

## Aiming for Zero-Carbon New Buildings in South African metros

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### What? (programme overview)

Four of South Africa's metros – Cape Town, eThekweni, Johannesburg and Tshwane – are working towards the implementation of ambitious policies and innovative programmes that aim for net zero carbon emissions from newly-built buildings by 2050.

This work is supported by the C40 Cities Climate Leadership Group (C40), with Sustainable Energy Africa (SEA) as the local implementing partner. Within each city, the work is driven by a technical officer, or advisor, funded by C40 and employed by SEA, but based within the city and supported by a city senior city line manager.

The overall programme objective is to achieve building energy performance (through policy, regulations or by-laws); piloting this in some building types (e.g. office buildings), followed by city-wide implementation; and sharing lessons among cities throughout the process.

The initiative spearheads the country's intentions articulated within the National Development Plan: to achieve zero emission building standards by 2030<sup>1</sup>. It supports and leads on the national intentions articulated within the (draft) National Energy Efficiency and Climate Change Strategies, as well as the update of the National Building Codes energy efficiency component currently under review (SANS 10400-XA).

The approach also speaks to the 'enabling milestones' of the plan in that the upskilling of the technical officers will ensure that skilled, technical, professional and managerial posts better reflect the country's racial and gender makeup.

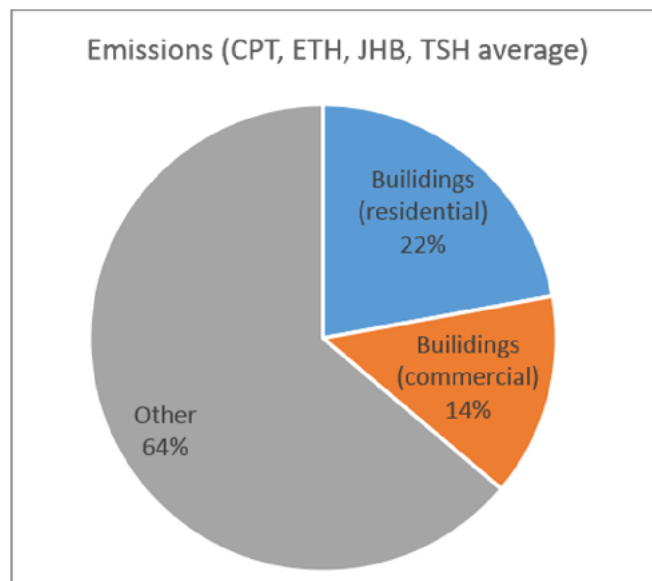
### Why? (the climate imperative)

C40 Deadline 2020 research has shown that urgent greenhouse gas reducing actions are needed now to limit global temperature rise to 1.5°C above pre-industrial levels, in line with the Paris Agreement.

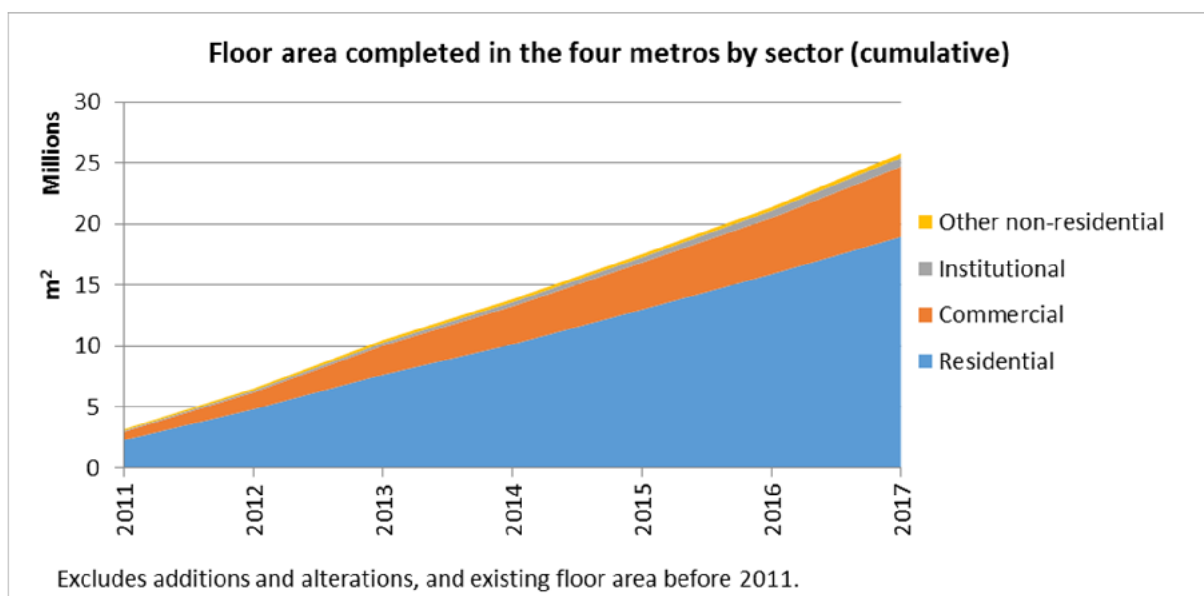
Most of South Africa's man-made greenhouse gas emissions result from the consumption of fossil fuel. This energy consumption is concentrated in cities, as a result of the concentration of people and economic activities. **Within the four programme cities, a third (36%), of the energy-related greenhouse gas emissions are from residential and commercial buildings combined.**

