



*DRAFT GREEN BUILDING POLICY:
NEW BUILDINGS*

TRANSITIONING TOWARDS A LOW CARBON FUTURE

*APRIL 3, 2020
CITY OF JOHANNESBURG*

Draft Green Building Policy: New Buildings

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DEFINITIONS

“Building” means a structure on land, irrespective of the materials used in the erection or construction thereof. It includes –

- (a) Any other structure, whether of a temporary or permanent nature and irrespective of the materials used in the erection thereof, erected or used for in connection with –
 - i. the accommodation or convenience of human beings or animals;
 - ii. the manufacture, processing, storage, display or sale of any goods;
 - iii. the rendering of any service;
 - iv. the destruction or treatment of refuse or other waste materials;
 - v. the cultivation or growing of any plant or crop;
- (b) any wall, swimming bath, swimming pool, reservoir or bridge or any other structure connected therewith;
- (c) any fuel pump or any tank used in connection therewith;
- (d) any part of the building, including a building as defined in paragraph (a), (b) or (c);
- (e) any facilities or system, or part or portion thereof, within or outside but incidental to a building, for the provision of a water supply, drainage, sewerage, stormwater disposal, electricity supply or other similar service in respect of the building;

“Building Control Officer”: means any person appointed or deemed to be appointed by a local authority in terms of section 5 of the National Building Regulations and Building Standards Act, 1977 (Act No. 103 of 1977) as amended.

“Competent Person”: person who is qualified by virtue of his education, training, experience and contextual knowledge to make a determination regarding the performance of a building or part thereof in relation to a functional regulation or to undertake such duties as may be assigned to him in terms of the National Building Regulations.

“Council”: means the municipal council and legislative authority of the City as contemplated in section 157 of the Constitution.

“Deemed-to-satisfy” requirement: non-mandatory requirement, the compliance with which ensures compliance with a functional regulation

“Development”: the development of land, changes in the use of land or intensification of that use and includes any matter in relation to land for which a development application is required, as defined in the City of Johannesburg Municipal Planning By-law, 2016.

“Dwelling House”: means a detached self-contained inter-connected suite of rooms containing a kitchen and the applicable ablutions, used for the living accommodation and housing of one household, together with such outbuildings and subsidiary dwelling units as is ordinarily permitted therewith, as long as the subsidiary dwelling units complies with the requirements stipulated in the City of Johannesburg Land Use Scheme (2018) in Use Zone “Residential 1”.

An entertainment, reception and/or living area within a dwelling house or part of a reasonably required and ancillary outbuilding.

According to the National Building Regulations and Standards Act (1977), refers to the building class occupancy (H4) consisting of a dwelling unit on its own site, including a garage and other outbuildings, if any.

“ Dwelling Unit ”: as per the Johannesburg Land Use Scheme 2018. Also referred to as “unit” or “units” in this framework. Can also include “dwelling house” as per the Johannesburg Land Use Scheme 2018, in this document.

“ Embodied carbon ”: means the carbon footprint of a material. It considers how many greenhouse gases (GHGs) are released throughout the supply chain and is often measured from cradle to (factory) gate, or cradle to site (of use).

“ Energy Use Intensity (EUI) ”: the total sum of annual energy consumed on-site divided by the building gross floor area (calculated and measured in terms of kilowatt hours per square metre (kWh /m²).

“ Energy Performance Certificate ”: rating scheme to summarise the energy efficiency of buildings.

“ Floor Area Ratio (FAR) ”: as per the Johannesburg Land Use Scheme 2018. The ratio obtained by dividing the floor area of a building/s by the total area of the erf or site upon which the building/s are erected.

“ Floor Area ”: as per the Johannesburg Land Use Scheme 2018. The sum of the gross area covered by the building at the floor level of each story, provided that the area reasonably required for the purposes detailed below may be excluded from the calculations of the floor area, which calculations of the floor area shall be clearly indicated on the building plans. Floor area shall be measured from the outer face of the exterior walls of similar supports of such building, and where the building consists of more than one storey, the total floor space shall be the sum of the floor area of all the storeys, including that of basements.

Areas that may be excluded from the calculation of the floor area are:

- i) any area, including a basement, which is reserved solely for parking of vehicles and loading and off-loading areas;
- ii) 10% of the total floor space area shall be regarded as areas required for the cleaning, care, maintenance and proper mechanical and electrical functioning of the building.

“ Green building ”: a building that takes into consideration resource efficiency and practices environmental responsibility throughout the lifecycle of the building i.e. through design, construction and operation while taking financial impacts into consideration.

“ Hospital ”: means a place for the diagnosis and treatment of human illness; with integrated facilities such as operating theatres and live-in accommodation for patients and staff; and includes a clinic and medical consulting rooms.

“ Greenhouse effect ”: refers to the earth's natural temperature control system in which certain atmospheric gases are critical. Greenhouse gases trap some of the heat radiated by the earth, which results in global warming – an increase in the average temperatures experienced on earth.

“ Greenhouse gas emissions ”: refers to gases that include carbon dioxide, methane, nitrous oxide, sulphur hexafluoride, perfluorocarbons, hydrofluorocarbons and nitrogen trifluoride that result from anthropogenic activities and which contribute to the Greenhouse effect.

“ HVAC ” – Heating, Ventilating and Air Conditioning

“ Hospital ”: means a place for the diagnosis and treatment of human illness; with integrated facilities such as operating theatres and live-in accommodation for patients and staff; and includes a clinic and medical consulting rooms.

“Land development application”: means an application for the erection of buildings or structure on land, or the change of use of land, including township establishment, the subdivision or consolidation of land or any deviation from the land use or uses permitted in terms of an applicable land use scheme.

“LED”: Light-Emitting Diode

“Major refurbishment”: defined as construction that results in the fundamental remodelling or adaptation of existing elements of the building envelope, structure and renewal of key building services.

“New building”: new permanent building construction, including major refurbishments.

