

NATIONAL HOME BUILDERS
NHBRC
REGISTRATION COUNCIL

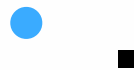
WORKSHOP 4:-
INNOVATIVE
SUSTAINABLE
TECHNOLOGIES 2024.
ISAAC VUSI HARTLEY



City Centre Sustainable Design Housing Competition



- The right to Housing is codified as a human right in the universal declaration of human rights(1948)
- Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family; including food clothing, housing...{article 25(1)}



Availability of services, materials, facilities and infrastructure:

access to safe drinking water, adequate sanitation, energy for cooking, heating, lighting, food storage or refuse disposal are considered an integral part of the concept of adequate housing.

Tenure security:

Occupants of housing have to have some degree of tenure security that guarantees legal protection against forced evictions, harassment and other threats. Protection against forced evictions is considered an integral part of the adequate housing concept

Cultural adequacy:

housing is adequate if it respects and takes into account the expression of cultural identity.



Affordability:

housing is not considered adequate if it is so expensive that it compromises the occupants' ability to enjoy other human rights.

Accessibility:

accessible housing refers to options provided by the state and/or private enterprises and considers the needs of disadvantaged and marginalised groups.

Location:

housing is not adequate if it does not provide easy access to **employment opportunities**, health-care services, schools, childcare centres and other social facilities, or if it is located in polluted or dangerous areas.

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The legislative landscape for housing :_

Section 24 of the Bill of Rights embedded in the Constitution of the Republic of South Africa (Act No. 108 of 1996) states that:

Everyone has the right:

a) to an environment that is not harmful to their health or well-being; and

b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that:

i) prevent pollution and ecological degradation;

ii) promote conservation; and

iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.”

Acts which impact upon housing

National Regulator for
Compulsory Specifications
administers Act

Regulated aspects of housing

- Planning of housing developments
- Design and construction of housing

- National Building Regulations and Building Standards Act 103 of 1977
- Housing Consumers Protection Measure Act 95 of 1998 as amended
- Occupational Health and Safety Act 85 of 1993 Construction Industry Development Board Act of 2000
- Consumer Protection Act 68 of 2008
- National Regulator for Compulsory Specifications Act 5 of 2008

- Management of housing developments
- Safety of constructed homes
- Legislation which relates to the rental and sale of homes
- Provision by the state of housing
Housing Act of 1997

All buildings including homes are in terms of this Act are required to be erected in accordance with the provisions of the National Building Regulations. This Act makes building control officers appointed by the local authority responsible for:

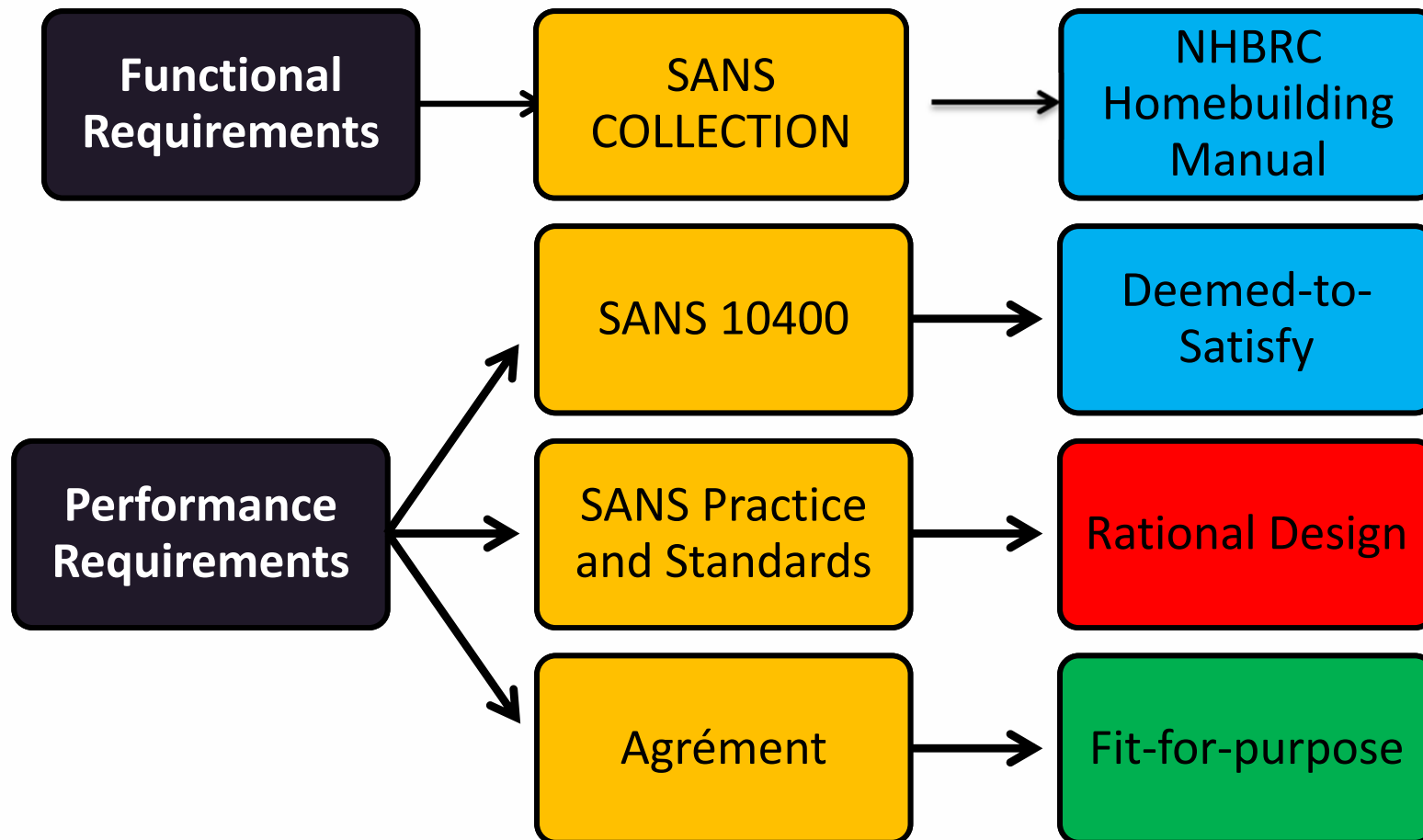
- making the relevant recommendations for approval by the Local Authority of building plans, specifications, certificates, etc,;
- ensuring that the requirements of the Local Authority regarding approvals are carried out; and
- inspecting buildings under construction or completed to confirm compliance with approved plans and specifications and conditions of approval including defined usage, location on site, etc.

The Act establishes the NHBRC as a regulator body of the home building industry. The NHBRC protects housing consumers who are exposed to contractors who deliver housing units of substandard design, workmanship or material. The services provided by the NHBRC are:

- Home builder registration
- Enrolment of new homes
- Home inspection
- Complaints and conciliation Suspension of home builders
- Advisory services
- Home builder training and development

The Department for Human Settlements determines finances, promotes, communicates and monitors the implementation of housing and sanitation programmes in South Africa.

Building Standards and Regulations promote uniformity in the law relating to the erection of buildings; for the prescribing of building standards; and for matters connected therewith.



