

BRIDGING THE GREAT DIVIDE - Building Log Books

**P G Jones (Building Energy Solutions)
Dr H Davies (CIBSE Research Manager)**

Summary

Better information leads to better buildings! UK Building Regulations now require building log books in new and refurbished buildings. This paper describes the role of building log books in improving buildings by bringing together the design and facilities management communities. It outlines what a log book should include, as indicated by CIBSE TM31, and how they might be used to log building energy performance, as shown in Good Practice Guide 348. The role of the designer, facilities manager and client are considered along with the benefits they may realise. Ten golden rules for building log books are provided to aid the development and use of log books.

The great divide

Why has such a great chasm opened up between building designers and operators? When we hewed out caves we were both designers and operators of the space and its services (fire and light). This combined approach lasted until about the 18th century. Granted, buildings have become more complex but that isn't a reason to separate the professions to the present extent. Designers and operators should at least work together even if they are not one and the same person. Designers don't seem to talk to operators and few operators get to even meet the designers. Even PFI projects seem to draw a line between the two phases of work. A great divide has opened up in our industry that is detrimental to the product that we supply - buildings. One of the key performance indicators this has a big effect on is energy efficiency.

So how can we bridge the great divide? A good start is the Building Log Book! Introduced in the 2002 changes to the Building Regulations⁽¹⁾ (England & Wales), building owners are now obliged to have a log book in place for all works covered by Part L of the Regulations. This begins to provide a bridge, or at least a two way ferry, to pass information between the designer and operator. They should also provide a useful source of information for the ferry owner, the client. Ultimately, better information leads to better buildings.

When you buy a car you get a reasonably simple handbook and somewhere to log the maintenance history. In the same way we need to set down, in simple terms, how the building is meant to work with somewhere to log performance and maintenance. What we seem to have in buildings at the moment is the detailed workshop manual in the form of very large and inaccessible O&M manuals that few people use. A car costing £10-20,000 has a simple handbook but a building costing £10-20 million does not? Are we providing the right information with our product? Is it surprising that clients complain about the buildings not working when we don't tell them what they need to know to operate them successfully?

This paper describes the building log book and then describes how it might benefit designers, operators and clients, and lead to better buildings.

Do not remove from: Building operations room 1/17		Building Log Book	
<h2>Building Log Book</h2> <h3>Vermont Court</h3>			
Watson Square London EL4M 8BR 020 8123 4567			
Building owner: Davies properties plc Main occupants: London traders Ltd			
Facilities manager responsible for log-book:	D Smith Wetherby House Pentham Essex 09876 54321	Signed: D Smith	
This building log book was prepared by	P G Jones Building Energy Solutions 12 Asquith House Dunmymans Road Banstead Surrey KT18 5UF		
Version No 1: 27.5.03			
This building energy log book is analogous to a car handbook, providing the building manager with easily understood information about how the building is intended to work. It also allows ongoing building performance and major alterations to be recorded.			
Please ensure that this log book is kept up-to-date and in a readily accessible (designated) position, e.g. in the main building operations room. It contains important information for anyone carrying out work on the building and its services.			
This log book is to be kept at all times in:		Building operations room 1/17	
Electronic master is kept at:		Main server: C:/building/building log book	
Vermont Court © 2003 CIBSE	Log Book 1/05	Prepared by: Building Energy Solutions	

What is a building log book?

Part L of the Building Regulations (2002)⁽¹⁾ includes requirements for "Building Log Books" in new and refurbished buildings. They are also required for existing buildings when "controlled services" such as boilers are upgraded or replaced. The Building Log Book is intended to provide the building owner or occupier:

"... with details of installed building services plant and controls, their method of operation and maintenance, and other details that collectively enable energy consumption to be monitored and controlled".

Part L includes log-books because they are seen as an essential tool to promote more energy efficient operation of buildings. Log books should improve understanding, management and operation resulting in more sustainable buildings with lower running costs. Specifically, they provide a vehicle for continually recording and comparing building energy performance. Building occupants also stand to benefit as the provision of information will contribute to enhanced occupant comfort, satisfaction and productivity.

Ten golden rules for log books:

1. Ensure the requirement for a log book is included in the client's brief (log books are essential for compliance with the Building Regulations) and include it in the fee structure, so resources are allocated to develop it.
2. Appoint a single person, e.g. the lead designer or consultant, to be responsible for producing the log book, even if final production is sub-contracted to specialist authors.
3. Start the process early and don't release sub-designers until they have summarised their section of the design and provided the required information to the log book author.
4. Use the distinctive CIBSE style so that it is easily recognisable among the many other manuals likely to be found in the building operations room.
5. Keep the contents list reasonably similar to the template so it retains a common structure that is recognisable to anyone working in the buildings industry.
6. Make it easy to read/use for all facilities managers and building operators. Use simple explanations with minimum jargon, utilising diagrams wherever possible.
7. At handover the log book should be between 20 pages (for a small/simple building of floor area greater than 200 m²) to 50 pages (for a large and/or complex building) in order to make it a useful and easily accessible summary. Buildings/tenancies having a floor area less than 200 m² can use the 'small business' template which might give a log book of 5–10 pages.
8. The building manager should sign the log book at handover as a recognition of taking over responsibility for the log book.
9. Keep the log book up-to-date by undertaking an annual review as part of the quality assurance system, particularly with regard to energy performance, maintenance and alterations to the building.
10. Keep the log book in a designated location in the main building operations room, and not to be removed without the building managers approval.