“Net Zero Carbon Building”: a building that is highly energy-efficient, and the remaining energy use is from renewable energy, preferably on-site but also off-site where absolutely necessary, so that there are zero net carbon emissions on an annual basis (Net Zero), or if the energy from renewable energy results in more energy being produced than what is used on site (Net Positive).

“Net Positive”: generating energy which is more than what is required for the building operation.

“Off-site renewable energy”: energy generated from renewable sources outside the boundaries of the building site.

“On-site renewable energy”: energy generated from renewable sources produced at the building site.

“Office”: means the use of a: New permanent building/s and/or land for the conducting of an enterprise primarily concerned with administrative, clerical, financial or professional services and includes medical consulting rooms and financial institutions.

“Operational load”: refers to the total energy consumption of the building including all building services / functions. Excludes energy used in construction processes;

“Place of instruction”: means the use of a building/s and/or land for education at pre-school, and/or school and/or post school levels construction, including a crèche, nursery school, child care centre, early childhood development centre, primary school, secondary school, college, technical institute, university, research institute, lecture hall.

“Plug Load”: the energy used by products that are powered by means of an ordinary AC plug (e.g., 100, 115, or 230 V). This term generally excludes building energy that is attributed to major end uses (HVAC, lighting, water heating, etc.)

“Rational Design”: design approach quantified, using set models or values, to allow optimal performance of a building and optimal comfort level for its occupants.

“Renewable Energy”: energy generated from renewable resources, as may be determined from time to time, which are naturally replenished on a human timescale, by sunlight, wind, rain, tides, waves and geothermal heat, by photovoltaic systems, solar thermal power plants, geothermal power plants, and wind turbines. This might also include biogas production from organic waste.

“Residential Building”: means the use of a building/s, excluding a dwelling house and/or dwelling unit, that contains habitable rooms, with or without common ablution facilities and with common kitchen-, dining-, and/or lounge facilities such as hostels and dormitories,. Such definition includes but is not restricted to hostels, hotels, dormitories, communes, boarding houses, guest houses (excluding

converted dwelling houses and/or dwelling units), bed and breakfasts and old age homes that may or may not include ancillary frail care facilities.

“Residual building energy”: the remaining energy demand required to operate a building.

“Resources”: refers to natural or man-made materials and/or substances whose utility can be exploited for economic gain. The City of Johannesburg refers to energy, water, waste and the ecology.

“Resource efficiency”: means the optimisation of the use of resources to ensure that they can be continuously replenished, or to ensure that there is an endless amount of it that can be captured or harnessed and useful towards providing energy without there being a decrease in supply.

“Resource efficient building”: refers to a development that consumes minimal energy and water, and decreases waste generated from the building operations, offering positive impacts to relevant stakeholders.

“Retail”: see “shop”.

“Site”: single or multiple erven forming the subject of a building plan application.

“Shop”: according to the City of Johannesburg Land Use Scheme (2018), means the use of a building/s and/or land for the retail sale and accompanying storage of goods and services to the public, including a retail concern where goods which are sold in such a concern are manufactured or repaired; provided that the floor space relating to such manufacture or repair shall not comprise more than 30% of the floor space of the shop; “shop” does not include industry, service trade, public garage or restaurant.

“Shop, Large”: according to the National Building Regulations (1977), building class occupancy (F1) where merchandise is displayed and offered for sale to the public and the floor area exceeds 250m².

“Shop, Small”: according to the National Building Regulations (1977), building class occupancy (F2) where merchandise is displayed and offered for sale to the public and the floor area does not exceed 250m².

“Small-Scale Embedded Generator”: power generation under 1MW/1000kW, which are located within the distribution network and produce for own their own use or feed excess back into the grid.

1. INTRODUCTION

1.1 *Changing the development trajectory*

In response to growing climate change concerns and an imperative to transition to sustainability, the City of Johannesburg through its Development Planning Department is in the process of drafting a policy to guide the development of green buildings within the City. The aim of the City's first Green Building Policy is to promote resource efficiency and set high-performance standards for all new buildings within Johannesburg's built environment, on a pathway towards a low carbon future.

Accelerating the transition of Johannesburg to a sustainable city is central to service delivery and growth- and the health and well-being of our communities and citizens.

Although the City of Johannesburg has continuously been improving service delivery in key sectors, including energy, waste management, water and sanitation, and public transport, the challenges are exacerbated by rapid urbanization and population growth in a city still struggling with the legacy of apartheid spatial development. This results in an inefficient city across sectors, increased greenhouse gas emissions and over-reliance on limited natural non-renewable resources and increased vulnerability to shocks. This not only severely limits the City's economic growth potential, but impacts the quality of life of all citizens. The poor remains the most vulnerable and the result is deepening poverty affecting the majority of the City's residents.

Climate change is one of the major challenges affecting global society. The main concern related to climate change is global warming, which is based on a 'greenhouse' effect. Commitment and decisive, effective action is required to reach global commitments that will limit future warming to below 1.5 °C. South Africa, and the major metropolitan cities in the country, including Johannesburg, have committed to addressing climate change, through finding new ways to balance development priorities with efforts to reduce the resource, energy and carbon intensity of our economy. South Africa is ranked among the top 20 countries measured by absolute carbon dioxide (CO₂) emissions, with emissions per capita in the region of 10 metric tons per annum. Gauteng estimated its CO₂ emissions for 2030 to be a third of the national emissions trajectory. This is being driven primarily by the electricity intensive economy responsible for about one third of South Africa's energy consumption and GDP.

The biggest opportunities for emissions reduction can only be realized through a significant transition in urban form, energy sources, transportation and resource efficiency. The built environment (i.e. urban form) produces a third of the world's carbon dioxide emissions and, thus, needs to be at the forefront of efforts to drastically reduce the amount of CO₂ generated.

