SCOTTISH FUTURES TRUST

Review of Public Sector Procurement for Construction

Whole Life Appraisal Tool For the Built Environment

Collaborative, efficient,
sustainable and outcomes focused
procurement in construction

Contents

This toolkit has been produced in response to the **Review of Public Sector Procurement in Construction 2013**.

This document is **not** Statutory Guidance but offers a best practice approach to embedding, monitoring and reporting on whole life appraisals within infrastructure investment.

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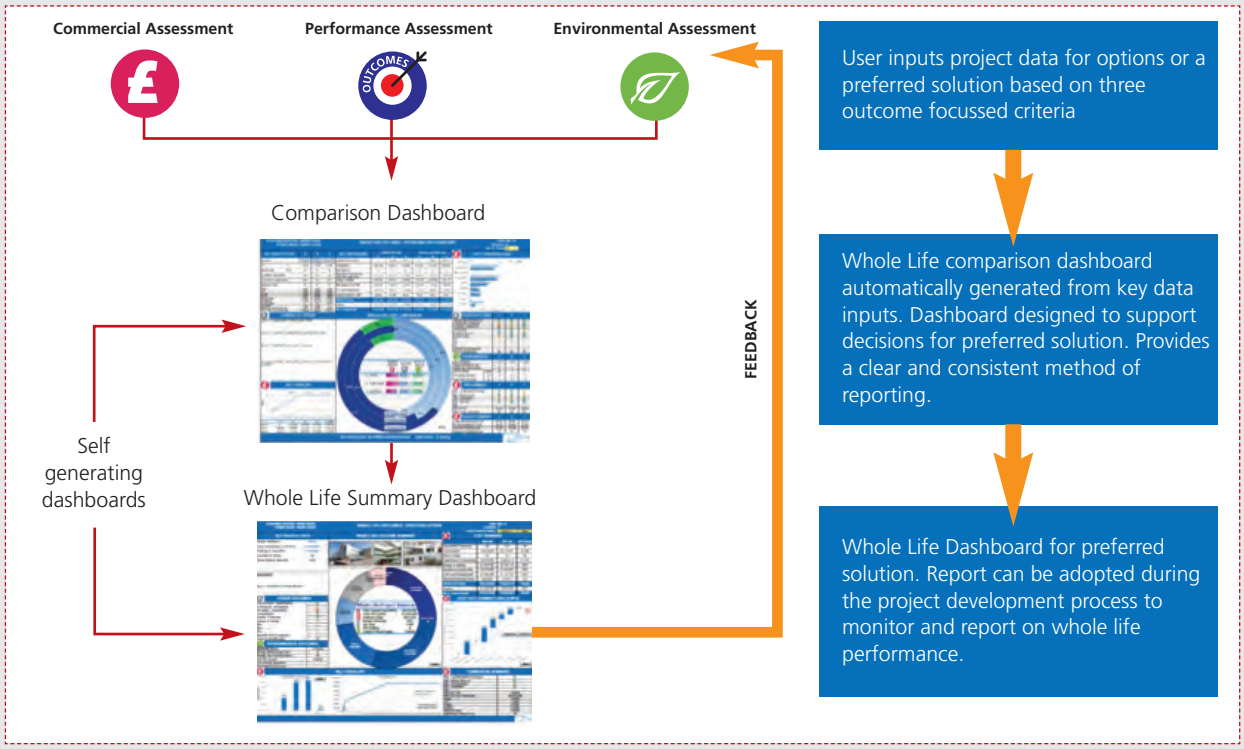
1.0 Introduction

This Whole Life Appraisal Tool is designed to assist the public sector procurer make informed decisions to optimise a built asset's whole life performance. The appraisal tool provides a consistent method of comparing and reporting whole life outcomes for a new project. It is both a qualitative and quantitative process that looks at the costs and outcomes during the design, construction, operation and disposal stages for a built asset. The appraisal tool promotes the analysis of whole life outcomes across three assessment criteria: commercial; performance; and environmental.

Figure 1: Whole Life Assessment criteria

The Whole Life Appraisal Tool consists of an online excel workbook that offers a clear and consistent method of reporting whole life outcomes for a project. The key output of the tool is a Whole Life Dashboard which summaries and compares whole life outcomes for different options or for a preferred solution. The key steps to this toolkit are outlined below:-

Figure 2: WHole Life Tool Process



The appraisal tool offers a flexible framework for whole life appraisals and is designed to be adopted across sectors and in a variety of scenarios including general project reporting, comparison of options, comparison of design options, comparisons of materials or renewables. This guidance sets out how this appraisal tool should be adopted and the flexibility in how the user can modify the tool to align to the needs of their project. Access to the appraisal tool can be requested by e-mailing mailbox@scottishfuturestrust.org.uk.

2.0 A Whole Life Approach

2.1 Leveraging Whole Life Efficiency Within Design

This appraisal tool supports the analysis and reporting of the whole life outcomes within infrastructure investment. The tool has been designed to address the recommendation within the Review of Scottish Public Sector Procurement in Construction which stated:-

> ***"design and whole life costing should be afforded appropriate priority in any construction procurement process. A comprehensive business case and procurement strategy focusing on desired outcomes and whole life costs should be developed. This will require the earliest possible engagement between clients, users, designers and contractors".***
>
> *Review of Public Sector Procurement in Construction 2013*

To support the delivery of efficient whole life outcomes, procuring authorities should seek to provide informed client leadership from the outset of the project. This begins with a clearly defined brief for the project which links to the services that investment is to delivery. A clear brief, offers the design team a platform to create efficient and creative solutions to support the outcomes required by the authority.

The need to procure suitably skilled and resourced designers and consultants is also key to delivering efficient whole life outcomes. This team must work within a collaborative design process from inception through to completion. The greatest opportunity to influence whole life performance occurs at the early stages of a project. A commitment to design-led thinking and to creating an environment that supports whole life outcomes should therefore be established early in the project process. This commitment needs to be maintained throughout the project process in order, to deliver the outcomes and benefits identified at business case stages. In any project, there is a need to balance issues such as cost, environmental impact, functionality, social impacts, flexibility and other relevant issues. Using a collaborative and high quality design process to evaluate these issues can help to address this balance and optimise outcomes.