CIBSE have recently published TM31⁽²⁾ (sponsored by the DTI Partners in Innovation scheme). This publication is targeted at the design team, specifically those developing the log book. TM31 explains the whole process of developing log books and provides a template as a tool to aid this, along with some example log books for different sizes/types of building. A small business template is also included for buildings or tenancies less than around 200 m². The contents list of the main template are shown overleaf.

The log book should be an easily accessible focal-point of current information for all those working in the building. It has four main functions:

Summary of Building - it is a summary of all the key information about the building including the original design, commissioning and handover details and information on its management and performance. One of the main things it will provide is a strategic understanding of how the building is meant to work i.e. the design intent. As a summary, it should not duplicate the O & M manuals (or other existing documents) but should refer to the appropriate parts of them.

Key reference point - it is the single document in which key building energy information is logged and kept. It could be regarded as the hub document linking other relevant documents. The log book should provide key references to the detail held in O&M manuals, BEMS manuals and commissioning records. It should therefore be kept in a readily accessible (designated) location in the main building operations room and should not be removed without the approval of the facilities manager.

Source of Information/Training - it provides a key source of information for anyone involved in the daily management or operation of the building and to anyone carrying out work on the building and its services. It will be relevant to new staff and external contractors and consultants and should play a role in training and induction.

Dynamic document - it is a place to log changes to the building and its operation. It is also used to log building performance and continual fine-tuning commissioning. It is essential that it is kept up to date. Alterations should only be made with the approval of the facilities manager and should be signed and dated by that person.

Action Energy have recently published a Good Practice Guide GPG 348 *Building log books - a user's guide*⁽³⁾. This targets those using the log book and includes simple examples of how to complete annual reviews by filling out the log book. In particular, it provides worked examples of how to log and compare energy performance.

The designers role (Developing the log book)

TM31 and its templates represent what is good practice in the development of building log books. The associated templates provide tools to help the design team develop log books that not only meet the needs of Building Control but provide easily accessible and useful information to the building operator. It essentially specifies what should be in the log book and, equally important, what should be left out. The three example log books show the size, accessibility, written style and likely diagrams to guide designers about the level of detail needed.

The development process, culminating for the designers at handover, represents feed-forward. This is vital if designers want to see their buildings running as they intended. Even relatively new buildings have been found wanting in energy performance and occupant satisfaction⁽⁴⁾. This is often a result of poor management due to a simple lack of understanding as to how the building is meant to work. The log book should improve understanding and ensure that the design intent is implemented. This is the outward ferry journey across the great divide.

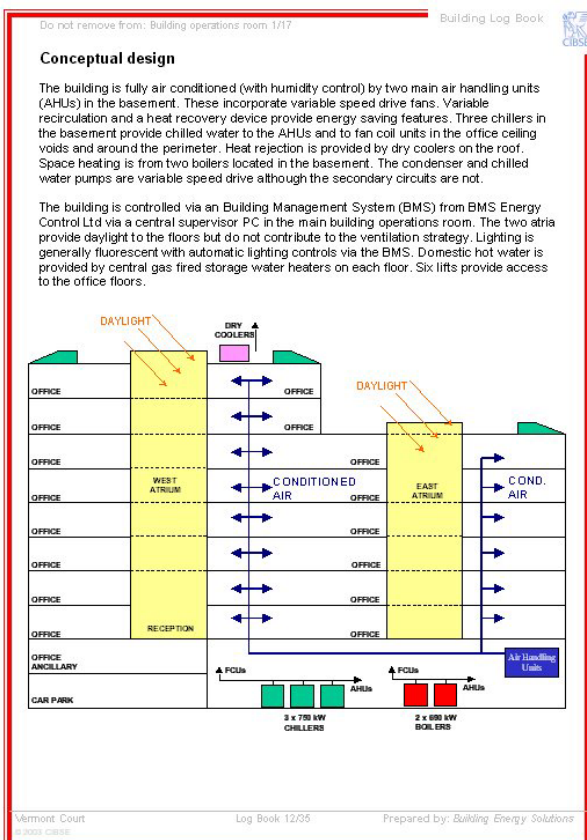
In an ideal world with a no blame culture, designers and operators would work together to make buildings perform better. In practice, blame is often apportioned, sometimes in court. In some ways

the log book is an insurance policy for the designer. It sets out the client's requirements throughout the design process and any changes can be highlighted easily. It also sets out the basic design principles so that when an operator comes back and says "my building isn't working" then the designer can say "have you read (and implemented) the instructions".