1.2 *Strong legislative and policy direction*

The Green Building Policy derives its legislative and policy impetus from a number of legal frameworks (draft and approved) from national to the local level, addressing climate change, environmental sustainability, natural resources and infrastructure, including:

The Constitution, Act 108 of 1996 in Section 24 states that everyone has the right to have the environment protected, for the benefit of present and future generations, through reasonable legislative focused and other measures that prevent pollution and ecological degradation; promote conservation, and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development. Furthermore Chapter 7 of the Constitution read in conjunction with schedule 4 part B states that Local Government has authority over municipal planning, building regulations as well as the reticulation of electricity within its local jurisdiction. The

National Development Plan (National Planning Commission, 2012) identifies the transition to a low-carbon economy and sustainable resource management as one of ten priority areas, with the imperative to develop regulations towards net zero buildings by 2030. The National Climate Change Response White Paper (2012) identifies the regulation of commercial and residential building standards to enforce green construction practices as one of its mitigation strategies to ensure emissions reductions while limiting job contraction and promoting the green economy.

The National Building Regulations, and specifically SANS 10400XA (2011), regulates energy efficiency of buildings in South Africa. The recently published draft updated SANS 10400XA Version 2 (2020) regulations introduces more stringent energy efficiency requirements. Given the overall South African and City of Johannesburg climate change commitments, greater efficiencies and further carbon emission reductions will be required over the next decade and other critical resource scarcities also have to be considered.

Provincial strategies such as Gauteng Climate Change Response Strategy and Plan (2017) also specifically identifies the need for the building sector to be transformed to ensure significant carbon emissions reduction.

Many of the City's spatial, environmental and infrastructure policies, strategies and by-laws already addresses urban form, resource efficiency and low-carbon development as part of the City's overall sustainability framework in support of the City's long-term Growth and Development Strategy (GDS). The City vision as declared in the GDS: "[to be] a Smart City that provides high quality of life; [a] City that provides sustainable services for all its citizens; and a resilient society". The vision is coupled with a mission that speaks to "optimal management of natural resources and the environment". This is further embodied in three of the GDS outcomes, namely:

- Outcome 1: Improved quality of life and development-driven resilience for all.
- Outcome 2: Provide a resilient, liveable, sustainable urban environment – underpinned by infrastructure supportive of a low-carbon economy.
- Outcome 3 also has a dedicated environmental focus: "Enhanced, quality services and sustainable environmental practices". This outcome speaks to six outputs which include water security; energy efficiency; waste reduction; eco-mobility; sustainable human settlements and climate change resilience and environmental protection.

The City of Johannesburg aims to adopt a policy, with an approach that will promote green building design for all new buildings, including major refurbishments without mandating high-tech and expensive additions. This would be the first decisive step in the direction of changing the development trajectory towards a more sustainable, low-carbon built form.

The Green Building Policy is part of a larger system of spatial and development management - and ultimately to achieve deep efficiency and renewable resource systems, will require precinct level approaches. Technical advances and innovative systems approaches are encouraged to emerge to tackle the dynamic technological, social and economic complexities. 1.3 What if we don't act now?

The urgency of reducing greenhouse gas emissions and other environmental impacts, together with increasing non-renewable resource scarcity is driving the change to a more sustainable built environment. There is a critical window of opportunity to address buildings and construction in the coming decade to avoid locking in inefficient buildings for decades to come.

Buildings are estimated to contribute approximately 40% of carbon emissions in South Africa.

In the case of Johannesburg, the building sector is set to grow (and in fact, this growth is key to Johannesburg's transition into a spatially just and inclusive city) and the emissions generated are expected to grow with it. The aim of this policy is to direct and focus this growth along with a greener

and more sustainable trajectory, so that the growth of the city does not have to equate to an acceleration of climate change.

Typically, buildings have a relatively long lifespan of 40 to 120 years and the building stock in cities is growing rapidly. Significant opportunities exist for decreasing emissions from buildings through reducing energy demand in buildings and then supplying remaining energy demand with energy generated from renewable energy sources such as rooftop solar panels. Any inefficient building built now, “locks in” high energy use into the future, because although retrofitting with efficient technologies (such as efficient lighting) can help reduce energy demand, the actual building’s design can reduce the number of energy services required in the first place. Buildings are also consumers of services such as energy, water as well as producers of waste. They are essential to tackling service delivery challenges if developed in a manner that minimizes resource consumption.

1.4 Purpose of the policy

The aim of the Green Building Policy is to actively promote resource-efficient design, construction and operational practices for all new buildings in Johannesburg in order to mitigate the lifecycle impacts of buildings on the environment while maximising positive social and economic impacts.

The objective is to achieve low to net zero carbon by 2030 for all new buildings in the city by 2030.

This policy is intended to help plans examiners, inspectors, designers, developers, owners, occupants and energy consultants who wish to submit a building application to the City of Johannesburg.

1.5 Policy approach

Realizing low to net zero carbon targets are challenging and require major shifts in the built environment industry and the behaviour of users. The policy approach is to outline a pathway over time, to reach targets set out for the next thirty years, with a specific emphasis on critical changes to be made within the first decade.

The approach emphasises the need for all building categories to firstly improve energy efficiencies through innovative design and technology and reducing energy use; and thereafter meeting the buildings’ residual electricity consumption through the provision of renewable energy from 2030. Voluntary inclusion of renewable energy before 2030 is not precluded, but it is not mandatory before 2030.

Carbon emissions vary between different building categories. Each building category has its own energy intensity target and timeframe for the inclusion of renewable energy.

Residential development is the biggest contributor to the city’s carbon emissions and the annual increase in carbon emissions, but its sub-categories are also the most costly in terms of financial feasibility. Consideration for the impact of the pathway and targets on feasibility and affordability is reflected in the thresholds used.

It is important to note that the scope of this policy extends only to the design, construction and the operational energy use of new development. The consideration of embodied carbon currently falls outside the prescripts of this policy; however, the incorporation of local materials are highly encouraged. It is envisaged that future policy reviews will consider embodied carbon requirements.

In addition to the pathway towards net zero carbon for all new buildings, development requirements are set out addressing energy, waste and water.