Key areas to consider when implementing a design led approach that supports whole life outcomes include:

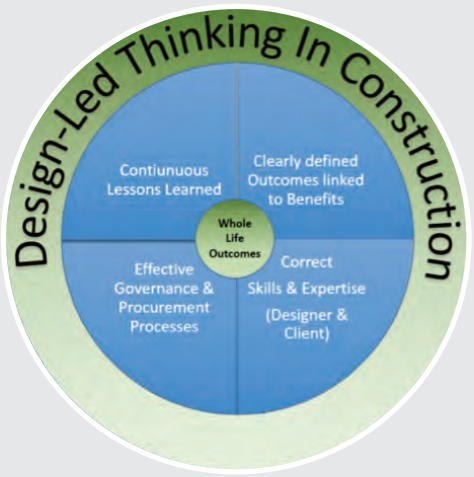
Analysis - Defining project outcomes and understanding opportunities

Skills - An informed client and appropriately skilled design team

Commitment - Supporting design-led approaches through project governance and procurement processes

Learning – Continuous feedback supported by effective collaboration

Figure 3: Design-Led Thinking Supporting Whole Life Performance



Setting a clear brief for a project, coupled with a collaborative outcome focussed design process, will provide a strong platform to deliver best whole life value.

2.2 Implementing an early Whole Life Approach

Whole life appraisal is a systematic approach to make informed decisions that optimise a built asset's performance. It has been evidenced that the strongest opportunity to influence the running costs or the whole life costs of a building is during early design stages:

> This is primarily because at this stage, most if not all, options are open to consideration

> Over the course of the project the procuring authority's ability to influence cost decreases.

> It has been estimated that 80-90% of the cost of running, maintaining and repairing a building is determined at the design stage.

For a typical office building, over a thirty-year life span, for every £1 of capital expenditure, there will be an associated £5 of operational expenditure and £200 of business operating costs. An effective whole life appraisal strategy assists the decision maker to make informed decisions to optimise an assets' expenditure and to reduce investment risk, making their assets work more effectively.

2.3 Embedding Whole Life Appraisals into the Decision Process

Once a service need has been established and the brief is prepared, the project design begins to develop. Whole life considerations should be monitored throughout the development process. This should be embedded within business cases or approval stages. Where possible metrics or budgets should be set upon which whole life performance can be measured against.

The whole life dashboards generated from this appraisal tool have been designed to support and form part of business cases, decision making points within projects and can also be used as a regular monitoring tool.

The authority may also wish to consider the adoption of BSRIA Soft Landings which promotes early consideration of operational performance at brief stage. It then promotes a staged approach to ensure operational performance in use is measured and achieved. A summary of soft landings is contained at Appendix A.

2.4 A Flexible Framework for Whole Life Appraisals

This appraisal tool has been designed as a flexible reporting tool to compliment and improve whole life analysis within projects. The tool can be adopted for a number of scenarios including:-

> Comparison of whole life options within the business case.

> Comparison of design options (Materials, design options, components, renewables etc)

> Ongoing reporting tool to summarises project costs.

> Post project evaluation and performance.

The appraisal tool allows the user to tailor various elements to align with their project specific requirements. Areas that can be adjusted include performance criteria, indexation levels, risk reporting, project description and images.

The appraisal tool promotes a standard definition for the whole life commercial assessment and this is defined through nine cost headings as detailed within figure 3 and appendix B. However, within each cost heading the user can include and tailor the sub-headings to align to their project. Where the appraisal tool does not offer the required flexibility, the user can submit any enquires to mailbox@scottishfuturestrust.org.uk.

2.5 Definition of Whole Life Outcomes

To promote consistency, the Whole Life Appraisal Tool, includes for a consistent definition for a whole life appraisal. This will support consistency of reporting, clarity for budgeting purposes and transparency of approach. Whole life outcomes have been split into three elements: -

Figure 1: Whole Life Assessment criteria

The definition of whole life outcomes comprises the following headings:-

Figure 5: Whole Life Definition

WHOLE LIFE OUTCOMES	Whole Life Commercial Assessment		Purchase	Includes land and finance
		Life Cycle Costing	Construction	Design and construction costs for new build, refurbishment, etc.
			Rent & Rates	Costs of renting and the like
			Operation & Occupancy	Costs of operating and occupying the building and external works arising from the building itself, excluding direct business user costs, such as staffing.
			Energy	Annual costs of utilities and energy consumption
			Maintenance (Hard FM)	Annual costs of planned and reactive maintenance incurred to retain a building or its parts in a state in which it can perform its required function.
			Life Cycle Replacement	Cyclical costs of major replacement of components at planned frequencies
			Disposal	Costs payable and credits accruing at end of period of analysis
			Income	Third party income, sales, etc.
	Whole Life Performance Assessment	User Defined Criteria	Functionality	Qualitative assessment of functionality of option
			Complexity/Buildability	Qualitative assessment of level of complexity to deliver and operate.
			Flexibility/Adapability	Qualitative assessment of ability to adapt to changes in services.
			Accessibility	Qualitative assessment of accessibility.
			Quality of Service	Qualitative assement of quality of services
			Design Quality	Qualitative assessment of design quality of option
			Other	User can insert and score other design performance indicators.
	Whole Life Environmental Assessment		BREEAM Rating	Either targeted on achieved BREEAM rating
			Energy Performance Certificate	Either targeted on achieving EPC rating
		Energy Consumption	Energy use per m2	This is a rate of energy per kg/m2 per annum during operation
			Carbon per annum	This is the total estimated carbon use per annum during operation
			Carbon per Whole Life	Total estimated carbon use of asset during defined operational period
			Embodied Carbon	Total estimated carbon use in the construction (relates to materials only)

Proposed criteria listed, user can modify as rqeuired for each appraisal

The adoption of this standard definition will support the development of benchmarking, analysis of data and collaborative sharing amongst procuring authorities. Further information in relation to the commercial and performance criteria is contained within Appendix B & C.

