LABELLING & LOG BOOKS

Phil Jones
Building Energy Solutions
- On behalf of Action Energy

“Better information leads to better buildings”

• New buildings
• Major refurbishments
• When replacing controlled services
WHAT IS A BUILDING LOG BOOK?

Analogous to car owners handbook

Where are the instructions?

WHAT IS A BUILDING LOG BOOK?

• Summary of building
• Single reference point
• Source of information/training
• Dynamic document

For recording building alterations, maintenance and energy performance
CIBSE TM31
- How to develop log books
- Authors toolkit
- Lays down an industry standard
- Dti support

The Toolkit

<table>
<thead>
<tr>
<th>Printed Publications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Technical Memorandum</strong></td>
</tr>
<tr>
<td>TM 31</td>
</tr>
<tr>
<td>Building Log Books - a guide and template</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Associated Disc</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building log book</td>
</tr>
<tr>
<td><strong>MAIN TEMPLATE</strong></td>
</tr>
<tr>
<td>Building log book</td>
</tr>
<tr>
<td><strong>SMALL BUSINESS TEMPLATE</strong></td>
</tr>
<tr>
<td>Building log book</td>
</tr>
<tr>
<td><strong>EXAMPLE 1</strong></td>
</tr>
<tr>
<td>Large air-conditioned office</td>
</tr>
<tr>
<td>Building log book</td>
</tr>
<tr>
<td><strong>EXAMPLE 2</strong></td>
</tr>
<tr>
<td>Small naturally ventilated school</td>
</tr>
<tr>
<td>Building log book</td>
</tr>
<tr>
<td><strong>EXAMPLE 3</strong></td>
</tr>
<tr>
<td>Very small micro business office</td>
</tr>
</tbody>
</table>

GPG 348 - Building Log Books - a user’s guide
GIL 65 - Metering new non-domestic buildings
KEY FEATURES

• Facilities manager takes ownership
• Blue & green ‘fill-in’ text
• Encourages diagrams and tables
• Indications of page lengths
• Distinctive border
• Written style to come from examples
• Relevant certificates in appendix
Golden Rules (Authors)

- Include log book in clients brief and fee structure
- Appoint a single person responsible for production
  - e.g. Lead building services designer
- Start the process early
- Use the distinctive CIBSE style so it is easily recognisable
- Keep the contents list close to the template to retain a common recognisable structure
- Make it easy to read and understand, use diagrams
- 20 to 50 pages at handover
  - (5 to 10 for small businesses < 200m²)

BENEFITS TO DESIGNERS

- Sets out the design criteria
- Gets the design philosophy across
- Leads into O&Ms, drawings etc.
- Protects against building misuse
- Insurance policy against.....
  ...."my building isn’t working"
  ...."my building consumes more"
- Ensures a better handover
ENSURE COMPLETE HANDOVER

Log books help ensure that building services are properly commissioned and handed over to the FM.

Good Practice Guide 348 - a user’s guide

- Aimed at FMs
- Examples of how to log energy
- Action Energy publication

www.actionenergy.org.uk
**FM RESPONSIBILITIES**

1. Ensure it is up to date at handover

2. Keep it up to date on a day-to-day & annual basis
   - including any changes to the building fabric, services, operation or management

3. Ensure that all those working in the building are aware of information contained in the log book

4. Keep the log book in its designated location

5. Ensure that building maintenance and energy performance is logged

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**TAKING RESPONSIBILITY**

The Facilities Manager signs the log book at initial handover or when taking over from a predecessor.
This log book is to be kept at all times in: Room name/No & designated location in that room.

An electronic master is kept at: Server/PC, directory name & file name.

The facilities manager must approve any changes made to the log book. Updated pages must have a new separate number to show a progressive history.

