not just underestimates of costs that needs to be considered in the context of optimism bias but also the tendency to be over optimistic for the level of expected benefits or positive outcomes.

Optimism bias needs to be recognised within investment appraisal and sensitivity analysis should be undertaken used to test the assumptions that have been made regarding the anticipated costs and benefits.

It is recommended that the *Green Book* Mott McDonald principles and values are applied to assessing optimism bias within the appraisal but that where available LSC data should be used on delivery of projects on budget and time in the sector.

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* Green Book, pg 29, paragraph 5.6.1
5. Key Relationship Between Financial and Economic Appraisal

Economic appraisal considers the VfM of a proposed project (or policy or initiative) from the perspective of the national interest. As such it has a very wide scope and, in theory, aims to incorporate and quantify all of the costs and benefits accruing from a project. This does not provide information on the financial viability (affordability) of a proposed project at the level at which it is procured (ie the college) as economic benefits that are not translated into cash income obviously cannot fund the project.

Economic appraisal indicates what should be done whereas financial appraisal indicates what can afford to be done. Therefore, both sets of analyses should be undertaken for any given project's options.

The objective of a financial appraisal is to determine whether the proposed activity is viable from a financial perspective. Financial appraisal therefore includes analysis of projected cash-flows and examines the funding arrangements for the project. By ensuring that projects do not fail prematurely, financial appraisal can provide confidence that public money is not going to be wasted on projects that are unviable. The financial appraisal will be undertaken without examining the impacts (costs or benefits) that accrue to other organisations.

The main element of the financial case will be a financial forecast which should show that the institution can deal with the immediate cashflow implications of the project and demonstrate financial health clearly at the point of project delivery and that its long term financial position is robust. This is formally assessed by the LSC using the financial plan, although the model includes a cashflow tool to facilitate early stage options analysis.

Whilst the economic educational and environmental costs and benefits relevant to the economic appraisal are not relevant to the financial case, the costs associated with the capital investment, the operational costs, staff costs and the premises costs are all relevant for both the economic and the financial case. The cash income streams for financial appraisal will relate to the level of capital grants, revenue funding and financing available as opposed to the increased earnings of learners used in the economic case. Thus these income streams are inputted in the model as they support the financial assessment of the project although do not influence the CBA.
6. Investment Appraisal Outputs

The results of the NPV analysis on which the investment decision is made are presented in terms of the incremental NPV of an option compared to the base case or reference case.

Risk and sensitivity analysis

Sensitivity analysis should be used to provide an understanding of the impact on the valuation being placed on benefits and the robustness of the decision being made. Risks to the project should be recognised and evaluated to test the robustness of the choice of a preferred option and for future project management.

Undertaking sensitivity analysis helps provide confidence that a project remains sensible even if some of the key input assumptions change. For example it is useful to examine the impact of cost overruns or a shortfall in the projected number of learners on the economic assessment of the project. A scenario based approach may examine multiple sensitivities simultaneously - such as the impact on the project of both cost overruns and falling numbers of learners. Undertaking sensitivity and scenario analysis allows for risk and uncertainty to be factored into the options appraisal process.

This analysis will help identify if a particular option is especially risky, that is, if the outcomes are particularly sensitive to changes in the estimated inputs, which may help in deciding between different courses of action. Although decision makers will usually examine the 'expected value' of the project, if there was a high level of risk aversion amongst decision makers it may be appropriate to select an option which yields the highest return under the worst case scenario. This is described as the 'maximin return'.

The model enables sensitivities to be run on up to twelve variables and up to six different scenarios. This means that different combinations of key variables could be examined which would represent alternative views of the future.

Please note that the sensitivities calculated by the model are not time sensitive. The sensitivity will therefore be applied for the entire model period ie for the whole course of the investment appraisal.
7. Investment Appraisal Decision Making

The Green Book does not stipulate that a project must generate a positive NPV, but rather it focuses on the need for an effective analytical and decision making process to demonstrate that a preferred investment option leads to the most economic practical outcome based on a range of factors and that has demonstrated a robust affordability position.

Prescriptive mechanistic guidance in terms of exactly how to choose between options is not appropriate. If it was possible to accurately quantify and monetise all the costs and benefits, the project with the highest NPV could be chosen with confidence if it were within any budgetary constraint. In reality the decision will be formed by a range of factors, not simply an NPV, although this will be a critical element.

Therefore in practice, selecting the best option will include taking into consideration benefits and costs for which it has not been possible to assign financial values. ‘Weighting and scoring’ techniques can be useful where this is the case but ultimately judgement is required since results from a weighting and scoring exercise will need to be compared alongside the monetised CBA.

There is a considerable body of research which examines linkages between education and wider benefits. For example, the non monetary benefits of having a more highly educated population are:

- Improved health (lower chances of depression, obesity, respiratory problems, lack of exercise).
- Longer life expectancy.
- Lower infant mortality.
- Reduced crime.
- Social cohesion.
- Intergenerational transfer of skills between parents and children.
Whilst appraisals may want to consider regional studies, in Educational & Skills: The Economic Benefits (DfES 2001) the national evidence is clearly set out.

Due to uncertainty about the robustness of the relationships and the additional complexity that attempting to capture these effects would introduce these benefits are not assigned monetary values in the model. These factors may be quantified based on local demographic and statistic data but not monetised. The appraisal of these benefits will be based on scoring the relative performance of alternative options in achieving objectives.