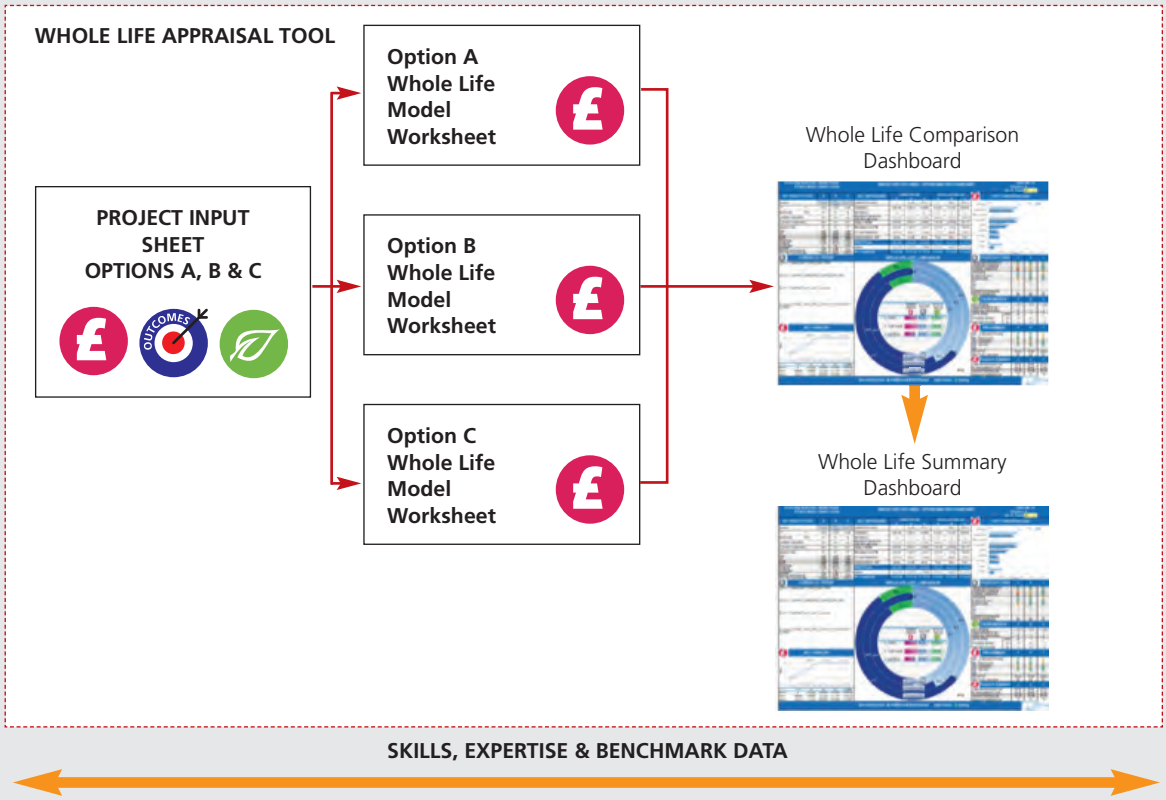
3.0 Whole Life Appraisal Tool

3.1 Overview

The Whole Life appraisal tool provides a framework and process to consolidate whole life analysis data and offer flexible methods of reporting. The online appraisal tool has 4 key parts as outlined below:-

1. **Project Input Sheet -** User inputs key data for all options.
2. **Whole Life Model Worksheet** – User prepares and inputs a Whole Life Cost analysis for a maximum of 3 options under consideration.
3. **Whole Life Comparison Dashboard –** This automatically populates based on the data provided in sections 1 & 2. The function of the dashboard is to compare up to three proposed options.
4. **Whole Life Dashboard** - **Preferred Option** - This automatically populates based on the data provided in section 1 & 2. The function of the dashboard is to summaries the Whole Life Outcomes of the preferred option.

Figure 6: Process for using Whole Life Appraisal Tool



Key rules when using the Whole Life Appraisal Tool

1. The user can only input into yellow highlighted cells.
2. When completing an option appraisal, the user should ensure that all cost headings are addressed for each option to ensure a like for like comparison is made.
3. The user should assess how they will approach discounting and ensure the appraisal tool is aligned to their needs.
4. The criteria for the performance assessment can be defined by the user within the project input sheet.

3.2 Project Input Sheet

The project input sheet allows the user to input key data for all project options. This has three sections:

> Commercial Assessment (Commercial Summary & Risk)

> Performance Assessment

> Environmental Assessment

The tool can accommodate and compare a maximum of three options.

Commercial Assessment Data

This section allows the user to insert key project parameters and details including a description of the project. A summary of the data is listed below:-

Figure 7: Commercial Criteria Input Sheet

	Commercial Criteria		Option A	Option B	Option C
1	Reference/Title				
2	Authority				
3	Project Title				
4	Building Type				
5	Construciton Commecement				
6	Completion/Commentment of Operations				
7	Length of WLC Assessment				
8	End of Consession				
9	Pricing Date				
10	Location				
11	Capex Indexation	%			
12	LCC Indexation	%			
13	Energy Indexation	%			
14	Income Indexation	%			
15	Real discount rate	%			
16	Assumed cpi	%			
17	Discount Rate	%			
18	Revision/Reference Nr				
19	Gross Internal Area	0			
20	New Build Element				
21	Refurbished Elements				
22	Functional Units				

The tool provides flexibility in how discounting can be applied and allows the user to define and apply their preferred approach. The user can either adopt a standard discount rate of 3.5% to derive the nett present value (NPV) and this can be inserted within the real discount rate cell within line 15. Alternatively, the user can introduce specific indexation for the various cost headings. The table below summarises how the tool applies the indexation to the various cost headings.

Figure 8: Summary of indexation & discounting to cost headings

Cost Headings	Indexation				Discount	
	Capex	LCC	Energy	Income	Real	CPI
Purchase	✓				✓	✓
Construction	✓				✓	✓
Rent & Rates		✓			✓	✓
Operation & Occupancy (Soft FM)		✓			✓	✓
Energy			✓		✓	✓
Maintenance (Hard FM)		✓			✓	✓
Life Cycle Replacement		✓			✓	✓
Disposal		✓			✓	✓
Income				✓	✓	✓

Commercial Risk Assessment

This section allows the user to provide a high level summary of the key risks for each option. The user can score each options from a rating of 1 to 3 as outlined below:-

Score of 1 = Red – Option represents a high risk.

Score of 2 = Amber - Option represents a medium risk.

Score of 3 = Green - Option represents a low risk.

Figure 9: Commercial Risk Criteria Input Sheet

	Commercial Criteria - Risk	Option A	Option B	Option C
1	Risk - Land/Property Acquisition	3	3	2
2	Risk - Below Ground	3	3	2
3	Risk - Construction	2	2	3
4	Risk - Operation	3	3	3
5	Risk -			
6	Risk sum as within construction phase (£)			
7	Risk sum as within construction phase (%)			
8	Risk sum within operational phase (£)			
9	Risk sum within operational phase (%)			

Performance Assessment

This section allows the user to input a qualitative assessment as to how well each option delivers the required outcomes. This is simple to adopt and offers flexibility in defining criteria to measure and compare the various options. The decision on the performance criteria will be a matter for the procuring authority, design team and end users and should also link to the required outcomes for the project. A list of suggested criteria is contained in Appendix C. Once the criteria has been defined the users inputs a score of 1 to 3 defined as follows:-

Score of 1 = Red - Option delivers against criteria to a lower standard.