INNOVATIVE BUILDING SYSTEMS

Classification label	Category	Name of building system
A	Light building system (LBS) with steel structural frame	Vela building system Amsa building system Alternative steel building system FSM building system Space frame building System
B	Light building system (LBS) with structural steel frame and insulated foundations	Imison 3 building system Imison stud building system
C	Light building system (LBS) with panels and light weight concrete	Goldflex 800 building system Goldflex 100 building system Goldflex 800 seismic building system
D	Hybrid building system (HBS)	Automapolyblok building system Aruba building system Blast building system Insulated concrete panel building system Rapidwall building system Styrox building system
E	Heavy weight building system (HWBS) with panels and dense concrete	Banbric building system Robust building system
F	Heavy weight building system (HWBS) with building blocks	BESA 2 building system Hydroform building system Izoblock building system
G	Masonry construction	Masonry

ENERGY EFFICIENCY OF IBT

- Energy efficiency overlaps with thermal comfort in that it establishes how much kWh can be saved to reduce costs on electricity but achieve thermal comfort and improved health at the same time. SANS 10400XA is used as a benchmark against the optimization/rational design of energy efficiency of the building envelope –
- There must be an improvement in energy usage of the optimized IBT home compared to the standard SANS 10400XA IBT home at the design stage.

- ***SUSTAINABLE INNOVATIVE SYSTEM***

1. WALLING SYSTEMS

2. BUILDING SYSTEM

3. ROOFING SYSTEMS

4. CEILING SYSTEM

5. INSULATION

6. WATERPROOFING AND DAMP PROOFING

7. **WALLING SYSTEMS**

CATEGORY A

LIGHT BUILDING SYSTEMS (MONOLITHIC)

CATEGORY D

HYBRID SYSTEMS

CATEGORY E

PREFABRICATED PANELS

Building and walling systems

Monolithic

Hybrid

LSF

Prefabricated/precast panels

Monolithic system

A monolithic building system is a type of construction in which structure members, walls and slabs are constructed together with usually the same or similar materials.

- Speedy Construction
- Provide a speedier solution to the housing shortage.
- Helps to optimise the cost & time of housing.
- Stronger against horizontal forces as compared to conventional Buildings.
- Provides a disaster-resistant structure.
- Require less equipment.
- No need for any type of bricks, blocks, and filling materials.
- Higher quality finished structure.
- Lighter structure.
- No thermal bridges between building elements, better R-value.

- Required a few days of training for workers.
- Repair and maintenance of monolithic construction require skilled labours.
- High Initial Investment
- Required Special types of materials or frameworks.
- **Low flexibility**

Hybrid system

A semi-volumetric construction that combines volumetric units and panel systems. This construction method integrates precast structures such as Light Steel Structure (LSF) or cast in-situ concrete to take advantage of the different qualities that make them unique.

- Helps to optimise the cost & time of housing
- Require less equipment
- No need for bricks, blocks, or filling materials.
- Higher quality finishing
- Fast construction
- Flexible
- Variety of options

- Several thermal bridges between different systems
- Required training for workers
- High Initial Investment
- Required special types of materials or frameworks
- Heavier structure compared to monolithic
- High possibility of water leaking and cracking on the joints of different systems