2. GENERAL REQUIREMENTS AND CONDITIONS FOR APPROVAL AND IMPLEMENTATION OF GREEN BUILDINGS

2.1 Application

The Green Building Policy is applicable to all new buildings, including major refurbishments that require building plan approvals. Major refurbishments are defined as “*construction that results in the fundamental remodelling or adaptation of existing elements of the building envelope, structure, and renewal of key building services.*”

2.2 Submissions

Building plan submissions to Council must demonstrate that the proposed development will comply with the mandatory standards outlined in the Green Building Policy. Compliance with mandatory standards should be demonstrated through the submission of completed forms (Annexure X) and any required supporting documentation. Complete and correct documentation must be provided; if not, the submission will not be assessed and will be returned for completion and resubmission.

It should be noted that submission requirements may be amended from time to time by the Council in order to support ongoing performance improvement in the built environment. It is the responsibility of persons wishing to submit applications for building plan approval to check that they are using the latest, and current, submission forms.

Submissions of building plan applications must be made by a competent person. A competent person is defined as a built environment professional as defined by the application requirements. Meeting the mandatory requirements will require an integrated design approach; specifically with regards to integrating energy modelling into the design process and providing supporting documentation meeting the City's requirements.

2.3 Green Building Policy: Penalties for Non-compliance

Submissions that do not comply with mandatory standards will not be approved until the submission is fully compliant with the City of Johannesburg's Green Building Policy. Buildings found to be non-compliant with mandatory standards at the point of completion may have their occupation certificate withheld until the building is fully compliant.

If any incentives were applied as part of the land use application process and the envisaged performance is not achieved at building plan approval/occupation certificate phase, penalties will be imposed.

2.4 Green Building Incentive Scheme

The Municipality may, from time to time, provide incentives to submissions that not only comply with mandatory standards but also comply with promoted standards. Incentives may include but are not limited to the following non-financial and financial incentives:

- Expedited development application procedures
- Additional land development rights, including floor area, height and density
- Relaxation of specific planning requirements such as parking provision
- Formal recognition of performance through recognition.
- Reduced development contributions
- Access to reduced cost or free green building technical training and seminars
- Access to municipal negotiated discounts for energy efficient / sustainable technologies

- Access to municipal negotiated finance interest rate reductions from banks and financial institutions
- Assistance in applying for grants or tax incentives for investments in energy efficient/sustainable technologies

2.4.1 Development Contributions

Developments planned and constructed to achieve a net zero carbon and/or net zero water footprint will be eligible for the reduction or waiving of development contributions as per the CoJ Development Contributions Policy (2020)¹.

2.4.2 Additional land development rights for developments aiming to achieve net zero before 2030

Developments that will consist of new buildings or major refurbishments aiming to achieve net zero before 2030, will be considered for additional land use right (density, floor area ratio and height) at the time of consideration of land use applications, subject to the following:

2.4.2.1 Applications shall be located within the spatial areas defined as Transformation Zones in terms of the City's approved Spatial Development Framework, 2040.

2.4.2.2 A maximum increase of 50% from the allowable policy parameters as per relevant spatial policy- floor area ratio, height and/or density – will be considered.

2.4.2.3 Conditions will be included into the approval of the applicable land use application that ensure that additional land use rights may only be exercised if Building Plans reflect the achievement of the net zero target.

2.5 Starting Date and Review Period of the Policy

The policy will come into effect 90 days from the adoption of the policy by Council.

The policy should be reviewed within four years of it coming into effect (90 days from the adoption of the policy by Council) and every five years thereafter. The review should assess the success of the policy and make relevant changes if any. Reviews may take place as and when required by Council, with due process to be followed.

2.6 Application of the Policy within Broader Legislative Framework

The policy supports the City in executing its mandate in addressing aspects related to electricity reticulation, building regulations and municipal planning in terms of section 156 read with Schedule 4 Part B of the Constitution.

The Green Building Policy will inform the assessment of building applications for all new buildings in the City from the starting date and may inform land use application decisions as part of the incentive scheme. Development proposals should comply with the policy criteria as they are entrenched in City's approved policy. Non-compliance with these criteria may result in the rejection of a building or land use application.

The development proposals must however also comply with any other acts, regulations and municipal by-laws which remain legally enforceable.

Should there be any discrepancy with provisions in the underlying legislation, the actual legislation takes precedence and should be consulted directly.

¹ Currently Draft Development Contributions Policy

2.7 Green Building Policy and subsequent Green Building By-law

The municipality aims to use various instruments to ensure, and support, the development of a more sustainable built environment. These include:

- Green Building Policy: A policy applicable to all new buildings in the city that embeds and actions resource efficiency targets, control mechanisms, approval processes and related incentives that are required to transform the built environment towards a carbon-neutral status.
- Green Building By-Law: This will come into effect upon Council approval. Accompanying (to the Policy) By-Laws to legislate resource efficiency mechanisms and controls

3. PATHWAY TOWARDS REACHING NET ZERO CARBON

3.1 Description of the proposed pathway

- 3.1.1 The approved SANS 10400 XA (2011) energy efficiency standards, as part of the National Building Regulations, forms the base of the current energy intensity values.
- 3.1.2 The newly published (draft) SANS 10400 XA Version 2 (2020) provides the target energy intensities for 2021² – this would require a significant improvement of energy efficiencies and includes additional categories of buildings targeted.
- 3.1.3 The energy intensity target for 2022 will be the SANS 10400 XA Version 2 (2020) but will include plug loads. i.e. there are no additional energy efficiency requirements but the introduction to EI reporting (i.e. kWh/m²/annum operational load (including plug load)). This will allow developers to become acquainted with the design tools and the reporting requirements.
- 3.1.4 The pathway 2025 EI target is 30% off SANS 10400 XA (2020) and covers total operational load. Thus the EI target is SANS 10400 XA (2020) plus the City energy efficiency requirement (30% improvement).
- 3.1.5 The pathway 2030 EI target is the 2025 EI target plus a further 25% off the SANS 10400 XA (2020) and covers total operational load. The renewable energy requirement must be met and this will result in a total 55% improvement.
- 3.1.6 The pathway 2030 EI target value is the amount of renewable energy (preferably on-site) that is required to make the building NZC.
- 3.1.7 The pathway 2040 and 2050 targets are a further 10% improvement on the 2030 targets. However these EI targets are indicative only and will be reviewed at a later date based on technology and material development.
- 3.1.8 Embodied energy is not currently part of the requirements. However, the City encourages that lifecycle cost is considered in the extraction of materials, manufacturing, design, construction and operation and demolition of new developments.