Score of 2 = Amber - Option delivers against criteria to a satisfactory level.

Score of 3 = Green - Option delivers against criteria to a high standard

Figure 10: Performance Assessment

	Performance Criteria	Option A	Option B	Option C
1	Functionality (Example)	3	3	3
2	Staff Environment (Example)	2	2	3
3	tbc.....			
4	tbc.....			
5	tbc.....			
6	tbc.....			
7	tbc.....			
8	tbc.....			
9	tbc.....			
10	Benefits from investment			
11	Value of benefits (£m)			
	TOTAL	5	5	6

User Defined Criteria

The tool also allows the users to score the level of benefits that each options can deliver and an associated value if this information is available. The definition of all performance criteria can be provided as an appendix to any dashboard report.

Figure 11: Environmental Assessment Data

	Environmental Criteria		Option A	Option B	Option C
1	Energy consumption during ops CO2	kg/m2/yr			
2	Embodied carbon during construction CO2	kg/m2			
3	Energy Performance Certificate				
4	BREEAM Rating				

Environmental Assessment

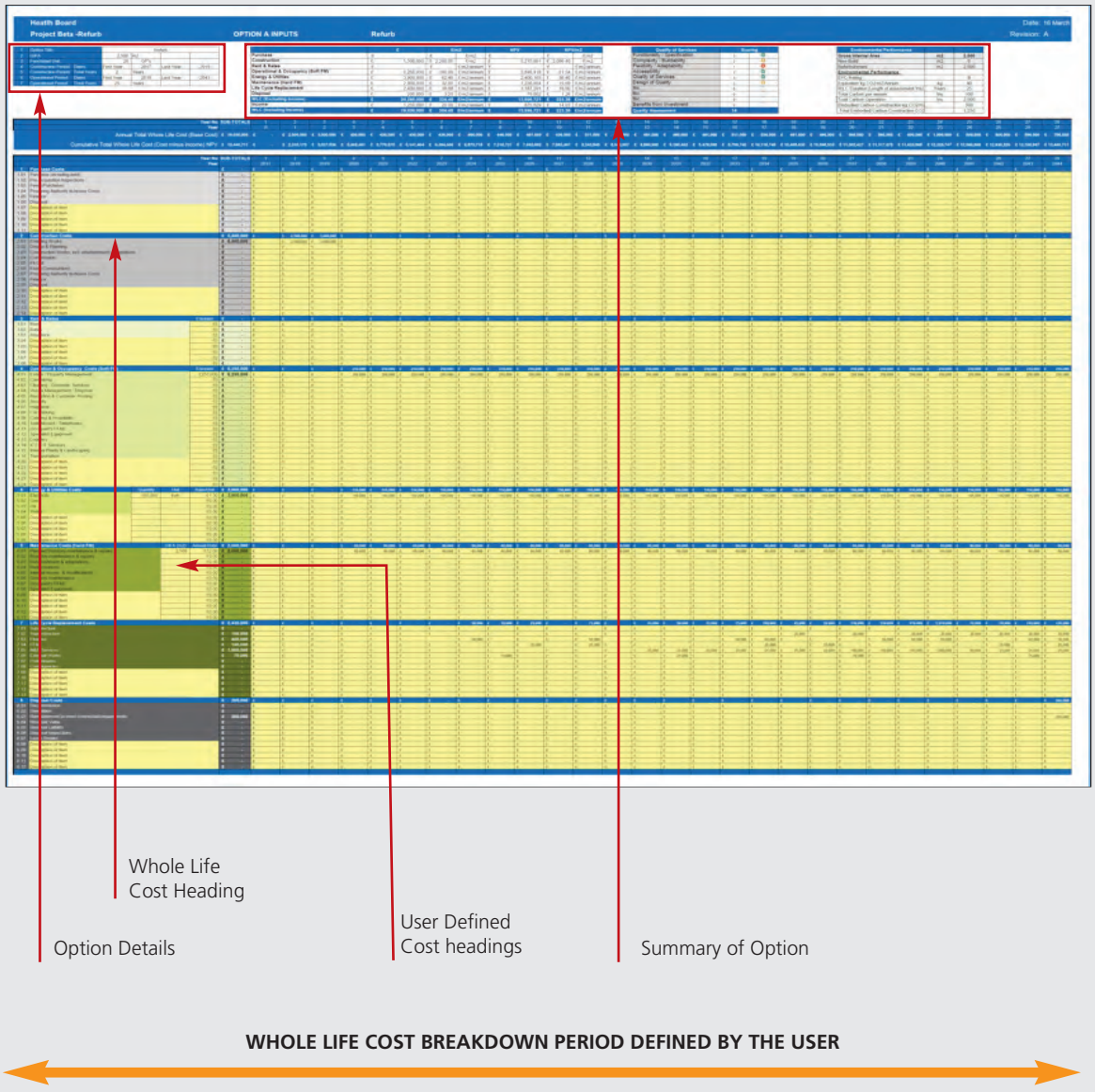
This section allows the project to input a quantitative assessment of the environmental performance of the three options based on estimated, target or actual data. The key data is listed below:-

Upon completion of the base Input sheet, the appraisal tool will use this data to generate the whole life dashboards. The next steps is for the user to populate the whole life cost model for either a preferred option or multiple options.

3.3 Whole Life Cost Model

This section of the appraisal tool allows the user to prepare and input a whole life cost model for a preferred solution or for multiple options. This is a standard format and utilises the key data the user provided within the Project Input sheet such as indexation, costs, durations and other key commercial drivers.