PREFAB HOUSES



Ecokit's prefab cabin is sustainable home you can assemble for yourself

PREFAB HOUSES



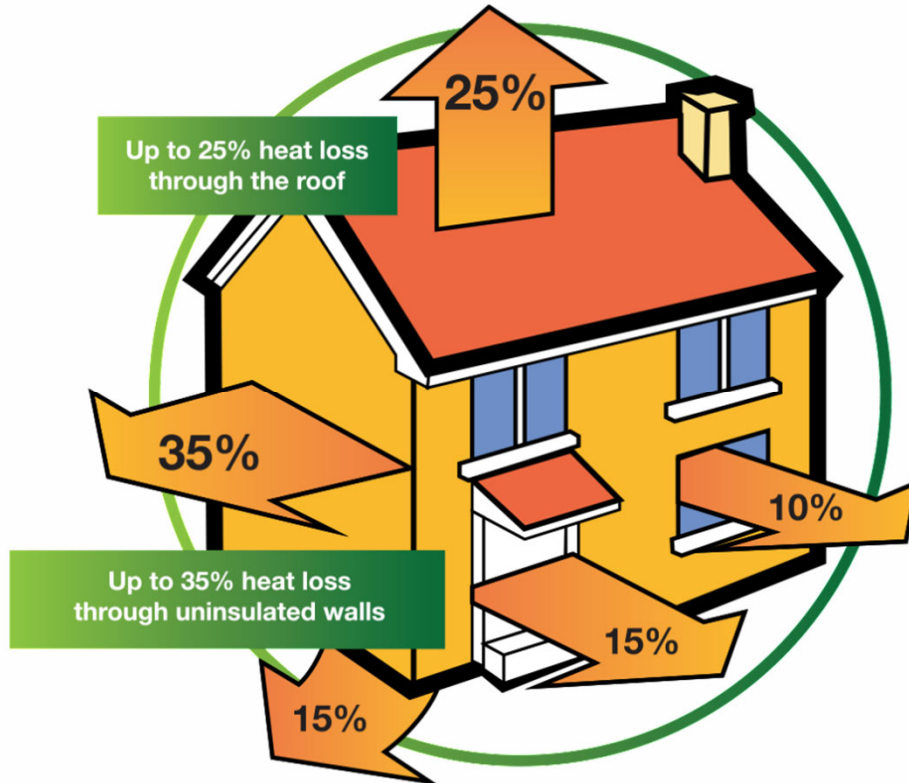
Exterior | LOG HOMES AFRICA SA

Log Homes South Africa | Log homes,
Underground sprinkler, Large yard

DEEM TO SATISFY RULES



What is wrong with current buildings?

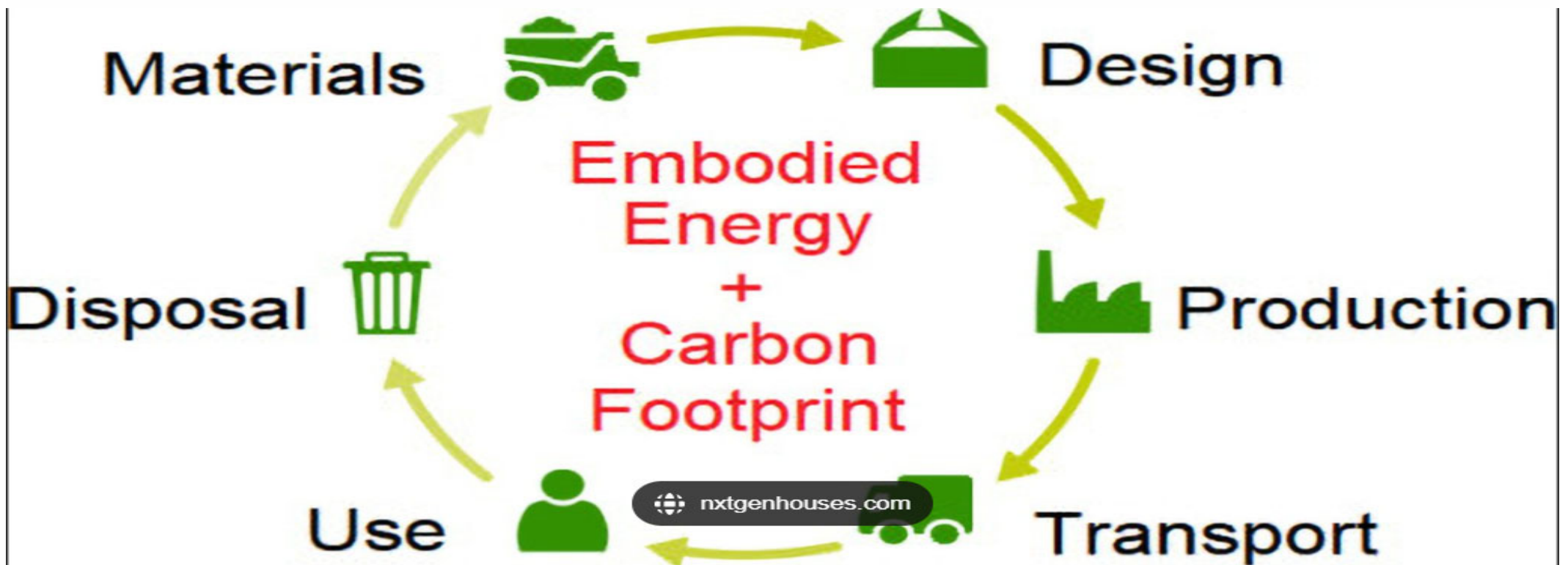


$$25\% + 35\% + 15\% + 15\% + 10\% = 100\%$$



EMBODIED ENERGY

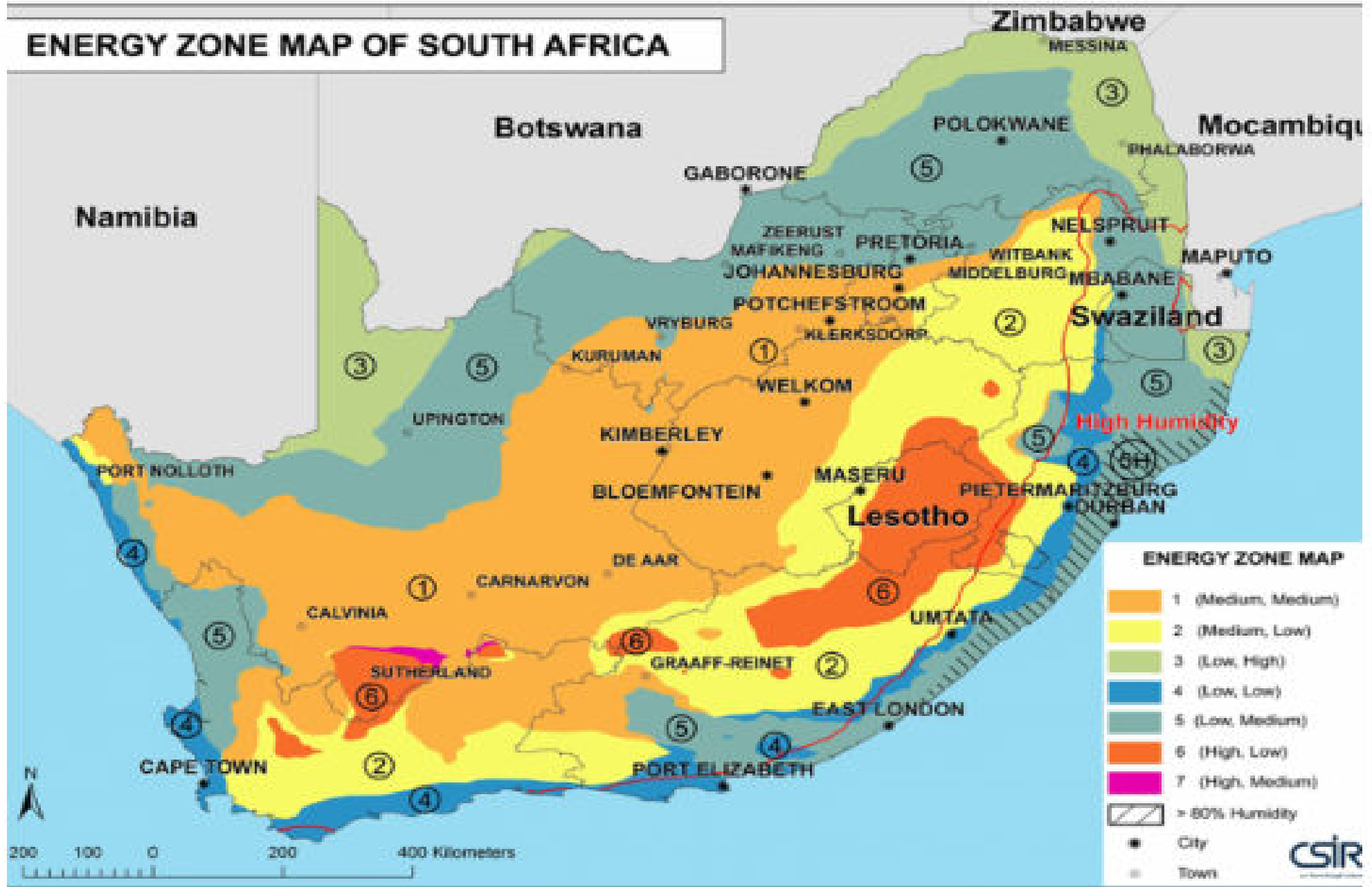
- **Embodied energy** is the [energy](#) that is consumed in order to build a given usable object. This includes the energy from material extraction, refining, processing, transporting, and fabricating.^[2] It is named as such because it is as if this energy is "embodied" within the item itself. Embodied energy also comes along with idea of embodied carbon, which is the associated [CO₂ footprint](#) that is emitted during the object's creation.



USE THE EDGE TOOL

- Compare different scenarios to typical local practices:
- Embodied energy and carbon
- operational energy and carbon
- utility cost
- water use, and
- incremental cost, payback period

ENERGY ZONE MAP OF SOUTH AFRICA



THE NEW STANDARDS NOW APPLY

ENERGY EFFICIENCY OF SYSTEMS

MONOLITHIC SYSTEMS	HYBRID SYSTEMS	PRECAST SYSTEMS
LOW EMBODIED ENERGY	HIGH EMBODIED ENERGY	HIGH EMBODIED ENERGY
SUITABLE TO ALL CLIMATIC ZONES	SUITABLE TO ALL CLIMATC ZONES	NOT SUSITANBLE TO ALL CLIMATIC ZONES
HIGH THERMAL PERFORMANCE	HIGH THERMAL PERFORMANCE	LOW THERMAL PERFORMANCE

- QUALITY SYSTEMS ; -TO COMPLY TO ISO 9001
- STRUCTURAL INTERGRITY: TO COMPLY TO SANS SANS 10160 -2 AND SANS 10400 PART K.
- MANAGEMENT SYSTEMS:- TO COMPLY TO THE CER

STRUCTURAL INTEGRITY

- The objective is to provide a safe and secure house for individuals or communities displaced from their homes due to disasters, conflicts, or other crises.
- Performance Requirements
- **Design Life**
- The performance requirements for emergency housing are as follows:
- 1) The structural system of the shall have a minimum design working life of 30 years as per SANS 10160-1; and
- 2) Repairable or replaceable components and materials, such as claddings, roofing materials, exterior trims, windows, and doors, shall have a minimum design working life of 5 years.
- **Materials**
- These requirements ensure that the housing units are built to be durable and resilient, capable of withstanding the harsh environmental conditions that are often present in emergencies. As per the latest edition of SANS 10160, the structural system of the emergency housing shall be designed to withstand the free stream velocity pressure that is applicable to the region where the housing will be installed.

SOCIAL ACCEPTABILITY

- Objective
- The objective is to ensure that the housing meets the needs and preferences of the occupants and is culturally appropriate and socially acceptable in the community where it is located. This objective recognises that emergency housing is not just a physical structure but also a social environment that affects the mental and emotional well-being of its occupants.
- **Functional requirements**
- The functional requirements related to this objective are:
 - To assure that the house is delivered within the subsidy amount as determined by the Director General of the National Department of Human Settlements; and
 - To create housing that promotes a sense of safety, security, and well-being of the occupants.

Walling Systems



This home in Swaziland is constructed with wooden poles. The walls are filled with rocks, which will then be plastered over with mud. (Jon Sojkowski)

Q & A