<table>
<thead>
<tr>
<th>Review year</th>
<th>Description of annual log book review and updates made</th>
<th>Pages updated or added</th>
<th>Building manager’s signature</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No significant changes to design made it not up to handover</td>
<td>10a</td>
<td>5. Smith</td>
<td>01/09</td>
</tr>
<tr>
<td></td>
<td>Fan in RAV 2 replaced in defect liability period due to under performance</td>
<td>25a</td>
<td>6. Smith</td>
<td>02/08</td>
</tr>
<tr>
<td></td>
<td>Annual review of energy performance carried out</td>
<td>30a</td>
<td>6. Smith</td>
<td>03/08</td>
</tr>
<tr>
<td></td>
<td>Annual review of maintenance carried out</td>
<td>35a</td>
<td>6. Smith</td>
<td>04/08</td>
</tr>
<tr>
<td></td>
<td>Variable speed drive added to domestic hot water circulation loop as an energy saving measure</td>
<td>40a</td>
<td>6. Smith</td>
<td>05/08</td>
</tr>
<tr>
<td></td>
<td>New sub meter installed on kitchen extract fans to log energy use</td>
<td>45a</td>
<td>6. Smith</td>
<td>06/08</td>
</tr>
<tr>
<td></td>
<td>Main heating pumps upgraded to improve water flow and distribution of heat</td>
<td>50a</td>
<td>6. Smith</td>
<td>07/08</td>
</tr>
</tbody>
</table>
## Summary of Areas and Occupancy

(Not more than one page of text plus one simple plan per floor)

### Occupancy and Activities

<table>
<thead>
<tr>
<th>Level</th>
<th>NIA (m²)</th>
<th>Occupancy type</th>
<th>Floor space factor (person/m²)</th>
<th>Population sum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basement</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lower Ground</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ground</td>
<td>2,800</td>
<td>Office</td>
<td>12</td>
<td>233</td>
</tr>
<tr>
<td>First</td>
<td>2,690</td>
<td>Dealer</td>
<td>7</td>
<td>270</td>
</tr>
<tr>
<td>Second</td>
<td>2,843</td>
<td>Office</td>
<td>12</td>
<td>237</td>
</tr>
<tr>
<td>Third</td>
<td>2,750</td>
<td>Office</td>
<td>12</td>
<td>229</td>
</tr>
<tr>
<td>Fourth</td>
<td>2,750</td>
<td>Office</td>
<td>12</td>
<td>229</td>
</tr>
<tr>
<td>Fifth</td>
<td>2,501</td>
<td>Office</td>
<td>12</td>
<td>208</td>
</tr>
<tr>
<td>Sixth</td>
<td>1,341</td>
<td>Office</td>
<td>12</td>
<td>112</td>
</tr>
<tr>
<td>Seventh</td>
<td>1,059</td>
<td>Office</td>
<td>12</td>
<td>88</td>
</tr>
<tr>
<td>Eighth</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sum</td>
<td>10,742</td>
<td></td>
<td></td>
<td>1,007</td>
</tr>
</tbody>
</table>

The total number of occupants in the building is 1,007 (based on core hours of use).

<table>
<thead>
<tr>
<th>Main occupied areas</th>
<th>Weekday hours</th>
<th>Saturday hours</th>
<th>Sunday hours</th>
<th>Total hours/week</th>
<th>Heating (Yes/No)</th>
<th>Late working sometimes (Yes/No)</th>
<th>No. of occupants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Desirable floor</td>
<td>07:00-21:00</td>
<td></td>
<td></td>
<td>72</td>
<td>Yes</td>
<td>Yes</td>
<td>270</td>
</tr>
<tr>
<td>General offices</td>
<td>08:00-18:00</td>
<td>None</td>
<td>None</td>
<td>50</td>
<td>Yes</td>
<td>Yes</td>
<td>1300</td>
</tr>
<tr>
<td>Restaurant catering staff</td>
<td>07:00-15:00</td>
<td>None</td>
<td>None</td>
<td>40</td>
<td>No</td>
<td>No</td>
<td>7</td>
</tr>
</tbody>
</table>