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<sup>1</sup> A Chapter 5 objective, "National Development Plan 2030 | South African Government". [www.gov.za.NDP](http://www.gov.za.NDP), 2013.



Buildings have a long lifespan (40-120s years) and South African cities have a rapidly-growing buildings stock. 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 amount of energy services (such as lighting) required in the first place. Growth of the building stock in the participating metros between 2011 and 2017 increased our national GHG emissions by approximately 7 million tonnes<sup>2</sup>.

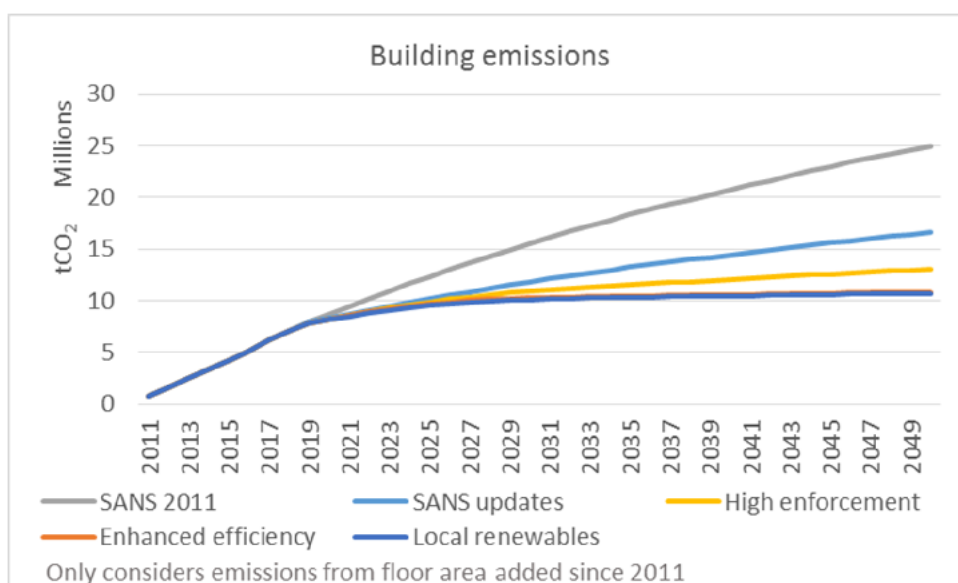
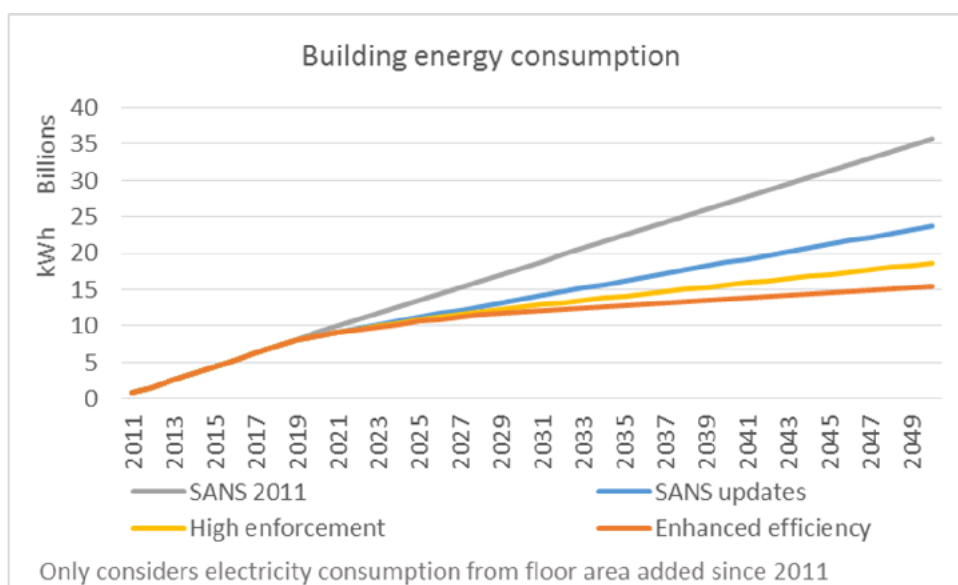