Figure 12 : Whole Life Cost Model Sheet



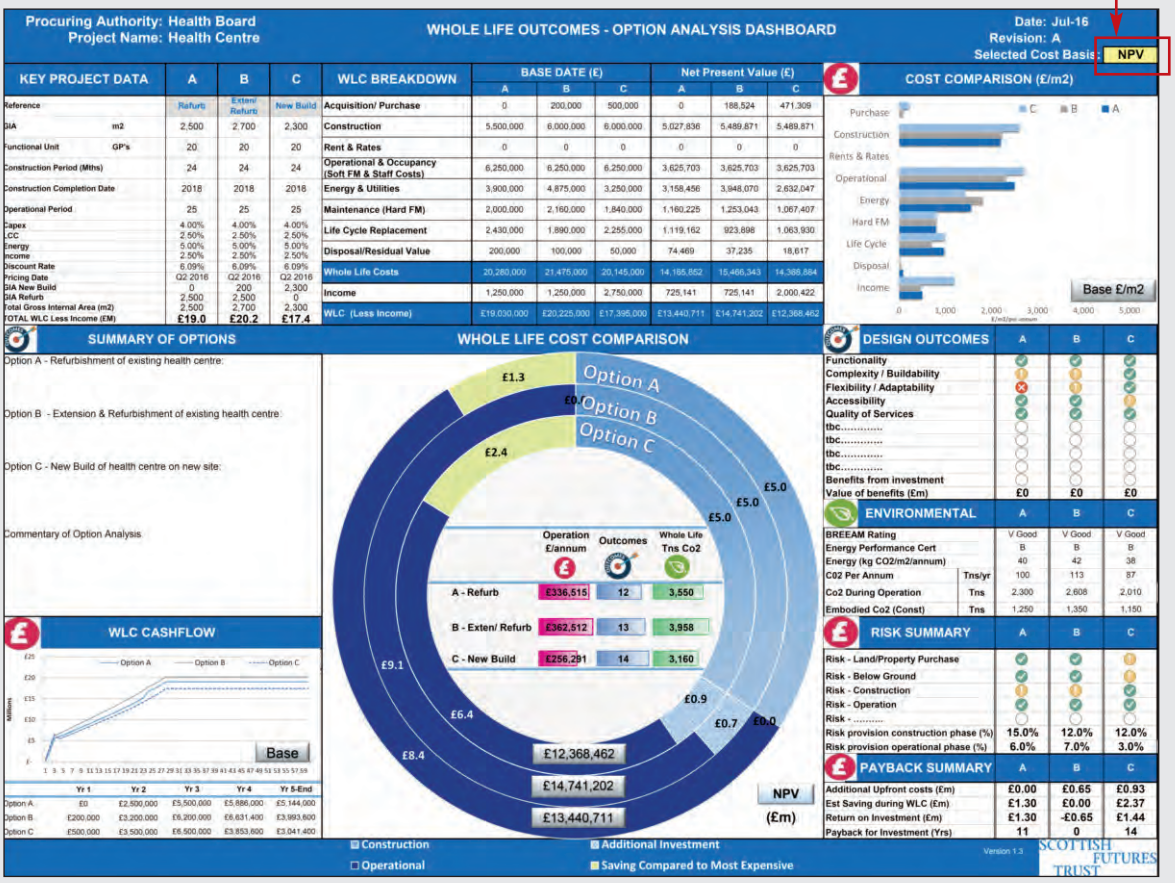
The template contains the cost headings aligned to the whole life commercial definition as described in section 2.5 and appendix B. There are also suggested sub-headings included to help the user capture all key costs within their assessment. The user can also insert additional sub-headings to capture all project related costs. A list of all sub-headings is contained in Appendix B.

3.4 Whole Life Comparison Dashboard

Based on the data provided within the project input sheet and associated whole life cost models, the appraisal tool will automatically generate a comparison dashboard for a maximum of three options.

Figure 13: Whole Life Comparison Dashboard

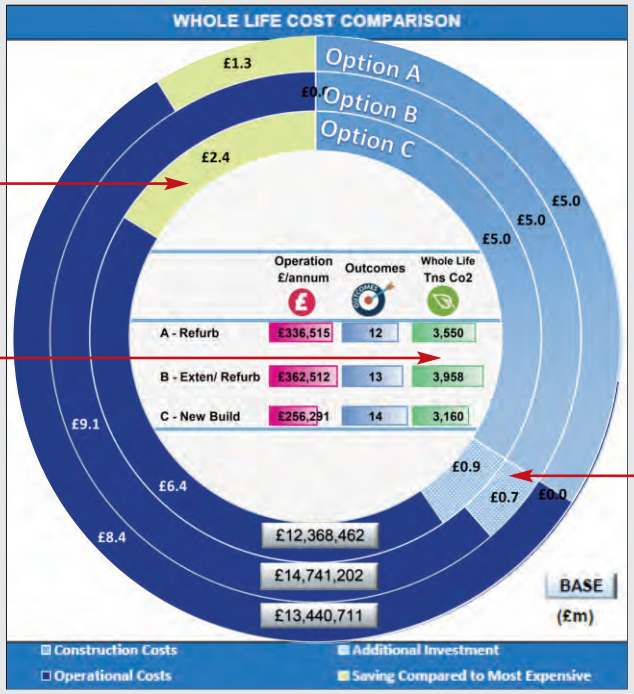
Vary costs from Base to NPV from dropdown list.



The whole life comparison chart summarises the performance of the three options in the central diagram as figure 14:-

Figure 14: Whole Life Summary Chart

Estimated saving in green against more expense option (B)



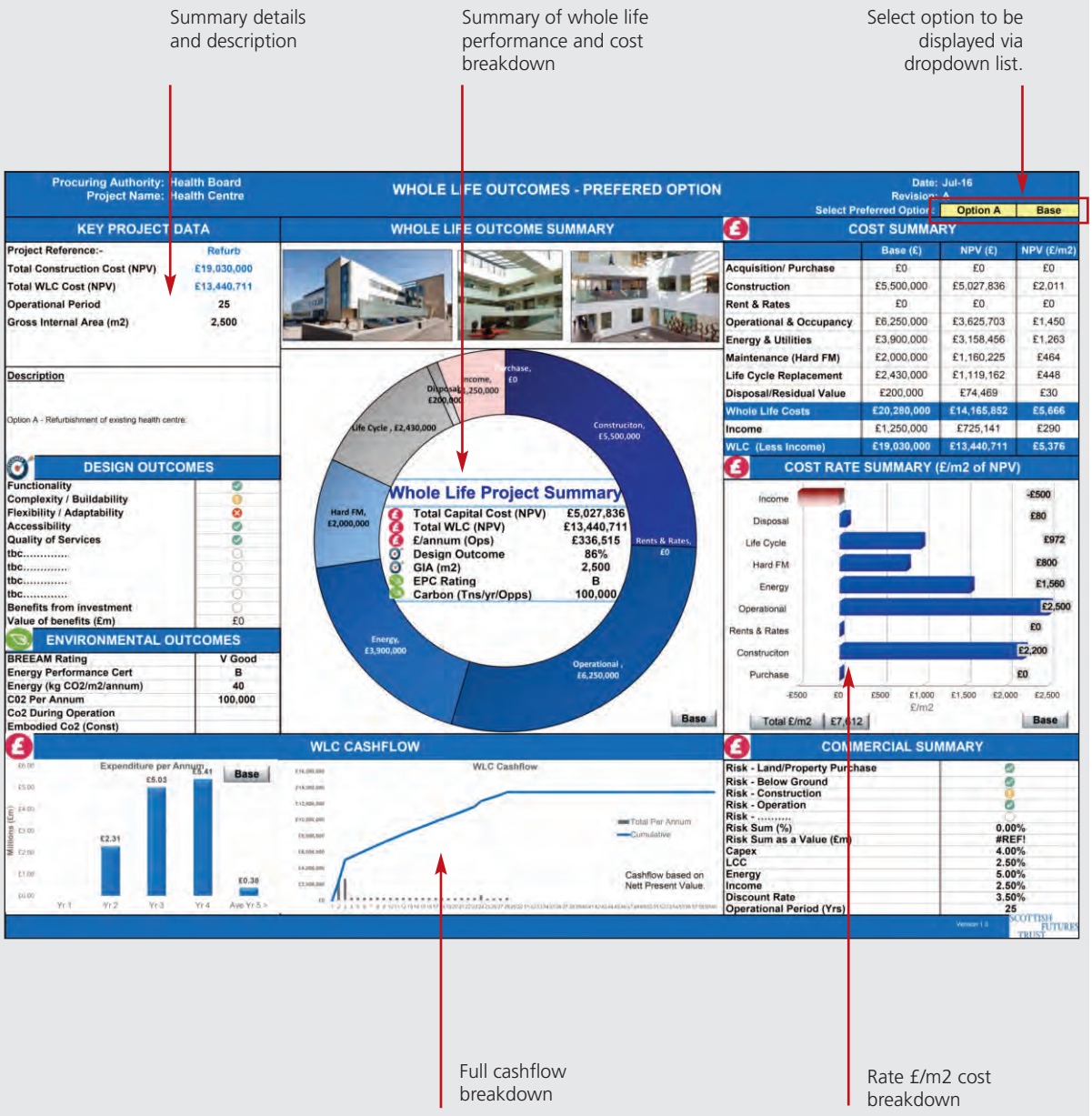
Comparison of options against cost, performance outcomes and sustainability.

