Energy-Efficient Sustainable Housing
15 October 2020
Vision and Mission Statement

Vision

World Class African City

Mission

To proactively deliver and create a City environment in 2040 that is resilient, sustainable and liveable. We will collectively enable support that drives economic growth, optimal management of our natural resources and the environment and we will develop an inclusive society that contributes the development of a capable and developmental local government.
Vision and Mission Align with Strategic Priorities

Vision

Jonesburg – a World Class African City of the Future – a vibrant, equitable African city, strengthened through its diversity; a city that provides real quality of life; a city that provides sustainability for all its citizens; a resilient and adaptive society.

• Joburg. My City – Our Future!

Mission

The City of Johannesburg commits itself to pro-active delivery and the creation of a city environment in 2040 that is resilient, sustainable and liveable. It aims to achieve this through long-term 2040 plans, targeted programmes, services and enabling support that drives economic growth, optimal management of natural resources and the environment, the development of society and the individuals within it, and the practice and encouragement of sound governance, in all the City does.

Joburg 2040 Growth and Development Outcomes

• Improved quality of life and development-driven resilience for all.
• Provide a resilient, liveable, sustainable urban environment – underpinned by smart infrastructure supportive of a low carbon economy.
• An inclusive, job-intensive, resilient, competitive and smart economy that harnesses the potential of citizens.
• A high performing metropolitan government that proactively contributes to and builds a sustainable, socially inclusive, locally integrated and globally competitive Gauteng City Region.

The Eleven Strategic Priorities

• Financial Sustainability.
• Good Governance.
• Sustainable Service Delivery.
• Economic development.
• Job Opportunity and Creation.
• Integrated Human Settlements.
• Safer City.
• Active and Engaged Citizenry.
• Sustainable environmental development.
• Smart City.
• Response to COVID-19 pandemic.
Population projections
• 2016: 4,86
• 2017: 4,96
• 2018: 5,07
• 2019: 5,18
• 2020: 5,30
• 2021: 5,42

Household projections
• 2016: 1,80
• 2017: 1,87
• 2018: 1,94
• 2019: 2,01
• 2020: 2,08
• 2021: 2,15

Average household size will decrease to less than 3 persons per household.
Focused acceleration areas

CHAPTER 2.1:  
Decarbonizing the electricity grid

CHAPTER 2.2: 
Optimizing energy efficiency in buildings

CHAPTER 2.3: 
Enabling next-generation mobility

CHAPTER 2.4:  
Improving waste management
STRATEGIC OBJECTIVE: To accelerate the development and implementation of transformational energy efficiency policies and programmes for new buildings in South African cities by 2020, working towards net zero carbon performance, and sharing the lessons widely across C40 city networks.
## Focused acceleration areas

<table>
<thead>
<tr>
<th>Opportunity</th>
<th>Average range of 2030 emissions reduction potential across city types, % of 2030 target</th>
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<tbody>
<tr>
<td>60%</td>
<td></td>
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<tr>
<td>Decarbonizing the electricity grid</td>
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<tr>
<td>Centralized renewables³</td>
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<tr>
<td>Distributed renewables³</td>
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<tr>
<td>Optimizing energy use in buildings</td>
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<tr>
<td>New build standards</td>
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<tr>
<td>Building envelope retrofits</td>
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<tr>
<td>HVAC and water heating</td>
<td></td>
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<tr>
<td>Lighting upgrades</td>
<td></td>
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<tr>
<td>Building automation and controls</td>
<td></td>
</tr>
<tr>
<td>30%</td>
<td></td>
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<tr>
<td>Enabling next-generation mobility</td>
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<tr>
<td>Transit-oriented development</td>
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<tr>
<td>Mass transit, walking, and cycling</td>
<td></td>
</tr>
<tr>
<td>Next-generation vehicles (shared, connected EV-AVs)</td>
<td></td>
</tr>
<tr>
<td>Commercial freight</td>
<td></td>
</tr>
<tr>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>Improving waste management</td>
<td></td>
</tr>
</tbody>
</table>

12 key opportunities could deliver 90-100% of necessary emission reductions.
So what should we do?

1. Make new buildings efficient from the start
2. Retrofit existing buildings for efficiency
3. Clean up the energy used by buildings to install solar panels
Actions required to achieve

Efficiency goals and improvement targets

- Set clear energy reduction targets to improve building performance across the city.
- Develop trajectories and/or roadmaps outlining key actions and milestones to be achieved.
- Measure and disclose energy demand and carbon emissions.
- Measure performance of departments with respect to achieving the targets.