<sup>2</sup> These figures are based on a model developed by SEA, based on the following assumptions:

- the maximum energy intensity values allowed by the current SANS 10400-XA;
- an enforcement level of SANS of 70%;
- floor area completed (as opposed to approved) between 2011 and 2018, drawn from StatsSA;
- assumptions on commercial sub-sector splits, based on data on the national split (source: StatsSA);
- and building base load only (excludes plug loads).

Decreasing buildings' emissions to net zero will require reducing buildings' energy demand greatly and supplying the remaining energy demand with clean energy, such as electricity generated from solar PV. National energy efficiency building regulations (SANS 10400-XA) implemented in 2011 already requires a certain level of efficiency and are currently in the process of being updated with lower energy intensity requirements.

Aggressive action will need to be taken to close the remaining gap towards net zero carbon buildings by 2030. The below graphs show the electricity consumption and emissions production impact across the four metros of (1) the stricter proposed national regulations, (2) increasing enforcement of these regulations, (3) increasing local efficiency requirements above and beyond what is required by the national regulations, and (4) requiring the remaining electricity demand to be met by renewable sources. The flattening of the cumulative emissions after 2030 indicates that no new buildings are producing emissions.



Typically net zero emissions building policies look to prioritise on-site, or local renewable energy generation. Initial modelling indicates that should all new build development in the participating cities be meeting a 'net zero carbon' status by 2030, the total installed capacity of embedded generation across all cities would be in the region of 3000 MW by 2050. In power terms this would generate approximately 5200 GWh of electricity per annum per city – which translates into some 40% of 2014/2015 electricity consumption in the city of Cape Town.

### Why? (other national imperatives: energy security and socio-economic benefits)

An energy efficient and green building industry can deliver on large-scale economic priorities beyond climate change mitigation such as energy security, resource conservation and job-creation, long-term resilience and quality of life.

From a national perspective, energy efficiency in construction standards is universally recognised as a practical and cost-effective way to achieve energy savings and avoid costly energy wastage: a megawatt saved being far cheaper than a megawatt generated.

Every year some 200,000 low-income houses are delivered by government. The quality of the housing impacts the quality of life for residents and energy inefficient houses subjects beneficiaries to a lifetime of high energy costs. The Department of Human Settlements published a 'Norms and Standards' document in April 2014, drawing elements of the SANS 10400-XA energy efficiency requirements into low-income housing delivery. The question is, can we do better and how do we do this in a manner that balances the huge demand for housing with a decent and sustainable standard of infrastructure?

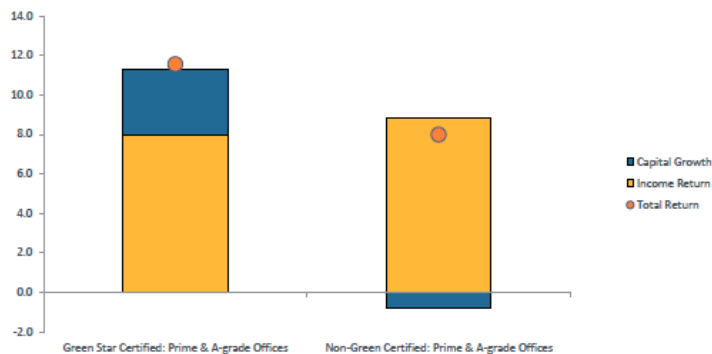
### Why? (the business case)

For developers, the data increasingly shows that 'green' property development is a viable investment. The MSCI Index released in 2017 show that the total return is roughly 45% higher for green buildings (*IPD South Africa Annual Green Property Index: Results for the year to December 31, 2017*).