Extra capital cost compared to the cheapest capital option (A)

3.5 Whole Life Summary Dashboard

This dashboard presents the whole life performance of the preferred option. The user can select the option they wish the dashboard to display by selecting from the drop down list on the top right corner of the spreadsheet. The user can also alter the costs from a base position to the nett present value by selecting from the dropdown lists.

Figure 15: Whole Life Summary Dashboard



4.0 Supporting Whole Life Appraisals

4.1 Skills & Expertise

The skills and expertise of the delivery team will inform how well any design solution addresses the whole life outcomes. As outlined in section 2.2, the earlier the whole life implications are considered and assessed, then the greater the influence a procuring authority can have on the whole life performance for that project. Therefore to deliver best outcomes the procuring authority must consider:-

> Procurement of suitably skilled design professionals who understand and develop designs which consider whole life implications.

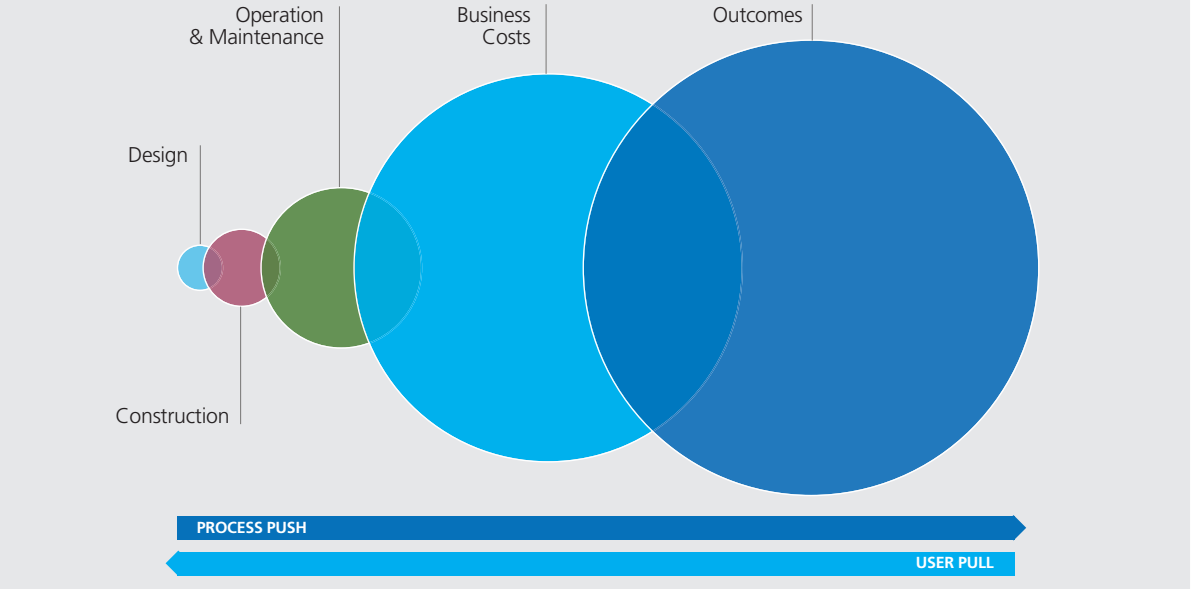
> Early engagement of a whole life cost consultant who is appointed specifically to manage, report and advise on the Whole Life performance of the proposed asset. Their role may include, but not be limited to:-

  > Development of the Whole Life dashboard in line with this guidance
  > Review design options and offer whole life design advice
  > Develop a detailed whole life cost model

An example scope of services for a whole life consultant is contained within Appendix D and can be adopted and amended to meet the needs of the procuring authority for each individual project. For most projects, it is anticipated that the whole life consultant will be included within the cost advisor appointment. However, the authority may wish to consider a separate appointment and organisation which will deliver the whole life consultant appointment within a project.

In the preparation and evaluation of design consultant tenders, the procuring authority should consider how they assess the ability of the designers to deliver efficient whole life outcomes which is aligned to their brief. Also to be considered is the balance between cost and quality within consultant procurement. Design costs represent a fraction of the whole life costs and benefits.

Figure 16: Constructing Excellence Whole Life Cost



Whole life design led thinking can derive and improve value through the various stages of the asset lifecycle. Further Scottish Government guidance in relation to design led thinking within construction can be found at the following (link).

4.2 Best practice & Benchmark Data

The approach, methodology and scope of a whole life cost assessment is a decision for the procuring authority. There is a variety of best practice guidance which can be considered and the procurer should seek appropriate advice when agreeing a whole life cost methodology. A summary of existing best practice is contained in Appendix E.