### Floor Areas

The total floor area of the building is 27,531 m² (based on gross floor area)

<table>
<thead>
<tr>
<th>Area type</th>
<th>Unheated (%)</th>
<th>Naturally ventilated (%)</th>
<th>Mechanically ventilated (%)</th>
<th>Mixed mode (%)</th>
<th>Heating and cooling only (%)</th>
<th>Full air conditioning with humidity control (%)</th>
<th>% of total area by servicing system</th>
<th>Total %</th>
<th>Total area (m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basement</td>
<td>9.36%</td>
<td>4.11%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>13.47%</td>
<td>3,708</td>
<td></td>
</tr>
<tr>
<td>Lower Ground</td>
<td>0.55%</td>
<td>6.62%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6.15%</td>
<td>1,663</td>
<td></td>
</tr>
<tr>
<td>Ground</td>
<td>1.15%</td>
<td>3.35%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4.16%</td>
<td>3,218</td>
<td></td>
</tr>
<tr>
<td>First</td>
<td>0.30%</td>
<td>3.83%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>9.04%</td>
<td>11.27%</td>
<td></td>
</tr>
<tr>
<td>Second</td>
<td>0.56%</td>
<td>3.86%</td>
<td>0.81%</td>
<td></td>
<td></td>
<td></td>
<td>11.56%</td>
<td>3,064</td>
<td></td>
</tr>
<tr>
<td>Third</td>
<td>0.92%</td>
<td>3.94%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>9.02%</td>
<td>11.40%</td>
<td></td>
</tr>
<tr>
<td>Fourth</td>
<td>0.81%</td>
<td>3.84%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>9.83%</td>
<td>11.48%</td>
<td></td>
</tr>
<tr>
<td>Fifth</td>
<td>0.32%</td>
<td>3.88%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8.78%</td>
<td>10.44%</td>
<td></td>
</tr>
<tr>
<td>Sixth</td>
<td>1.46%</td>
<td>3.64%</td>
<td>3.50%</td>
<td></td>
<td></td>
<td></td>
<td>9.50%</td>
<td>2,674</td>
<td></td>
</tr>
<tr>
<td>Seventh</td>
<td>0.44%</td>
<td>0.48%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3.59%</td>
<td>4.42%</td>
<td></td>
</tr>
<tr>
<td>Eighth</td>
<td>1.81%</td>
<td>0.34%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.90%</td>
<td>2.15%</td>
<td></td>
</tr>
<tr>
<td>Total %</td>
<td>18.86%</td>
<td>21.71%</td>
<td>0.38%</td>
<td></td>
<td></td>
<td></td>
<td>59.04%</td>
<td>100.00%</td>
<td></td>
</tr>
<tr>
<td>Total area (m²)</td>
<td>5,190</td>
<td>5,977</td>
<td>105</td>
<td>16,265</td>
<td>27,531</td>
<td></td>
<td>16,265</td>
<td>27,531</td>
<td></td>
</tr>
</tbody>
</table>
The energy figures shown are the DESIGNERS ESTIMATES of what the plant will use based on the design assumptions. These can be used to compare against actual performance - one looks at the key.

In new buildings, the designer will have provided a metering strategy in the design. This shows how the metering fits together to monitor energy performance.

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In new buildings, the designer will have provided a metering strategy in the design. This shows how the metering fits together to monitor energy performance.
Logging Overall Energy Performance - a step by step approach

- Step 1: Take meter readings
- Step 2: Calculate consumption
- Step 3: Calculate annual totals
- Step 4: Calculate performance indicators
- Step 5: Compare with benchmarks and design estimates
- Step 6: Take action on excessive consumption
# LOGGING OVERALL ENERGY PERFORMANCE

1. **Log the annual consumption in kWh**

2. **Multiply by CO\(_2\) factor**
   - This shows how many kilograms of CO\(_2\) are emitted when one kWh of each fuel is used.