² Plug loads are excluded from SANS 10400 XA. However, the pathway EI target values are operational and hence include all loads in the building (including plug loads) and thus the EI target values from 2022 will be SANS 10400 XA: 2020 values adjusted to include plug loads.

3.2 Approach

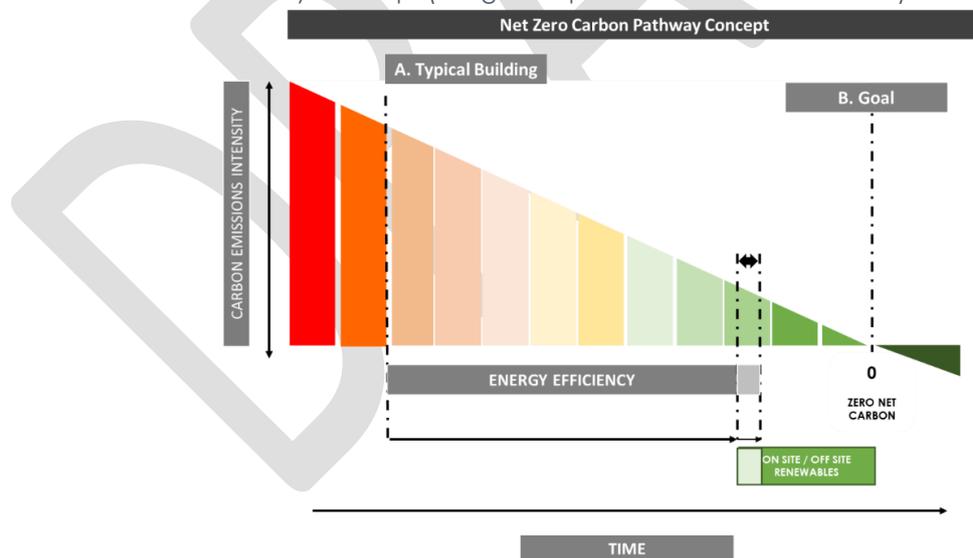
To achieve net zero carbon for all new buildings by 2030, the following is required:

- 3.2.1 Firstly, for all building categories to significantly improve energy efficiency first, through interactive design, technology and systems improvements. To determine whether a building's energy use intensity is meeting the required intensity value, a buildings' annual energy use intensity relative to its floor area is calculated and measured in terms of kilowatt-hours per square metre (kWh /m²). Annual energy use intensities are outlined in the table below.
- 3.2.2 Secondly, for the residual electricity requirements to be met through the provision of renewable energy, mandatory from 2030 onwards for the building categories within the threshold as outlined in the table below.

This approach is illustrated below:

- A. **Reducing** building energy demand for **heating, cooling and lighting** through passive heating/ventilation /cooling design and improved building envelope/ daylighting performance techniques;
- B. **Reducing** total building energy demand and operational building use energy demand through the **installation of high efficiency mechanical, lighting and power systems**, and energy efficient appliances; and
- C. **Supplying** remaining building energy needs from a **renewable source of energy**, (on-site to the extent possible and optimal and then off-site) where necessary.

Figure 1 Zero Net Carbon Pathway Concept (Image adapted from Architecture 2030)



3.3 Development threshold and exemptions

- 3.3.1 This policy applies to all new buildings and major refurbishments in the City of Johannesburg area of jurisdiction.
- 3.3.2 The following development thresholds are excluded from meeting the net zero targets by 2030 and are required to demonstrate compliance with the minimum energy performance standards in accordance to the SANS 10400 part XA Revision 2 as amended:

3.3.2.1 Major refurbishments in any of the building categories measuring less than 250m² in extent.

3.3.2.2 Free standing dwelling houses with a total floor area equal to or less than 80m².

3.3.2.3 Residential dwelling units with a market value of less than R450 000³ per unit (though the total value of the residential building may exceed this value).

3.3.2.4 Retail: Small shops with a total floor area equal to or less than 250m².

The following table indicates the Energy Use Intensity (EI) targets for the exempted categories:

Table 1: EUI targets for exempted thresholds

Occupancy	Class of Occupancy or building	Occupancy Description	Energy Intensity (EI) kWh/m ² /annum						
			2011	2020	2022	2025	2030	2040	2050
Retail	F2	Small shop <250m ²	-	60	60	60	60	39	36
Residential	H4.1	Dwelling units < R450k value;	-	55	55	55	55	35	33
	H4.1	Dwelling houses that do not exceed 80m ²	-	55	55	55	55	35	33

The following table indicates the Renewable Energy (RE) targets for these categories:

Table 2: RE targets for exempted thresholds

Occupancy	Class of Occupancy or building	Occupancy Description	Energy Intensity (EI) kWh/m ² /annum						
			2011	2020	2022	2025	2030	2040	2050
Retail	F2	Small shop <250m ²					0	27	27
Residential	H4.1	Dwelling units < R450k value;	-				0	25	25
	H4.1	Dwelling houses that do not exceed 80m ²	-				0	25	025

3.3.2 However, the abovementioned categories are required to meet the following requirements:

3.3.2.1 Any building plan submission for developments within the abovementioned categories must demonstrate compliance with the South African Building Regulations SANS 10400-part XA as amended; and

3.3.2.2 Must comply with the City's Energy Checklist.

³ Market value should increase in line with the national housing price index/ prices may be corrected for inflation using yearly consumer price inflation rates for housing in urban areas, published annually by Statistics South Africa.

3.3.2.3 Must demonstrate the use of alternative energy sources that are non-electrical and/or highly energy-efficient cooking appliances.