Benchmark data is another key element to offer robust and credible analysis of the whole life options. Various sources of benchmark data include:-

> Community Infrastructure Benchmark Database (link)

> Building Cost Information services

> BSRIA Life Cycle Assessment - an Introduction (BG 52/2013)

> Spons Pricing Book

> Guide M, Maintenance and Management, CIBSE 2nd Edition 2014

> The Authorities own cost and operational data.

> Environment Agency Carbon Calculator

The procurer can also utilise the experience and expertise of their consultants to further support and validate any whole life assessment.

4.3 Spend to Save Initiatives

When developing a whole life appraisal, this may identify that additional investment in a project may offer reduced operational costs. Where the long term savings are greater than the additional investment required, these opportunities should be clearly understood and communicated to the decision makers. With restricted capital budgets, this may provide challenges to implement spend to save initiatives. When a spend to save initiatives is identified, consideration should be made to:-

> What is the payback period? Ie When will a positive return on investment be reached.

> What are the risks associated with achieving the proposed option?

> What is the total saving in adopting this approach?

> Have all consequential costs been considered. (i.e. interest on any funding)

The whole life comparison dashboard summarises the likely payback value and period.

Appendices A-E

Appendix A
BSRIA Soft Landings

Design and construction professions must not only focus on technical inputs, but also put much more emphasis on in-use performance strategies. The desired operational outcomes need to be considered at the very earliest stages of procurement, managed right through the project and reviewed in use.

The following summarises the BSRIA soft landings approach which is a process to promote early operational considerations. A link to the website is below:-

https://www.bsria.co.uk/services/design/soft-landings/free-guidance/

Stage 1: Inception and briefing

Briefing is the most crucial stage of procurement. To obtain the greatest value from Soft Landings, the expectations and performance targets that emerge from the briefing process should be arrived at within a well-structured, logical and recorded context.

Stage 2: Design development and review

Client and design targets will be informed by actual performance in use, reviewed at intervals as the project progresses, and have any adjustments agreed and signed-off. Close attention needs to be given to the usability and manageability of the proposed design solutions. Where the occupiers are known, their facilities managers and user representatives should be involved in reviewing the proposals. Suitable preparations must be made during design and construction to plan, programme and resource the critical periods in the weeks immediately before and after handover.

Stage 3: Pre-handover

The main purpose of the pre-handover stage is to help to ensure that by the time the building is handed over it is not just physically complete, but ready for operation. Great care needs to be given to demonstration, training and documentation. Proposed activities by the client and occupier also need to be reviewed, e.g. staffing, operation and maintenance contracts, and move-in plans including fit-outs where relevant. It is essential that the client's management team takes over the operation of the building in a timely fashion. Even in the best-managed projects, the commissioning period can get squeezed. Soft Landings will help to reduce the effects of any such slippages as the continuity it provides between the pre-handover and aftercare stages makes it much easier for any outstanding commissioning activities to be continued after handover.

Stage 4: Initial aftercare

The service during the initial aftercare period is intended to help the occupiers to understand their building, and the facilities managers to operate its systems. The size and complexity of the project and the occupants' move-in timetable will determine how much time will be required, over what period, and for how many people. The aftercare team must be visible, with a workplace in a readily-accessible location and not hidden away.

Stage 5: Years 1-3 Extended aftercare and POE

Once the initial aftercare period is over, the Soft Landings service moves from regular visits to periodic reviews. Responsibility for operation and provision and initial review of routine information must lie firmly with the building's facility manager or team. In Year 1 (the traditional defects liability period in the UK), the primary focus is on settling everything down, making sure that the design intent is well understood, identifying any problems, and logging usage and change. In Years 2 and 3 the reviews become less frequent, concentrating on recording the operation of the building and reviewing performance. By then the facilities management team should be fully in command of the building's systems. The Aftercare period will also include a number of independent post occupancy surveys. The type, coverage, method and timing of these surveys will depend on what has been agreed for each project.

Appendix B
Whole Life Commercial Definition

The following list sets out the 9 categories of costs which define the commercial whole life cost assessment. The sub-criteria within each category provide a likely indication of costs to be included. The user can add supplementary sub-criteria as required to offer flexibility and ensure all costs are accounted for.

1. Purchase Costs
Purchase (including land)
Pre-Acquisition Inspections
Fees (purchase)
Procuring Authority In-house Costs
Finance
Disposal
2. Construction Costs
Enabling Works
Design & Planning
Construction Works, incl. refurbishment, adaptations
Commission
Fit-Out
Fees (Construction)
Procuring Authority In-house Costs
Finance
Disposal
3. Rent & Rates
Rent
Rates
Insurance
4. Operation & Occupancy Costs
Estate/Property Management
Caretaking
Cleaning/Domestic Services
Waste Management/Disposal
Reception & Customer Hosting
Security
Helpdesk
Car Parking
Catering & Hospitality
Switchboard/Telephones
Occupant's FF&E
Specialist Equipment
Logistics
ICT & IT Services
Internal Plants & Landscaping
Transportation

5. Energy & Utilities Costs
Electricity
Gas
Oil
Water
6. Maintenance Costs (Hard FM)
Planned/Statutory maintenance & repairs
Reactive maintenance & repairs
Refurbishment & adaptations
Redecorations
Internal moves & modifications
Grounds maintenance
Occupant's FF&E
Specialist Equipment
7. Life Cycle Replacement Costs
Substructure
Superstructure
Finishes
FF&E
M&E Services
External Works
Preliminaries
Contingencies
8. Disposal Costs
Decommission
Demolition
Reinstatement to meet contractual requirements
Residual Value
Residual Liability
Disposal Inspections
Lease Breaks
9. Income
Rental Income
Sublet
Third party income e.g retail or tenant leases
Car Parking Income
Funding fromo ther sources
Funding for LCC
Sale of Asset
Business Disruption (Loss of Income)

Appendix C
Performance Assessment Criteria

The table below provides suggested performance criteria a user could adopt within a whole life appraisal.