3. **Divide by floor area**

4. **Compare with benchmarks**
   - Actual performance indicator versus those estimated by the designers versus good practice benchmarks, where available.

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### Building energy performance for period from Jan 2001 to Jan 2002

<table>
<thead>
<tr>
<th>Fuel</th>
<th>kWh</th>
<th>CO(_2) into kg CO(_2)/kWh</th>
<th>kg CO(_2)</th>
<th>Actual kg CO(_2)/m(^2)</th>
<th>Design estimates kg CO(_2)/m(^2)</th>
<th>Good practice benchmark kg CO(_2)/m(^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity</td>
<td>369.740</td>
<td>0.43*</td>
<td>158.773</td>
<td>7.94</td>
<td>61.2</td>
<td>56.3</td>
</tr>
<tr>
<td>Gas</td>
<td>1,103.960</td>
<td>0.19</td>
<td>209.752</td>
<td>104.9</td>
<td>85.0</td>
<td>85.7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,473.700</strong></td>
<td></td>
<td><strong>368.525</strong></td>
<td><strong>112.8</strong></td>
<td><strong>76.2</strong></td>
<td><strong>71.3</strong></td>
</tr>
</tbody>
</table>

---

- Keep electricity and fossil fuel separate as it helps identify where the energy problems might lie; in this case, electricity 7.2% above the designer estimates, possibly indicating excessive consumption by lighting or small power.

- If you want one single indicator of performance then use kg CO\(_2\)/m\(^2\).

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**WHERE SUB-METERING IS IN PLACE**

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Appendix - logging energy performance in more detail
LOGGING ENERGY PERFORMANCE
IN MORE DETAIL

STEP 1 – Take meter readings
Try and take readings over regular periods to allow comparisons e.g. monthly, quarterly etc.

STEP 2 – Calculate consumptions
Subtract previous meter reading to get kWh consumption over that period

STEP 3 – Calculate annual totals
Calculate the total annual consumption in kWh for each sub meter

There are 23 sub meters measuring electricity in this building, each has a unique code and name describing what it measures.
### Building energy performance for period from 4.1.02 to 4.1.03

Based on gross floor area of 27,531 m²

#### ACTUAL INCOMING METERED

<table>
<thead>
<tr>
<th>Main end use</th>
<th>ACTUAL INCOMING METERED Main end use energy consumption (kWh/yr)</th>
<th>ACTUAL SUB METERED Main end use energy consumption (kWh/m²/yr)</th>
<th>DESIGN ESTIMATES Main end use energy consumption (kWh/m²/yr)</th>
<th>BEST PRACTICE BENCHMARKS Main end use energy consumption (kWh/m²/yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ELECTRICITY</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lighting</td>
<td>107,295</td>
<td>35.1</td>
<td>30.5</td>
<td>28.7</td>
</tr>
<tr>
<td>Office Equipment</td>
<td>88,410</td>
<td>28.1</td>
<td>25.9</td>
<td>23.0</td>
</tr>
<tr>
<td>Fans</td>
<td>74,620</td>
<td>26.9</td>
<td>24.9</td>
<td>23.0</td>
</tr>
<tr>
<td>Cooling</td>
<td>91,350</td>
<td>33.1</td>
<td>22.9</td>
<td>18.9</td>
</tr>
<tr>
<td>Pumps</td>
<td>28,600</td>
<td>10.3</td>
<td>10.6</td>
<td>10.2</td>
</tr>
<tr>
<td>Refrigeration</td>
<td>87,300</td>
<td>31.7</td>
<td>28.6</td>
<td>24.9</td>
</tr>
<tr>
<td>Lighting - Electricity</td>
<td>62,500</td>
<td>23.0</td>
<td>19.9</td>
<td>15.9</td>
</tr>
<tr>
<td><strong>TOTAL SUB METERED ELECTRICITY</strong></td>
<td>717,700</td>
<td>260.5</td>
<td>245.9</td>
<td>198.9</td>
</tr>
<tr>
<td><strong>OTHER (UNMETERED) ELECTRICITY</strong></td>
<td>505,648</td>
<td>18.4</td>
<td>16.5</td>
<td>11.1</td>
</tr>
<tr>
<td><strong>Percentage unmetered</strong></td>
<td>6.6%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>GAS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Space Heating</td>
<td>303,186</td>
<td>110.1</td>
<td>117.6</td>
<td>80.8</td>
</tr>
<tr>
<td>Domestic Hot Water</td>
<td>46,750</td>
<td>16.9</td>
<td>14.2</td>
<td>10.2</td>
</tr>
<tr>
<td>Catering (Gas)</td>
<td>28,730</td>
<td>10.4</td>
<td>9.6</td>
<td>6.0</td>
</tr>
<tr>
<td><strong>TOTAL SUB METERED GAS</strong></td>
<td>378,666</td>
<td>137.4</td>
<td>141.8</td>
<td>96.8</td>
</tr>
<tr>
<td><strong>OTHER (UNMETERED) GAS</strong></td>
<td>0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td><strong>Percentage unmetered</strong></td>
<td>0.0%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Step 5: Compare performance: Actual vs. benchmarks vs. Design estimates