Green Building Council of South Africa figures indicate that the green premium on capex for green buildings to range from 0 – 5% in South Africa (2014 data). In Australia, where mandatory building energy codes were introduced in 2003 and are updated annually, this stands at -1% (2011 data).

## IPD South Africa Annual Green Property Index

Results for the year to December 31, 2017



IN ASSOCIATION WITH



The IPD South Africa Annual Green Property Index tracks the performance of Green Star Certified Prime & Grade A Office properties to the rest of the IPD Prime & Grade A Office Universe and in the year to December 2017 produced a total return of

**11.6%**

Note: Usage data has been normalised for vacancy

### How? (process)

Cities have influence over building energy use, and therefore energy-related emissions, through the building plan approval process, building inspectorate and regulatory functions. City implementation approaches still need further discussion, but a range of responses are being explored. These include by-laws or standards that are more stringent than the national building regulations on building energy efficiency. Stringency would increase in tranches (say every 5 years) to meet the net zero / low-carbon target by 2030/2050. Precinct level / land use management development requirements may offer important intervention points. Incentives to encourage new development directions are also being examined.

Much work has already been done in our cities and each city is approaching the goal of low / no-carbon new buildings in a manner that is responsive to existing work and priority areas. The **City of Cape Town** plans to mainstream the buildings programme using an updated **Resource Efficiency Criteria for Development** guideline, integrating low-carbon development conditions for new buildings and precincts and developing carbon neutral new-build requirements for the Transit Oriented Development catalytic sites. **eThekweni** hopes to incentivise green development that is highly resilient to climate impacts affecting Durban, such as flooding. The **City of Johannesburg** has a Built Environment Guideline, which will be simplified and reissued for wider distribution and awareness-raising. The **City of Tshwane** frames itself as the green capital of South Africa and requires that new city-owned buildings achieve a Green Star certification rating of five stars or higher<sup>3</sup>. They plan to review their existing **Green Building By-law** to have a sharper / more clarified commitment to a zero carbon target.

### The building “blocks” (challenges)

There are a number of potential concerns listed by cities:

<sup>3</sup> According to the Green Building Council of South Africa, which awards stars based on resource efficiency. Six stars is the highest rating.

The **business case** for low-emissions buildings may be difficult to sell, considering the recent economic slowdown and consequent lower rate of investment, as well as the perceptions of already-high taxation within South Africa.

**Enforcement** of the current national energy efficiency building regulation or existing local standards / requirements is not always guaranteed, due to the **lack of financial and staff capacity** within building control.

There were **legal uncertainties** as to whether a city could implement a by-law that addresses something already covered in national regulations, in this case the national energy efficiency building regulations SANS 10400-XA. Though recent indications seem to be that the Constitution does indeed grant municipalities autonomy with regards to building regulations and municipal planning.

The low-carbon buildings work needs to “hook” into existing city goals, such as decreasing poverty and increasing employment, in order to gain **political traction**. In a similar vein, **political changes** can create uncertainty relating to staff positions and policies; hampering the continuity of programmes.

There is **limited funding** to put towards low-carbon incentives and the case must be made that incentives will be paid back through higher rates as a result of increased property value, in order not to fall foul of National Treasury.

There is a **lack of analytical capacity and data** to assist with analysing current buildings’ performance and to build the business case for green buildings.

Building a sustainable future: “A tree is known by its fruit” (Zulu proverb)

The cities will work closely with each other to create synergies and will align this initiative with national goals and objectives to ensure that it has a positive impact on the sector. In turn, the project offers a practical and efficient opportunity for national government to deliver on our country’s global climate mitigation commitments.

Global climate finance will provide an important source of infrastructure funding in the years to come. Cities that can demonstrate that they have ‘their own house in order’ will be better placed to access such funds. Ensuring that all building / development approvals are low-carbon / net zero carbon into the future can provide such a signal.