The log book should also include the designers estimates of what the likely building energy consumption might be. Again, if the operator comes back saying "my building is using twice the energy you said it would" then the designer can either point to the instructions or to his design assumptions. In most cases, where the instructions are being followed, the operator will be running the building at different times, temperatures, service levels etc. Protection aside, the key benefit will be that the log book has caused the operator to talk to the designer.

Some might say that O&M manuals provide this function but in practice they don't! Ten volumes of inaccessible technical information never get read

Building log book Contents	
1.	Updates and annual reviews
2.	Purpose & responsibilities
3.	Links to other key documents
4.	Main contacts
5.	Commissioning, handover & compliance
6.	Overall building design
7.	Summary of areas and occupancy
8.	Summary of main building services plant
9.	Overview of controls/BMS
10.	Occupant information
11.	Metering, monitoring & targeting strategy
12.	Building energy performance records
13.	Maintenance review
14.	Major alterations
15.	Results of in-use investigations



by the facilities manager and rarely include the overall design philosophy. We do not expect or want the product technical file complete with wiring diagrams when what we want are simple instructions on how to set the time on a VCR. However, O&M manuals still play a valuable role in providing the detail for those fixing and maintaining the plant. Log books may also improve the commissioning and handover process by focussing on the key handover information.

So the development of the log book shouldn't be seen as just another extra chore in the design process but as feed-forward to ensure the design intent is not misused and abused. And as an insurance policy if you need one.

The operators role (Using the log book)

At handover, or at subsequent changes in facilities manager, the log book should be signed by the new manager as a statement that they are taking responsibility for the upkeep and use of the document. The log book should be a day to day working document on the desk of the facilities managers. It should be an easy to read summary of the building and the busy facilities manager (FM) shouldn't need to add much to the log book immediately after handover. At that stage, all the necessary technical information should have been included by the designer.

Key responsibilities of building manager

1. To ensure that the log book is correct and up to date at handover or when passing it on to any successor.
2. To ensure that the log book is kept up to date on an ongoing basis including any changes to the building fabric, services, operation or management.
3. To ensure that building maintenance and energy performance is logged.
4. To ensure that all those working in the building are made aware of relevant information contained in the log book.
5. To ensure that the log book is kept in its designated location at all times.

The building log book will improve understanding of buildings amongst the staff working in the building, those running the building and any external contractors or consultants that are new to the building. It should also help prevent random alterations to the building that might damage the overall design intent and could save time in searching for key information. Log books also provide a clear mechanism for monitoring building energy performance to highlight potential wastage.

GPG 348⁽³⁾ sets out good practice when using a building log book. It shows examples of how to update the log book when the building changes significantly and how to carry out an annual review of the log book under the organisations Quality Assurance procedures. This review should make sure the log book is up to date and represents the building at that time. Superseded pages should be retained to provide a history of the building. The two main areas for review should be maintenance, which has a big effect on energy, and energy performance.

It would be too onerous to carry out a full annual review of maintenance procedures and therefore the log book is based on a series of questions:

1. Are you reasonably satisfied with the maintenance on this system? (Yes/No)
2. Is this system capable of working in all the required modes and to the required time schedules? (Yes/No)
3. If not, is this due to poor maintenance? (Yes/No)
4. Any comments/problems? e.g. maintenance not carried out (give reason).

Asking these questions should raise any key maintenance problems that might be working against high energy performance.

Two full examples of the energy performance review are provided in GPG 348⁽³⁾ showing a fairly simple review of overall performance and a more detailed end-use assessment in a large air conditioned office. Part L⁽¹⁾ requires sub metering to be included that enables 90% of each fuel to be apportioned to end uses and therefore the office example is based on sub meter readings leading to a comparison of end use consumption against equivalent benchmarks. GIL 65⁽⁵⁾ provides guidance for designers as to where to put sub metering and how to develop a metering strategy. The step by step procedures in the log book should be well within the capabilities of a relatively non technical facilities manager. The approach also links well with that of TM22⁽⁶⁾. In fact, the log book could provide the input data to TM22 or a TM22 assessment could be fed back into the log book. This interchangeability of data is an important step forward for the industry and could even provide the basis for energy certification required by the EU directive on Energy Performance in Buildings⁽⁷⁾.