- Where available

Most of the end uses in this particular building are significantly above the designer estimates which in turn are above the benchmarks.

#### Step 6: Take action on excessive consumption

- Record the floor area and ensure that the benchmarks and design estimates are based on the same definition.

The log book should include the designer’s estimate of what consumption is likely to be. Typical and best practice benchmarks are available from Action Energy or CIBSE Guide F Energy Efficiency in Buildings.

- Calculate the unmetered consumption. If this is greater than 10%, then investigate what it could be.

**Diagram:**

**Electricity End-Use Comparison 2002**

- Pumps
- Chiller (ammoniated)
- Chiller (steam)
- Computer Fan
- Hot Water
- Lighting
- Office equipment
- Heating
- Fans
- Cooling
- Lighting
- Unmetered

**Consumption in kWh/m²**

- 0.0
- 200.0
- 300.0
- 400.0
- 500.0
- 600.0
- 700.0
- 800.0
- 900.0
- 1000.0
- 1100.0
- 1200.0

**Legend:**

- Actual Sub Metered
- Design Estimates
- Code Practice
- Benchmarks

**Note:**

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- Fans
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- Lighting
- Unmetered

**Consumption in kWh/m²**

- 0.0
- 200.0
- 300.0
- 400.0
- 500.0
- 600.0
- 700.0
- 800.0
- 900.0
- 1000.0
- 1100.0
- 1200.0

**Legend:**

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- Design Estimates
- Code Practice
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- Calculate the unmetered consumption. If this is greater than 10%, then investigate what it could be.
**HOW WILL IT HELP FM**s?  
- Managing the building will be easier with current design philosophy always available  
- Informs staff and contractors and saves time in searching for key information  
- Improves understanding of building  
- Provides an historical record  
- Avoids random alterations that damage design intent  
- Logging performance helps identify energy problems  
- Should help enhance occupant satisfaction

**HOPES FOR THE FUTURE**  
- Feedback could improve the way we design  
  - Improved benchmarks  
- Feed-forward could improve the way we use designs  
- Could be used in ‘sea trials’ & POE  
- Information could be used by developers/letting agents  
- Could play a significant role in implementation of EU ‘Energy Performance of Buildings’ directive
LOG BOOKS & LABELLING

Log books could……..

• hold the base information for labelling
  • e.g. Floor area & energy consumption
• hold the energy calculations & results
• hold the energy certificate
• feed data to software e.g. TM22
• hold the output from software
• build a historical record
BENEFITS OF PROVIDING INFORMATION

• Economic benefits
• Environmental benefits
• Better building services
• Better buildings

Better Information leads to better buildings

Phil Jones
Building Energy Solutions
phil@build.demon.co.uk