The investment appraisal model provides a template with which monetised and non-monetised benefits can be weighting and scored (please refer to the Model User Guide for further detail).

As stated previously, there is no prescribed mechanistic approach to arriving at a preferred option. Consideration needs to be given to the economic case (both qualitative and quantitative), the financial case and the commercial case. Taken with the overall strategic rationale, these three elements will together form the basis for justifying the selection of the preferred option.
Appendix 1: Gross Annual Earnings and Unemployment Rate by Highest Qualification

<table>
<thead>
<tr>
<th>Level</th>
<th>£</th>
<th>Unemployment %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 4 and above</td>
<td>33,748</td>
<td>2.9</td>
</tr>
<tr>
<td>Level 3</td>
<td>23,608</td>
<td>4.9</td>
</tr>
<tr>
<td>Trade Apprenticeships</td>
<td>22,880</td>
<td>3.8</td>
</tr>
<tr>
<td>Level 2</td>
<td>20,904</td>
<td>6.6</td>
</tr>
<tr>
<td>Below level 2</td>
<td>19,396</td>
<td>8.1</td>
</tr>
<tr>
<td>Other qualification</td>
<td>22,412</td>
<td>6.8</td>
</tr>
<tr>
<td>No qualification</td>
<td>17,576</td>
<td>10.8</td>
</tr>
</tbody>
</table>

Source: figures from DFES based on Labour Force Survey Data, Quarter 4, 2006
Appendix 2: Displacement – Worked Example

Table 1 shows an illustration of the issue of displacement for an FE college (‘College 1’) which is examining the merits of two intervention options. The college expects the number of learners to remain at 1,000 learners under the do-nothing option, compared to an increase to 1,400 learners under ‘option 1’ and an increase to 2,000 under ‘option 2’. The college has a success rate of 80%. However, it is important to consider how learner numbers at other colleges are affected. All the other colleges have a success rate of 70%. The table shows that:

- Under option 1 the growth in learner numbers of 400 at College 1 is entirely at the expense of other colleges. Additionality is therefore zero as no increase in learners occurs across the region. However, because of the higher success rate at College 1 there are an additional 40 learners who achieve their qualification (‘additional employees’).

- Under option 2 there is some additionality but again displacement has a significant impact on the numbers. In particular, College 1 increases learners by 1,000 but only 200 of these are additional learners. However, because of the higher success rate at College 1 there are additional 240 learners who achieve their qualification (‘additional employees’).

Table 1: Illustration of the impact of displacement

<table>
<thead>
<tr>
<th>Colleges in the region</th>
<th>Learners</th>
<th>Learners</th>
<th>Learners</th>
<th>Learners</th>
<th>Learners</th>
<th>Learners</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Success Rates</td>
<td>Success Rates</td>
<td>Successful Learners</td>
<td>Successful Learners</td>
<td>Successful Learners</td>
<td>Successful Learners</td>
</tr>
<tr>
<td>College 1</td>
<td>1,000</td>
<td>80%</td>
<td>800</td>
<td>1,400</td>
<td>80%</td>
<td>1120</td>
</tr>
<tr>
<td>College 2</td>
<td>1,000</td>
<td>70%</td>
<td>700</td>
<td>900</td>
<td>70%</td>
<td>630</td>
</tr>
<tr>
<td>College 3</td>
<td>1,000</td>
<td>70%</td>
<td>700</td>
<td>900</td>
<td>70%</td>
<td>630</td>
</tr>
<tr>
<td>College 4</td>
<td>1,000</td>
<td>70%</td>
<td>700</td>
<td>900</td>
<td>70%</td>
<td>630</td>
</tr>
<tr>
<td>College 5</td>
<td>1,000</td>
<td>70%</td>
<td>700</td>
<td>900</td>
<td>70%</td>
<td>630</td>
</tr>
<tr>
<td>Total</td>
<td>5,000</td>
<td>3600</td>
<td>5,000</td>
<td>4,500</td>
<td>3640</td>
<td>5,200</td>
</tr>
<tr>
<td><strong>Additional Learners</strong></td>
<td>+0</td>
<td>-</td>
<td>-</td>
<td>+0</td>
<td>-</td>
<td>+200</td>
</tr>
</tbody>
</table>
| **“Additional Employees”**| -        | -        | +0       | -        | +40      | -        | +240
The gross outputs, net outputs and the level of displacement are summarised below.

Under option 1 gross and net additional qualifying learners are 320 and 40 respectively.

Under option 2, gross and net additional learners are 800 and 240 respectively.

Table 2: Gross outputs, net outputs and displacement

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Do-nothing</th>
<th>Option 1</th>
<th>Option 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qualifying Learners</td>
<td>800</td>
<td>1120</td>
<td>1600</td>
</tr>
<tr>
<td>Gross additional qualifying learners</td>
<td>-</td>
<td>320</td>
<td>800</td>
</tr>
<tr>
<td>Displacement</td>
<td>-</td>
<td>280</td>
<td>560</td>
</tr>
<tr>
<td>Net additional qualifying learners</td>
<td>0</td>
<td>40</td>
<td>240</td>
</tr>
</tbody>
</table>
Advisers to the independently minded

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