Functionality/Delivery of Outcomes	Qualitative assessment of functionality of option. How well does the proposed solution deliver the required outcomes.
Complexity/Buildability	Qualitative assessment of level of complexity to deliver and operate. Does the construction techniques offer greater challenges.
Flexiblity/Adaptability	Qualitative assessment of ability to adapt to changes in service delivery
Accessibility to Services	Qualitative assessment of accessibility to building. Parking, transport links etc
Quality of Service	Qualitative assessment of quality of services.
Design Quality	Qualitative assessment of design quality.
Staff Environment	Qualitative assessment on quality of working environment for staff. Consider comfort levels, natural light, facilities, green space, etc.
Patient Environment	Qualitative assessment on quality of patient environment. Consider comfort levels, natural light, facilities, wayfinding, green space etc.
Urban & Social Integration	How well does the design solution contribute positively to the local.
Community Benefits	How well does the proposed solution offer social and economic benefits to the local community
Sustainability	Qualitative assessment of overall performance of sustainable performance of the option. This may reflect environmental assessment.
Disruption to existing services	Qualitative assessment of likely disruption and operation risk in delivering proposed option.
Planning	Assessment on likely planning concerns, risks associated with this option.
Innovation	Does the option offer any level of innovation with the design proposals
Other	User can insert and score other design performance indicators.

Appendix D
Scope if Services Whole Life Consultant

The following scope of services provides an example of the scope that should be included within a cost consultant appointment or this can be treated as a separate appointment.

Pre-Procurement Stage

> Appointment of Consultants – Authority to procure consultants services for a project with focus, incorporating Whole Life Costing as one of the key criteria and example Questions for Design Led Procurement within procurement process.

> High level Business Case & Option Appraisal – As part of the Business Case assessment of the project, the WLC Consultant is to facilitate WLC focussed high level Business Case & Option Appraisal (with detailed input to be provided by design team, construction cost manager and other appropriate consultants) in order to deliver Dashboard report with supporting WLC model

Design Stage

> Elemental WLC Estimates – As part of the Design Development of the project, the WLC Consultant is to provide elemental level WLC estimates at key stages of the Design Stage of the project, typically at relevant stages of design development, updating the project Dashboard report and WLC model (with detailed input to be provided by design team, construction cost manager and other appropriate consultants)

> Ongoing detail WLC analysis – As part of the Design Development of the project, the WLC Consultant is to undertake detailed WLC analysis of key components / assets during the Design Stage of the Project, incorporating review of alternative options for key components / assets (with detailed input to be provided by design team, construction cost manager and other appropriate consultants), including reporting on impact to project Dashboard report and WLC model

Construction Stage

> Procurement of Contractor – As part of the Contractor Procurement process, the WLC Consultant is to assess the Whole Life Costing experience and capability of potential contractors (refer to scope of services and example Questions for Design Led Procurement within procurement process.

> WLC based Value Engineering - WLC Consultant to facilitate WLC focussed Value Engineering reviews/workshops to assess whole life impact of any value engineering solutions (with detailed input to be provided by contractor, design team, construction cost manager and other appropriate consultants), including reporting on impact to project Dashboard report and WLC model

> Detailed option appraisals of products / components – WLC Consultant to undertake detailed WLC option appraisals of key products / components during the Construction Stage (with detailed input to be provided by contractor, design team, construction cost manager and other appropriate consultants), including reporting on impact to project Dashboard report and WLC model

> Pre-Construction Business Case/Approval – WLC Consultant to update Business Case assessment including project Dashboard report for approval by Authority prior to commencement of construction.

OPTIONAL ADDITIONAL SERVICES

The following scope of services during the operation and disposal stages of the project may be undertaken by the WLC Consultant or the authority internal client team, which may be determined on the size and complexity of the project

Operation Stage

> WLC Consultant (or authority internal client team) to monitor performance in relation to WLC costs and data for the project on an annual basis and provide an annual report to the client comparing actual performance to anticipated.

> WLC Consultant (or authority internal client team) to collate and record actual operational costs and data for the project for inclusion within client benchmarking database for future projects (format and level of detail to be determined).

Disposal Stage

> WLC Consultant (or authority internal client team) to collate and record actual costs for inclusion within client benchmarking database for future projects (format and level of detail to be determined)

Scope of Services includes where appropriate:

> Comparison of Options – assessing alternative options in terms of different design, specification, FM regime, service life frequencies, energy efficiency, sustainability and the like in terms of Whole Life Costs to determine best long term solution as appropriate for the project, product or component under review

> Spend to Save Analysis – assessing options to determine if extra investment or initial capital cost is justified in order to reduce the WLC of the asset

> Sensitivity & Scenario Analysis – identifying and assessing which parameters have the most significant effect over whole life, showing potential for variance up or down

Appendix E
Whole Life Best Practice Guidance

Below is a list of the existing best practice that was used in the development of the whole life appraisal tool and upon which procuring authorities may wish to utilise in the development of their own project.

> BS ISO 15686-5:2008 Buildings & constructed assets – Service life planning – Part 5: Life cycle costing

> Standardized Method of Life Cycle Costing for Construction Procurement: A supplement to BS ISO 15686-5:2008 Buildings and constructed assets – Service life planning – Part 5: Life cycle costing

> BS 8544:2013 Guide for life cycle costing of maintenance during the in use phases of buildings, BSI, 2013

> BS ISO 55002:2014 Asset management – Management systems – Guidelines for the application of ISO 55001

> BS 7543:2003 Guide to durability of buildings and building elements, products and components

> NRM 3: Order of cost estimating and cost planning for building maintenance works

> Chartered Institute of Building Services Engineers, Guide M, Maintenance and Management, CIBSE 2008

> Building Costs Information Service, BMI Life Expectancy of Building Components, BCIS, 2006

> BSRIA 'Life Cycle Assessment - an introduction (BG 52/2013)'.

> BISRIA Guide – Whole Life Costing Analysis

> Constructing Excellence, Whole Life Costing

> 20 steps to encourage the use of Whole Life Costing

> Whole Life Costing, BRE Report 367

> Whole Life Costing, A client's guide – Confederation of Construction Clients

> International Total Occupancy Cost Code - IPD Occupiers Property Databank

> Scottish Government Procurement Guidance and Manual.

> Whole-life costing, Achieving Excellence in Construction Procurement Guide 7, OGC

> Project procurement lifecycle, Achieving Excellence in Construction Procurement Guide 3, OGC

> HM Treasury's Green Book, Economic Appraisal in Central Government.

> Life Cycle costing as a contribution to sustainable construction: towards a common methodology, European Commission (2007).

> Pricing Books – Various.

> Building Performance Group Ltd (2001) Building Services Component Life Manual, London: Blackwell Sciences Ltd.

> Whole life costing and life-cycle assessment for sustainable building design

> Getting it right: a clients' guide to functionality.

> Unlocking Whole Life Value in Infrastructure and Buildings – BRE Report for CIRIA

> SCI-Network: Working Group on Whole Life Costing Preliminary Report (A state of the art review)

> Achieving Whole Life Value in Infrastructure & Buildings.

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