Stakeholder engagement and advocacy

Engage various stakeholders to promote carbon zero development. This can be through competitions and awards, user-feedback and behavioural energy management activities.

Building efficiency codes and standards

Enact building energy codes and standards that stipulate minimum levels of energy efficiency in design, construction and/or everyday operation of buildings to ensure all new buildings operate at net zero carbon by 2030.

Government leadership by example

Demonstrate leadership to support the transition to net zero carbon buildings by committing to developing and/or occupying net zero carbon buildings, undertaking public building retrofits, lighting upgrades, innovative and sustainable procurement and supporting activities that lead to improved building efficiency.

Incentives & finances

- Develop a range of supporting incentives to help the private sector to develop, manage and occupy net zero carbon buildings.
- Facilitate strategic investments in building efficiency in partnership with national and private sector financial institutions to help overcome inertia and spur new investment in buildings.
- Develop innovative funding mechanisms and financing models to help cover upfront costs can spark greater investment.
**Action:** Building efficiency codes and standards

**What is it?** Regulatory tool that requires that all new buildings are carbon neutral.

**Objective:** provide mandatory guidance to optimize the design and construction of buildings and building services such as heating, cooling, ventilation, and lighting

**Status:** preliminary engagement with stakeholders

**Proposed next steps**
- Bylaw initiation and development

**Risks:**
- Political buy-in
- Going above national building regulations
- Enforcement
- Shifting development outside city

**Resources:**
- Internal capacity
- City departments – Development Planning, Group Strategy, EISD, Legal, Housing, etc.
- External support – City of Tshwane, City of Cape Town, eThekwini Municipality, Sustainable Energy Africa, Green Building Council of South Africa
- Budget?
SA Buildings Programme

2015: Agreement

2016: Deadline 2020 Commissioned Report

2017: Focused Acceleration

2018:
- April: Launch of C40 SA Building Programme
- September: GCAS Net Zero Commitments

2019: Policy and pathway development

End June 2021:
Policy approval: Implementation starts

2030: Net Zero Carbon New Buildings

2050: All Buildings Net Zero Carbon
City leads

Inner City Building Programme

Retrofit Municipal Buildings

City-owned development: Green Procurement & Regulations

Housing delivery
The Challenge at hand

- The five large metros dominate the national economy, among them, the three Gauteng metros account for almost a third (32 per cent in 2016) of national output.
- Gauteng is by far the most important geographical concentration of economic activity and increasingly operates as a single functional region (OECD, 2011).
- Total electricity generated and delivered, as per table 9 below shows the largest proportion of delivery for Gauteng, with an overall 2.7% year on year increase for 2020.
- This depicts the biggest reliance on electricity connections for the Province, with the three metros expected to the highest consumers of electricity.
- The infrastructure expenditure in 2016 also saw a 26% allocation towards electricity infrastructure, showing an increased investment into electricity as a main source of energy supply in the country.
- This demonstrates the role in which electricity is viewed and regarded as the main supply for the country, which causes a challenge for the future.

Table 9 – Volume of electricity delivered to provinces (gigawatt-hours)

<table>
<thead>
<tr>
<th>Province</th>
<th>Apr-20</th>
<th>May-20</th>
<th>Jun-20</th>
<th>Jul-20</th>
<th>Aug-20</th>
<th>Aug-20 year-on-year % change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Cape</td>
<td>1 464</td>
<td>1 621</td>
<td>1 661</td>
<td>1 732</td>
<td>1 761</td>
<td>-10.2</td>
</tr>
<tr>
<td>Eastern Cape</td>
<td>587</td>
<td>691</td>
<td>721</td>
<td>768</td>
<td>761</td>
<td>-1.5</td>
</tr>
<tr>
<td>Northern Cape</td>
<td>376</td>
<td>466</td>
<td>504</td>
<td>521</td>
<td>517</td>
<td>-0.4</td>
</tr>
<tr>
<td>Free State</td>
<td>748</td>
<td>902</td>
<td>969</td>
<td>1 028</td>
<td>1 018</td>
<td>2.5</td>
</tr>
<tr>
<td>KwaZulu-Natal</td>
<td>2 854</td>
<td>3 198</td>
<td>3 378</td>
<td>3 541</td>
<td>3 488</td>
<td>0.2</td>
</tr>
<tr>
<td>North West</td>
<td>624</td>
<td>1 221</td>
<td>1 331</td>
<td>1 450</td>
<td>1 383</td>
<td>-2.7</td>
</tr>
<tr>
<td>Gauteng</td>
<td>3 857</td>
<td>4 782</td>
<td>5 486</td>
<td>5 756</td>
<td>5 373</td>
<td>2.7</td>
</tr>
<tr>
<td>Mpumalanga</td>
<td>2 221</td>
<td>2 460</td>
<td>2 820</td>
<td>2 693</td>
<td>2 638</td>
<td>-1.1</td>
</tr>
<tr>
<td>Limpopo</td>
<td>1 189</td>
<td>1 566</td>
<td>1 616</td>
<td>1 678</td>
<td>1 677</td>
<td>2.7</td>
</tr>
<tr>
<td>Total</td>
<td>14 122</td>
<td>16 907</td>
<td>18 288</td>
<td>19 167</td>
<td>18 645</td>
<td>-0.4</td>
</tr>
</tbody>
</table>

