

Developing Energy Efficiency &
Energy Conservation
in the Building Sector, Botswana

Department of Energy
Ministry of Minerals, Energy
and Water Resources



ENERGY EFFICIENCY BUILDING DESIGN GUIDELINES FOR BOTSWANA

Author:

Andreas Groth

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- Mr. T. Morewagae (Association of Consulting Engineers, Botswana)
- Mr. N. Ofetotse (Botswana Housing Corporation)
- Mr. E. Mazhani (Botswana Institute of Development Professions)
- Mr. H.T. Tumisang (Botswana Technology Centre)
- Mr. H.B. Brown (Department of Building and Engineering Services)
- Mr. B. Kgaimena (Department of Energy)
- Mr. G. Kumar (Department of Energy)
- Mr. A. Groth (Department of Energy)
- Mr. J. Vauvert (Department of Energy)
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- Dr. Sajja (Department of Local Government and Development)
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Layout:

The Guidelines has been formatted in landscape orientation in order to make it easy to read on screen as a pdf file. The font size and scale for images have been chosen to allow it to be read at a scale that shows one page at a time.

In print format the Guidelines is intended to be printed on both sides and bound on the left side of the odd pages.

Comments and recommendations:

Comments and recommendations for revisions should be sent to:

Ministry of Minerals, Energy and Water Resources
Department of Energy
Private Bag 00378
Gaborone
Botswana

Tel: +267 3914221
Fax: +267 3914201
email: ead@gov.bw
website: eecob.com

or the author:

Andreas Groth
Motheo (Pty) Ltd.
P.O. Box 2224
Gaborone
Botswana

Tel: +267 3923462
Fax: +267 3923632
email: wolf@motheo.com

SECTION 1

INTRODUCTION

ENERGY EFFICIENCY BUILDING DESIGN GUIDELINES FOR BOTSWANA

Revision 1

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ENERGY EFFICIENCY BUILDING DESIGN GUIDELINES FOR BOTSWANA

Sections:

1. Introduction.
2. Design Brief.
3. Climate.
4. Indoor Environment.
5. Design and construction process.
6. Planning.
7. Building envelope.
8. Mechanical Systems.
9. Lighting - artificial and day lighting.
10. Operation & Maintenance and Building Management Systems.
11. Simulation.
12. Life-Cycle Cost Analysis.
13. Appendices.

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1. INTRODUCTION

1.1. Background

The project ‘Developing Energy Efficiency and Energy Conservation in the Building Sector, Botswana’ was established in the Ministry of Minerals, Energy and Water Resources in 2005 to address the Government policy as stated in NDP 9:

“... Improving energy efficiency and conservation is cost effective, offers a chance to defer new investment and helps reduce energy related pollution. During NDP 9, Government will continue to support and encourage improved energy efficiency and conservation in all sectors of the economy. Planned measures to achieve the policy objectives are:

- *Carrying out information and educational campaigns.*
- *Conducting energy audits of energy intensive industries and Government institutions*
- *Promoting energy efficient design and operation of buildings.*
- *Developing and implementing a national energy management plan.”*

One activity of the project was to develop guidelines for the design of energy efficient buildings. This was done through a process of consultation with interested parties through a Task Force that has been established for this purpose.

It is expected that this document will need to be regularly revised over the coming years to keep it up to date with

developments in the knowledge base and the regulatory environment of the building sector. The Guidelines and any subsequent revisions will be available as ‘pdf’ files on the website of the Department of Energy and the project website at <http://www.eecob.com/>.

1.2. Overview

1.2.1. Overall aim.

The Guidelines is intended to be a resource that will help in achieving the overall aim to improve energy efficiency and energy conservation in the building sector.

To achieve this, energy efficiency should be considered from the beginning of the lifecycle of a building. This is typically the stage when the initial Design Brief is prepared. For this reason the Design Brief has been chosen as the core document around which these Guidelines are structured.

Energy efficiency needs to be considered at every stage of the lifecycle of a building. An optimum level of energy efficiency can be achieved when all aspects of the building design, construction and operation are integrated with each other in a coordinated manner to take full advantage of the opportunities that such synergies offer.

The Guidelines can assist in this by providing relevant information and guidance on key issues related to the various stages in the life of a building from inception, procurement, design, construction, commissioning, operation, and ultimately decommissioning and demolition.

This will hopefully facilitate timely incorporation and consideration of those aspects early in the design process.

1.2.2. Classes of building.

Requirements and opportunities for energy efficiency differ in certain ways for different types of buildings. The first edition of the Guidelines is specifically directed at the following broad classes of building:

- Office buildings.
- Public facilities, such as Police Stations.
- Health facilities, e.g. hospitals and clinics.
- Schools.
- Residential houses.

1.2.3. Codes and Regulations.

At present the Codes and Regulations relating to buildings in Botswana make little or no reference to energy efficiency.