3.4 Building Energy Use Intensity (excluding renewable energy requirements)

The proposed minimum energy use intensity for building use (without consideration of renewable energy) have been set to ensure maximum energy efficiency. This means all building applications must meet or exceed (i.e. achieve a lower metric) the energy use intensity (in kWh/ m² per annum) according to their building type as per the following table:

Table 3: Energy Intensity Figures

Occupancy	Class of Occupancy or building	Occupancy Description	Energy Intensity (EI) kWh/m ² /annum						
			2011	2020	2022	2025	2030	2040	2050
			SANS 10400 XA	SANS 10400 XA V2	SANS 10400 XA V2 with compulsory EUI reporting	SANS 10400 XA + 30% EE	SANS 10400 XA + 45% EE	SANS 10400 XA + 55% EE	SANS 10400 XA + 65% EE
Office	G1.1	Large multistorey office buildings	190	80	80	67	43	33	24
	G1.2	Standalone buildings in Office parks	190	80	80	56	36	28	20
	G1.3	Call Centres	190	145	145	102	65	51	36
Retail	F1	Large shop >250m ²	245	110	110	102	65	51	36
	F2	Small shop <250m ²	-	60	60	80	80	80	80
School	A3.3	Urban, suburban and rural locations	400	45	45	39	25	19	14
Hospital	E2.1 & E2.2	Large hospital & medium short stay	-	135	135	123	79	61	44
	E2.3 & E2.4	Day hospitals and clinics	-	70	70	63	41	32	23
Hotel	H1.1	Hotel	600	145	145	102	65	51	36
Domestic houses	H4.2, H4.3, H4.4	Middle income and luxury houses >R450k value	-	55	55	49	32	25	18

3.4.1 The energy use intensity is the total energy used by the building in its operation, including plug loads, divided by the gross floor area;

3.4.2 All building applications must meet or exceed (i.e. achieve a lower metric) the energy use intensity (in kWh/ m² per annum) according to their building type;

3.4.3 Operational loads to allow for 10-15% from base build.

- 3.4.4 The maximum energy use intensity values are per Class of Occupation or Building type. The values are based on SANS 10400 XA Revision 2 (2020) as amended and modified to achieve Net Zero Carbon by 2030. This requires progressively higher standards for new buildings erected during particular time periods. In addition, these energy use values include both base and “plug” (operational) loads.
- 3.4.4.1 Compliance with the 2020 EUI target must be achieved in alignment with the prescribed SANS 10400 XA Revision 2 standard as amended (i.e. excluding plug load) for all buildings.
- 3.4.4.2 Compliance with the 2022 EUI target XA must be achieved in alignment with the prescribed SANS 10400 XA Revision 2 standard as amended, and must be adjusted to include plug load resulting in a 10-15% efficiency improvement with compulsory EUI reporting to Council.
- 3.4.4.3 Compliance with the 2025 and 2030 EUI target values must be demonstrated to consider the total load of the building (i.e. the operational load).
- 3.4.5 The maximum energy use intensity values so determined by Class of occupancy or Building Type will be as per the table above.
- 3.4.6 All buildings above 500m² must provide smart metering.
- 3.4.7 All buildings that are sublet must provide metering for all separate tenant spaces in a building.

3.5 *Renewable energy contribution*

The proposed minimum renewable energy generation requirements for building use have been set to ensure maximum energy efficiency. This means the following must be considered:

- 3.5.1 Once a building has reduced its site energy demand to meet the prescribed standards, it will require the adoption of renewable energy generation to offset the residual building energy (operational load), as outlined in the table below.
- 3.5.2 Renewable energy sourced to meet the residual building energy use intensity should be on-site (to the extent possible and optimal) and where on-site potential cannot meet demand requirements, off-site through power procurement schemes such as Tradeable Renewable Energy Certificates (TRECs) or through a contribution to the City's RE Generation Programme. Carbon offsets shall be considered for all new developments from 2030.
- 3.5.3 Onsite generation to demonstrate rooftop photovoltaic panels on the building plan.
- 3.5.4 Onsite renewable energy must be supplemented by an energy storage system.
- 3.5.5 In addition to renewable energy generation, energy storage must be adopted as a demand side management tool. Battery energy storage systems and alternative storage technologies i.e. geysers and automatic generators shall be used for scheduling and load management functions. The City's electricity grid network also provides an opportunity for energy storage.
- 3.5.6 All renewable energy generation including storage must comply with the City's Energy and Electricity Bylaw.

The table below outlines the modified values of renewable energy generation required for a building to reach net zero carbon:

Table 4 Renewable Energy Figures

Occupancy	Class of Occupancy or building	Occupancy Description	Renewable energy kWh/m2/annum						
			2011	2020	2022	2025	2030	2040	2050
				voluntary installation			compulsory to meet net zero requirement, but additional voluntary if City able to accept "prosumption"		
Office	G1.1	Large multistorey office buildings					43	33	24
	G1.2	Standalone buildings in Office parks					36	28	20
Retail	F1	Large shop >250m2					65	51	36
School	A3.3	Urban, suburban and rural locations					25	19	14
Hospital	E2.1 & E2.2	Large hospital & medium short stay					79	61	44
	E2.3 & E2.4	Day hospitals and clinics					41	32	23
Domestic house	H4.2, H4.3, H4.4	Middle income and luxury houses >R450k value					32	25	18

3.6 Required Documentation

Applicants are required to submit the following documentation with the building plan application⁴:

- 3.6.1 Documents with drawings, data and calculations sufficient to ascertain compliance with the applicable annual energy performance target for buildings and their sites, using predictive modelling.
- 3.6.2 A computer simulation model report of the development demonstrating the energy use intensity completed and signed off by a competent person⁵. This is calculated based on the total predicted annual energy use intensity of the entire building energy simulation divided by the gross floor area.
- 3.6.3 Proof of Small-Scale Embedded Generation application form and/or admissible renewable energy procurement certification.

⁴ Voluntary before 2030 - where renewable energy is used to meet residual building energy on-site; mandatory from 2030 where renewable energy is required.