1 Preliminary.
The housing demand continues to increase. The demand also means the increased infrastructure demand especially in areas where there is an increased delivery. The energy issue is more critical for households.
An energy efficient home can be described as a home that uses less energy and in turn emits less carbon which becomes a benefit for the environment, but it's also a social benefit.

With the power challenges that is faced by the power utility in the country, there is a need to encourage more energy efficient use of alternative energy to decrease the demand.

Living standards can be enhanced by reducing the electricity usage and hence the shortfall of energy for all homes in South Africa.

The urgency of the electricity shortage was realised in 2007/8 when South Africa started experiencing the power shock of widespread rolling blackouts as the supply fell behind the demand.

This has led to energy poverty and continuous rising energy costs.

Human Settlements has through NHBRC leading initiatives started exploring various ways in which it can intensively contribute to energy efficient measures in its developments.

The Department is exploring not only energy efficient methods, it also looks at various ways in which it can reduce costs of building and use of building methods through alternative building systems.
Alternative building methods initiatives

TRA planned developments

- Value for money, reduces building time, site standing time, labour costs, etc
- Easy to maintain
- Technical efficiency, absorbs more heat in winter days and cools off in summer
- Insulation of containers, to ensure units retain heat and reduce required energy for heating
South hill development comprises of a mix of fully-subsided homes, subsidised rental units, bonded units to the open market and free-stranding houses. South Hills is situated along a transport node, offering residents easy access to transport, job opportunities, and local amenities, including shops and hospitals. Over 90% of the units fall within the Financial Sector Charter definition of affordable housing.

The development addresses energy-efficiency, creating healthier living environments and reducing long-term energy costs for owners and tenants.

Units make use of gas, solar and solar farming, heat pumps, induction geyser, energy saving lights and prepaid meters for both electricity and water.

Calgro M3 has implemented a device called “Save a Flush” by Dry Planet SA. Placed in a toilet, the device reduces water consumption per flush by one litre.

Calculations, verified by an independent external party, shows that, based on the construction of a 40m² residential unit and 11 flushes per day, the group will be rendered “water neutral” for each unit it develops within just 84 days of being occupied.

While energy- and water-efficient affordable housing still has a long way to go, but these initiatives may reduce costs to owners.
The Challenges faced with electricity supply shortages

- Electricity demand vs available infrastructure for additional area demand
- Units completed unallocated due to additional electrical infrastructure required to connect households
- Unallocated Housing attract illegal invasion of units
- Unless various energy sources are explored, these challenges is likely to continue in the future
CURRENT DEVELOPMENT

Riverside Mega Development
Fleurhof Mega Development
Lehae Mega Development
Lufhereng Mega Development

Current housing developments
Energy efficient features
• Gas Geysers
• Solar Geysers
• Gas Stoves
• North facing Housing to allow sunlight

FUTURE DEVELOPMENT

Goudrand Mega Development

Energy efficient features
• North Facing housing to allow sunlight
• Gas stoves
• Solar Geysers
A balanced View

- The dominance in coal as a source of energy is a hard dominance to move away from for South Africa,
- This is because coal is cheap, and undeniably available.
- The mineral also contributes to economic growth, in 2018, coal surpassed gold as a contributor to GDP.
- Data shows a shift on coal’s dominance and an increase in solar and wind power.
- According to Stats SA, Coal generated 88.3% (or 215 691 GWh) of South Africa’s electricity supply in 2013, falling to the previously mentioned 85.7% (or 203 054 GWh) in 2016.

- Government’s recent renewable energy agreements with independent power producers (IPPs), indicates a move to more clean energy
- However, the Country & City is likely to keep the energy mix over time.
- Municipality still rely on electricity sales for income, employment contribution of electricity is still vast
THANK YOU

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