Actual energy performance will be logged against design estimates and against typical or best practice benchmarks for that type of building, where available. The facilities manager will then be able to make a clear comparison. Where a simple comparison of each fuel has been carried out then the FM will only get a feel for which fuel is good or bad. Where an end use assessment has been done using metered data then the FM will be able to highlight which end uses (e.g. lighting, fans pumps etc) are performing badly. Carrying this out annually should not be too onerous and in larger buildings a quarterly assessment would be very valuable in rapidly identifying and preventing waste.

Some FMs may see this as a way of highlighting their own poor performance! However, rather like the designer, it could be seen as a form of insurance protection to prove to management that the building is being managed well. The FM will have a better understanding of the building and they can develop a clear historical record of changes, problems and solutions that have been introduced. Equally, logging maintenance and energy performance provides a clear record as proof that the FM has been on top of building management. Where energy performance is poor, the log book may even be useful in securing funding for future changes to the building to address the energy waste.

Feedback from the log book will provide vital information that could improve current benchmarks and hence influence future design. So keeping the log book up to date and logging energy performance shouldn't be seen as just another extra chore in the building management process but as a feed-back process. Immediate feedback on performance to the FM but also feedback to the rest of the industry. This is the return ferry journey across the great divide.

The clients role

Ultimately, it is the client or developer that needs to ensure that the log book is in place at handover. They also have to pay for the log book in order to meet the Building Regulations. It needs to have been included in the clients brief and in the fee structure so there are resources allotted to develop the log book. With the introduction of TM31, the design brief might simply say:

"Develop a building log book in line with CIBSE TM31 main template"

So, what's in it for them? It will help ensure that their requirements are constantly and consistently at the heart of the design process. The client/developer will also know more about what they are getting as an end product. So, even the ferry owner will benefit from log books. The log book will hold summary information that might be used in selling/letting the building, giving greater confidence to letting agents. Prospective purchasers and tenants will also have greater confidence in what they are buying. Who knows, the log book may have an effect on this whole process, bringing energy and maintenance up the priority list (a little) with the prospect that more will be paid for energy efficient buildings.

Reflections

The building log book is here to stay and has the potential to span the great divide that exists between designers and operators. Feed forward and feed back should improve understanding of buildings which will lead to better buildings. Managing energy well often leads to a better building all round, with better comfort, maintenance and management. Whilst this leads to obvious running cost and environmental benefits, the potential improvements in staff productivity could be even greater.

Building log books aim to give us better buildings and should play a significant role in reaching the target of 60% reduction in CO₂ emissions by 2050 set out in the recent Energy White Paper⁽⁸⁾. They will also help to meet recommendations in the Egan Report "Rethinking Construction"⁽⁹⁾ which called for integrated teams and processes, a quality-driven agenda and a culture of performance measurement. Log books should prevent the current poor state of many buildings where facilities managers are "Flying Blind"⁽¹⁰⁾. Who knows, one day they may even lead to "Sea Trials" where the design team are involved in running the building for the first two years. Now that would be a real bridge across the divide rather than a simple ferry.

Phil Jones runs independent energy consultancy *Building Energy Solutions* (phil@build.demon.co.uk). He is a member of the CIBSE Carbon Task Group and is the author of CIBSE TM31, GPG 348 and GIL 65 alongside CIBSE Guide F *Energy Efficiency In Buildings*. Dr Hywel Davies is CIBSE Research Manager (hdavies@cibse.org) and was in charge of the development of TM31.

GPG 348 and GIL 65 are available from Action Energy at www.actionenergy.org.

References

1. The Building Regulations 2000 Statutory Instrument 2000 No. 440 (as amended) (London: The Stationery Office) (2000) (These apply to England & Wales. Requirements may be different in Scotland and Northern Ireland)
2. *Building Log Books - A guide and templates for preparing building log books* CIBSE Technical Memorandum TM31 (London: CIBSE) (2003)
3. *Building log books - a user's guide Good Practice Guide 348* (Action Energy) www.actionenergy.org
4. Bordass W T et al, Special Issue on Post Occupancy Evaluation, Building Research and Information 29(2) (March - April 2001)
5. *Metering Energy Use In New Non Domestic Buildings - General Information Leaflet GIL65* www.actionenergy.org.uk (2001)
6. *Energy Assessment and Reporting Methodology - Office Assessment Method* CIBSE TM22 (London: Chartered Institution of Building Services Engineers) (2003)
7. Commission of the European Communities - Directive of the European Parliament and of the Council on the energy performance of buildings 2002/91/EC (Brussels) (2002)
8. *Our energy future - creating a low carbon economy* ENERGY WHITE PAPER - (HMSO) (2003)
9. Construction Task Force, *Rethinking Construction*, "The Egan Report", DETR (July 1998).
10. Bordass W T, *Flying Blind - Everything you always wanted to know about energy in commercial buildings but were afraid to ask* (Association for the Conservation of Energy) (2001)