

Chapter 6

The Checking of the Standard Format to the Term of Reference

One important step of the research before implement the standard format of the energy audit report is to compare the standard format to the term of reference. It means that the standard format is set directly to the requirement as shown in table 6-1. That is to say the main contents of the report are maintained.

In table 6-1 the term of reference is quoted from chapter 2, item 2.1. Then the main idea of the term of reference is listed and compared to the content in the standard format of the energy audit report. The content in the energy audit report is written by using the item refer to the organization of the energy audit report in figure 3-2 or the standard format of the energy audit report in appendix.

From table 6-1 it shows that the standard format of the energy audit report covers the main idea as the term of reference. That is to say the contents of the report are maintained as the list below.

- Introduction
- Survey and Audit the Energy Utilization
- Technical Analysis
- Show the detail of implementation

Table 6-1 The checking of the standard format to the term of reference

| No | The requirement as the term of reference | Location of message in the energy audit report (refer to appendix) |
|-------|--|--|
| 1 | Introduction | - |
| 1.1 | Energy using | Technical data |
| 1.2 | Potential of the energy conservation | Abstract, 5.3 |
| 2 | Characteristic of energy using | - |
| 2.1 | Electrical power supply system | 2.1, 2.2, 2.3 |
| 2.1.1 | The energy consumption | 2.2.1, 2.2.2, 2.2.3, 2.2.4 |
| 2.1.2 | The number and capacity of main equipment (transformer, control board, generator, capacitor, moter, and pump etc.) | A.1 |
| 2.1.3 | Single line diagram | A.1.1 |
| 2.1.4 | Data (power (watt), voltage (volt), current (ampere), and power factor, size and status of the main line and circuit breaker) | A.1.2, A.1.3 |
| 2.2 | split type and window type of air conditioning system | A.2 |
| 2.2.1 | The lay out drawing of existing air conditioner and thermostat | Energy conservation improvement drawing |
| 2.2.2 | The data from existing air conditioner and thermostst (capacity (Btu), age (years), power (watt), potential (volt), current (ampere), power factor, EER: Energy Efficiency Ratio (Btu/h/watt), capacity per area (Btu/hr/m ²)) | A.2.1, A.2.2, A.2.3 |
| 2.3 | Central unit air conditioning system | - |
| 2.3.1 | The lay-out drawing of existing equipment (chiller, condenser water pump, cooling tower, pipe, and others) | - |
| 2.3.2 | Data (capacity (Btu), age (years), power (watt), voltage (volt), current (ampere), power factor, COP: Co-efficient of Performance, and air conditioning system index (Btu/hr/m ²)) | - |
| 2.4 | Ligthning system | A.3 |
| 2.4.1 | The lay-out drawing of the existing ligthing system | Energy conservation improvement drawing |

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| No | The requirement as the term of reference | Location of message in the energy audit report (refer to appendix) |
|-------|---|--|
| 2.4.2 | The data from lighting equipment (material, reflector in luminaries, cover of luminaries, charecteristic of lamp, accessories of luminaries e.g. ballast, maintenance condition, average illuminant (lux) on working plane, and capacity of lighthing (watt/m ²)) | A.3.1, A.3.2, A.3.3 |
| 2.5 | Thermal transfer through building envelope | 1.1, 1.2, 1.3 |
| 2.5.1 | The data for calculation of the OTTV, RTTV: (picture, map with direction, charecteristic with type and layer of opaque and transparent including insulation, area in each direction, and shading characteristic) | 1.2.1, 1.2.2, 1.2.3, 1.2.4 |
| 2.6 | Heating system | - |
| 2.6.1 | Lay out drawing of existing heating system | - |
| 2.6.2 | The data of the equipment and machine (fuel consumption, quantity of heat production, capacity of heat consumption, capability of heat consumption, capability of heat production, age of using, quantity/temperature/ pressure of heating equipment, blow out heat and condensate system, charecteristic of insulation/ piping system/heating equipment, efficiency of system or equipment, and maintenance condition) | - |
| 3 | Technical analysis | - |
| 3.1 | Analyze the electrical power supply system and suggest the measures | - |
| 3.2 | Analyze the air conditioning system and suggest the measures | 3.1 |
| 3.2.1 | Replace the low energy efficiency Ratio | 3.2.1 |
| 3.2.2 | Inatall the insulation on the top part of the building | 3.1.4, 3.1.5 |
| 3.2.3 | Maintenance the existing air conditioner | 3.1.1 |
| 3.2.4 | • Use the electronic thermostat with the appropriate temperature | 3.1.2 |
| 3.3 | Analyze the lighthing system and suggest the measures | 3.2, Appendix E |