In the absence of a specific Botswana code for energy efficiency in buildings, building developers may wish to use the Guidelines as a tool to achieve energy efficiency in new buildings. This may be done by encouraging consultants to work in accordance with the recommendations of the Guidelines throughout the design and construction process.

It is the intention that the information and recommendations contained in the Guidelines will be helpful in the development of an Energy Efficiency Code for buildings if and when this happens.

1.3. Structure of the Guidelines

1.3.1. The Design Brief.

When the need for a building has been established, it is good practice to prepare a Design Brief for the building. This should define all the requirements of the building, including the overall objectives that the building is intended to meet, the specific spaces that it will provide, their characteristics and relationships to each other, how the building will respond to its environment, constraints imposed by the site, the budget, the programme, and many other issues relating to the project.

A well-prepared Design Brief should guide the project throughout the design and construction process. The client and the design team can use the Design Brief as a tool for monitoring the development of the project, to ensure that the original objectives and requirements are being achieved.

These Guidelines have been structured around the Design Brief. The core document is **Section 2, Design Brief**. This sets out a suggested format for the Design Brief, and gives guidance for the preparation of each section of this suggesting how it can assist to enhance energy efficiency.

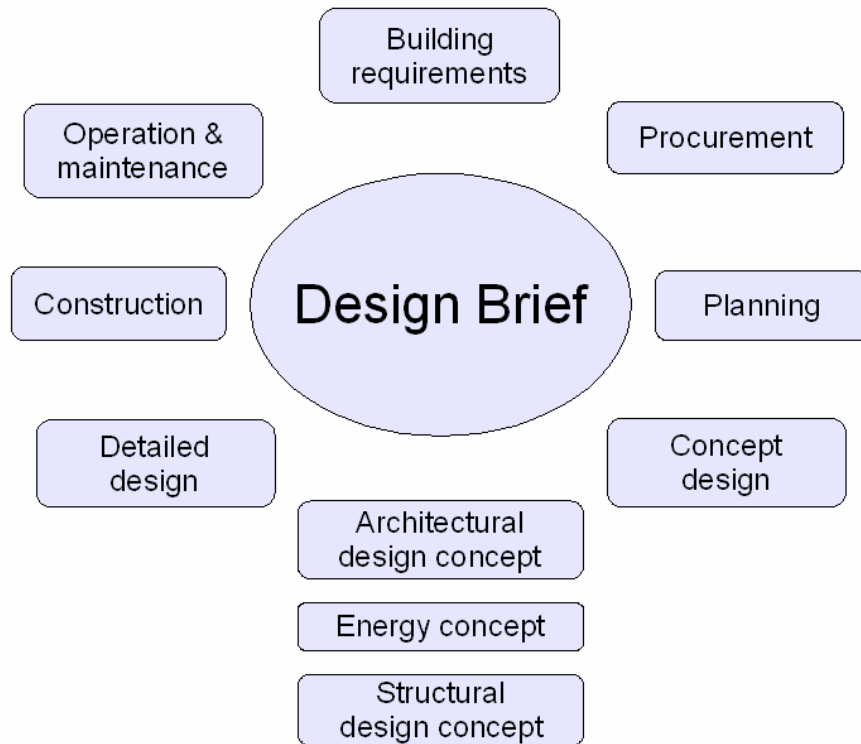
1.3.2. Technical Sections.

The core document has deliberately been kept short and simple, so that it can be useful to a wide variety of people. The more detailed and technical content relating to specific aspects of building design are included in Technical

Sections that are referred to in the relevant parts of **Section 2, Design Brief**.

The Technical Sections themselves also refer to other reference material including Standards, Codes of Practice, books, papers, websites, etc. where relevant information may be found.

Section 13, Appendices provides data on the thermal properties of materials and construction details, and other relevant information.



Technical Sections:

3. Climate.
4. Indoor Environment.
5. Design and construction process.
6. Planning.
7. Building envelope.
8. Mechanical Systems.
9. Lighting - artificial and daylighting.
10. Operation and Maintenance & Building Management Systems.
11. Simulation.
12. Life-Cycle Cost Analysis.
13. Appendices.

1.4. Who is the Guidelines intended for?

It is hoped that the Guidelines will be of interest to all people involved in the process of procurement, design and operation of buildings. This includes the following groups of people:

Owners and developers.

- Building owners.
- Developers.
- Company employees with responsibility for property development.
- Government employees with responsibility for property development.

Planners and design consultants.

- Town Planners.
- Landscape architects.
- Architects.
- Civil Engineers.
- Structural Engineers.
- Electrical Engineers.
- Mechanical Engineers.
- Quantity Surveyors.

People responsible for operation and maintenance of buildings.

- Facility Managers.
- Property Managers.
- Owners.

However it is specifically intended to be used by those involved in preparing and implementing the Design Brief. This includes the ‘client’ and the consultant team responsible for the design, construction and commissioning of the building.