⁵ A competent person – a person who is qualified by virtue of his education, training, experience and contextual knowledge to make a determination regarding the performance of a building or part thereof in relation to a functional regulation or to undertake such duties as may be assigned to him in terms of the National Building Regulations. This may typically be a mechanical engineer or architect, who has been on appropriate courses pertaining to the SANS 10400-XA 'Energy Usage in Buildings' Regulations

4. RESOURCE EFFICIENCY: WATER AND WASTE

4.1 Water efficiency

The purpose of this policy is to lower the *water consumption* to the maximum extent feasible for all building categories by:

- A. **Reducing** water consumption through water-sensitive design, construction and operation of buildings ;
- B. **Reducing** operational building use water demand through the **installation of highly efficient water harvesting and reuse systems**, and water efficient appliances.

4.2 Waste management

The purpose of this policy is furthermore for every type of building to effectively manage its *waste stream* to the extent that maximum diversion of waste from landfill is ensured. The purpose of this policy is to lower the waste generated during the building's construction and operational phase **and promote** waste minimization and upcycling of waste materials. This can be achieved by:

- A. **Reducing, reusing and recovery** of waste streams to **convert them to valuable resources** with minimum solid waste sent to landfills over the course of the year; and
- B. **Sourcing** waste from other sites and diverting waste from landfills for onsite **reuse** (on-site to the extent possible and optimal and then off-site) where necessary.

5. DESIGN AND DEVELOPMENT REQUIREMENTS

This section outlines the key areas of interventions and guidelines to be adhered to achieve the overall objectives:

5.1 Energy use and Greenhouse gas emissions

The building envelope (Opening, Walls, Windows, Roof assembly) shall be designed to increase thermal performance of the building. Demonstrate that the thermal performance of the building is equal to or better than the national building regulations.

- 5.1.1 The building design shall reflect the most optimum passive solar energy and shading strategy.
- 5.1.2 The energy demand shall be met by renewable energy and clean energy sources for all cooking, lighting, and space heating and cooling requirements.
- 5.1.3 Water heating to be met by alternative energy sources.
- 5.1.4 All electrical appliances shall be A-rated according to the Energy Labelling Standards.
- 5.1.5 All new buildings with a floor area above 500 m² must provide smart metering.
- 5.1.6 All new buildings must provide sub-metering where applicable.

- 5.1.7 All new buildings that are sublet must provide sub-metering for all separate tenant spaces within a building.
- 5.1.8 All new buildings must demonstrate that energy demand has been supplemented by renewable energy.
- 5.1.9 Energy source mix to be in line with the City's Energy Plan and Electricity Bylaws.

5.2 Water efficiency

- 5.2.1 All buildings must demonstrate a minimum of 20% reduction in water use from theoretical base building (this exempts all residential buildings with a total floor area of 80m² or below.).
- 5.2.2 All buildings must provide sub-metering where applicable.
- 5.2.3 All buildings that are sublet must provide sub-metering for all separate tenant spaces in a building.
- 5.2.4 All buildings are required to analyse water consumption through water account structuring, staff encouragement and if possible an incentive programme to ensure responsible water use behaviour, water leak detection, water meter / sub-meter installations, load investigation / record keeping and/ or low-pressure regulators.
- 5.2.5 All buildings with a floor area above 500m² are required to demonstrate water re-use by installing the relevant technologies.
- 5.2.6 All buildings required to demonstrate water recycling by installing the relevant technologies.
- 5.2.7 Implementation shall be monitored by promoting education programmes, water reduction strategies, development of strategies, on site-specific water balance.
- 5.2.8 Performance shall be monitored through metered consumption data for 12 months of the building's operation. Water consumption data for the past 12 months must be collected in order to demonstrate compliance with the policy criteria.

5.3 Waste management

- 5.3.1 All buildings larger than 1000m² are required to provide a waste management plan which will be provided to all developments greater than. Waste management plan to be submitted to the relevant departments.
- 5.3.2 A waste management plan specifically used for the site and shall demonstrate the following:
 - 5.3.2.1 Describing how all generated waste is monitored, which types of waste will be collected for recycling or for reuse, how recycling will occur, and who is responsible for the various aspects of the plan.

- 5.3.2.2 Instructions to crew and sub-contractors on recycling and reuse procedures. The waste management plan is to be developed and approved prior to demolition (if applicable) or construction start and is to be implemented for the entire construction duration. For guidance on the Waste Management Plan, refer to the Green Star Existing Building Technical Manual.
- 5.3.2.3 Operational waste must be managed through sorting, recycling, and reuse of materials.
- 5.3.3 All buildings above shall provide a recycling and sorting area in accordance with the Pikitup Waste Management Guidelines.

5.4 *Land Use and Ecology*

- 5.4.1 Greenfield developments shall impose no net reduction in the ecological values of the site from pre to post development.
- 5.4.2 Brownfield developments shall contribute towards a positive increase in the ecological value of the site from pre to post development.
- 5.4.3 Developments shall reserve 10% of total building floor area towards open spaces, recreational and other functional spaces.

6. **COMPLIANCE**

- 6.1 Compliance will be as per City's building plan approval processes.
- 6.2 The requirements of the National Building Regulations SANS 10400 series and subsequently updated standards.
- 6.3 Drawings, calculations and computer energy simulation modelling must be undertaken by a competent person and in accordance with the City's Energy Modelling Protocol.
- 6.4 Energy modelling software must demonstrate Agrément certification and reflect the correct data for Johannesburg microclimate and energy zone.
- 6.5 All buildings required to provide and display an updated Energy Performance Certificate under SANS 1544 are required to annually submit these certificates to the City of Johannesburg.
- 6.6 Residential and office buildings with a floor area above 500 m² and sectional title schemes must display annual Energy Performance Certificates and annually submit these certificates to the City of Johannesburg.