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| | The requirement as the term of reference | Location of message in the energy audit report (refer to appendix) |
|-------|---|--|
| 3.3.1 | Replace the existing lamp by the high efficiency lamp | 3.2.1 |
| 3.3.2 | Replace the magnetic ballast by the electronic ballast | 3.2.2 |
| 3.3.3 | Replace the non-reflector luminaries by the reflector luminaries. Improve the average luminaries more than 350 lux in the working room on the working plane | 3.2.3 |
| 3.4 | Analyze the thermal transfer though the buiding envelope and suggest the measures | Appendix B, F |
| 3.4.1 | Install the insulation on the top part of the building | 3.1.4, 3.1.5 |
| 3.4.2 | Attach the film, fin, or overhang to reduce the Overall Thermal Transfer Value and the Roof Thermal Transfer Value as the ministerial regulation explain the reason if the measures will not be implemented | 3.1.3 |
| 3.5 | Analyze the heating system and suggest the measures | - |
| 3.5.1 | Improve the efficiency of system and equipment | - |
| 3.6 | Analyze the important index | - |
| 3.6.1 | Important index (Btu/m ² for the air conditioning system, watt/m ² for the ligthing system, liter/m ² for water consumption) | Thecnical data |
| 3.7 | Analyze the measures in the economic view | - |
| 3.7.1 | Calculate the cost of main equipment and accessories, labor cost, and miscellaneous cost such as in air conditioner of each set | 3.1, 3.2 |
| 3.7.2 | Calculate the payback period | 3.1, 3.2 |
| 3.7.3 | Calculate the Internal Rate of Return (%IRR) | 3.1, 3.2 |
| 4 | Detail of implementation | - |
| 4.1 | Electrical power supply | - |

Table 6-1 The checking of the standard format to the term of reference

| No | The requirement as the term of reference | Location of message in the energy audit report (refer to appendix) |
|-------|---|--|
| 4.1.1 | Lay out drawing the new system | - |
| 4.1.2 | Technical installation | - |
| 4.1.3 | Specification of new equipment | - |
| 4.1.4 | Maintenance or suggest for improving about safety | - |
| 4.2 | Air conditioning system | 5.1 |
| 4.2.1 | Lay out the new system | Energy conservation improvement drawing |
| 4.2.2 | Technical installation (refrigerant pipe, switch, size of circuit breaker, and main line) | Energy conservation improvement drawing |
| 4.2.3 | Specification of new equipment | Energy conservation improvement drawing |
| 4.3 | Ligthing system | 5.2 |
| 4.3.1 | Lay out the existing and new system (maximum, minimum, and average illuminant (lux)) | Energy conservation improvement drawing |
| 4.3.2 | Picture and method of the existing and new luminaries | Energy conservation improvement drawing |
| 4.3.3 | Number and capacity (watt) of electronic ballast and method of installation | Energy conservation improvement drawing |
| 4.3.4 | Specification of the new equipment | Energy conservation improvement drawing |
| 4.4 | Buiding envelope | 5.1 |
| | Area of installation of the new insulation | Energy conservation improvement drawing |
| | Method of installation | Energy conservation improvement drawing |
| | Specification of the insulation | Energy conservation improvement drawing |

- means that " the practical energy audit report does not require as the term of reference

* Appendix C and D is the additional requirement from the department of energydevelopment and promotion