7. PERFORMANCE MONITORING

- 7.1 The City will monitor energy use intensity through regular analysis of electricity usage through meter reading and utility account for residential units valued below R450 000⁶.
- 7.2 The City will monitor water usage through regular analysis of water usage through meter reading and utility accounts for all residential, commercial and institutional developments.
- 7.3 For residential and office buildings with a floor area above 500m² and sectional title schemes, energy monitoring and evaluation will be done through the CoJ EPC process.
- 7.4 For buildings within the ambit of the SANS 1544 regulation, energy monitoring and evaluation will be done through the EPC process as envisaged by Department of Energy (Draft regulations for the Mandatory Display and Submission of Energy Performance Certificates for Buildings published by the Minister of Energy 2018 and based on SANS 1544 EPC for Buildings⁷), for all state-owned or occupied buildings over 1000m² and all private buildings over 2000m² which comprise of building types A1, A2 A3, & G1.

8. FINES AND PENALTIES

Buildings whose water and energy use intensity falls outside the provisions of the policy and the subsequent by-law, will face fines and penalties determined and imposed by the City's tariff structure and fines, which is annually reviewed.

9. DEVIATION FROM POLICY REQUIREMENTS

The following deviations may be considered:

9.1 Major refurbishment for affordable housing⁸ where EUI targets outlined under 3.4 cannot be completely met, must:

- 9.1.1 Meet its EUI target to the maximum extent possible (at least 75% of the prescribed standards.
- 9.1.2 Meet its remaining extent of the residual building energy demand by the adoption of renewable on-site energy generation, illustrated through an integrated building design approach.
- 9.1.3 This deviation will be considered until 2030.

9.2 Any other projects demonstrating that the building or site is extremely ill-suited to achieving the specific requirement may submit a detailed motivation requesting that the requirement be modified, or deemed not applicable, at the discretion of the City Manager or delegated representative.

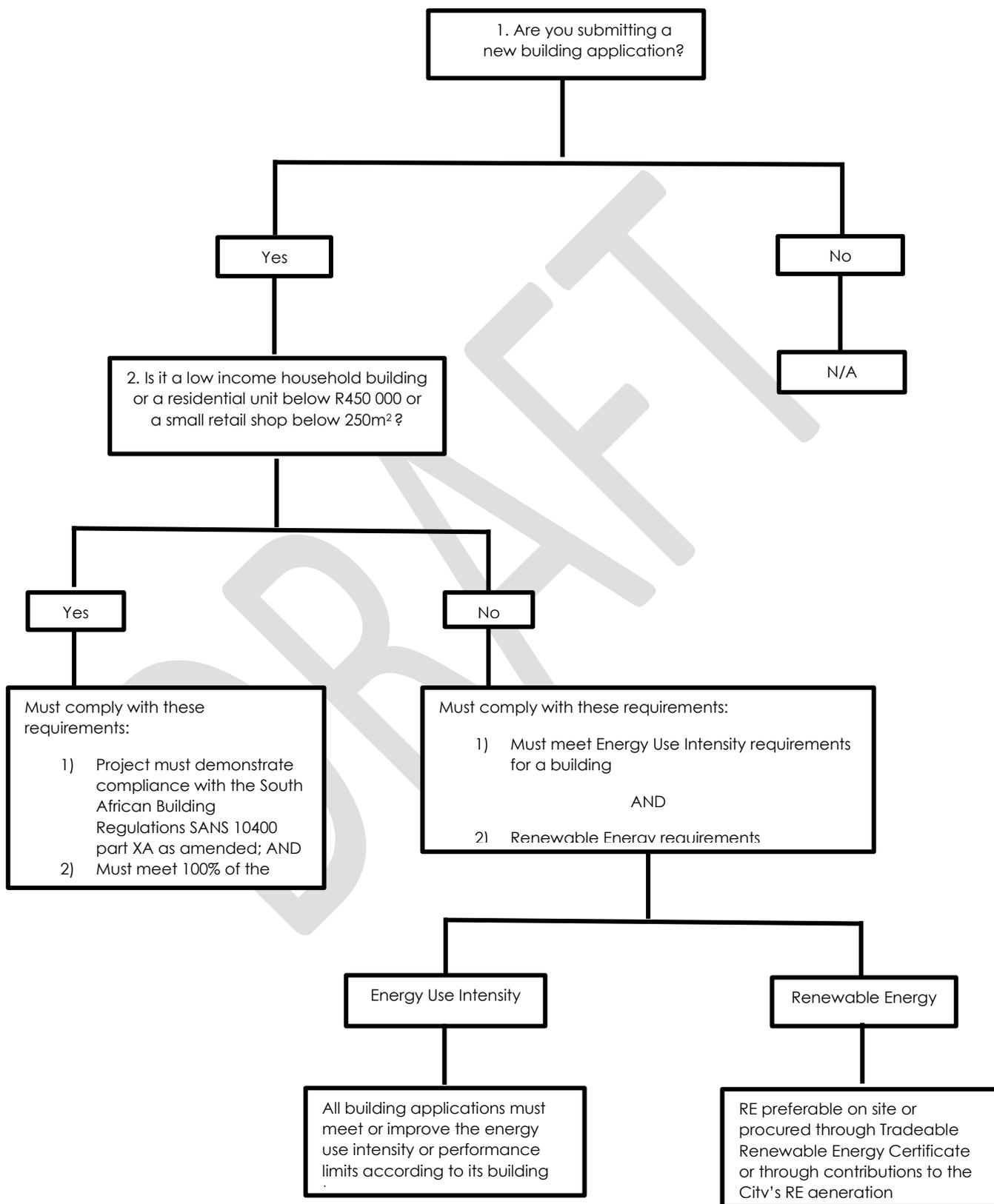
⁶ Residential units of a value of less than R450 000 -market value should increase in line with the national housing price index/ prices may be corrected for inflation using yearly consumer price inflation rates for housing in urban areas, published annually by Statistics South Africa.

⁷ Published in July 2015

⁸ Residential units of a value of less than R450 000 -market value should increase in line with the national housing price index/ prices may be corrected for inflation using yearly consumer price inflation rates for housing in urban areas, published annually by Statistics South Africa.

ANNEX 1

Decision tree: process for determining the policy requirements for a NEW BUILDING⁹:



⁹ Minimum compliance with South African Building Regulations SANS 10400 part XA (as amended) must be achieved.

ANNEX 2

Decision tree: process for determining the policy requirements for a refurbishment:

