



# Energy and Climate Change Strategy



**Ekurhuleni**  
METROPOLITAN MUNICIPALITY

a partnership that works

# INTRODUCTION

## to the strategy

### Why is energy important?

Energy is the lifeblood of society. Without energy, cities would grind to a halt. Modern cities rely heavily on energy for the provision of essential services and for powering industry and commerce. Energy improves the quality of life in homes, and enables transport systems to function.

Yet there are also problems associated with energy use. Energy use results in pollution, and contributes to global warming. Often, fuels used by poor households are also unsafe and unhealthy.

South Africa has ratified the Kyoto Protocol – the international agreement which aims to address global warming - and is one of the developing world's heaviest carbon emitters because of our energy use patterns. South African cities have an important role in reducing global warming emissions.

Local governments make decisions affecting land use, building codes, transportation systems and waste management, and each of these decisions impacts on energy use. City authorities are therefore key players in shaping our energy future.

### What is an Energy & Climate Change Strategy?

A responsible energy needs to address not only the immediate concerns around economic development and poverty alleviation, but needs to look at the longer-term implications of current energy use terms to ensure the welfare of future generations.

A City Energy & Climate Change Strategy is a plan that aims to integrate and entrench sustainable energy approaches and practices at the

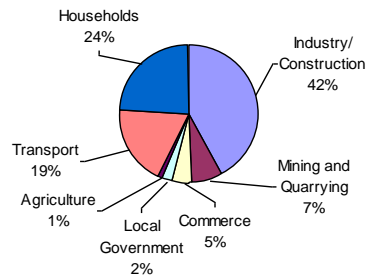
## GOALS OF AN ENERGY STRATEGY

An energy strategy supports the social, economic and environmental well-being of a city, via:

- Providing adequate energy for economic growth.
- Supporting poverty alleviation by promoting clean, safe and modern energy to households.
- Saving money by improving the efficiency of energy use.
- Reducing harmful effects of energy use such as pollution and global warming, by promoting cleaner, renewable energy sources.
- Promoting the use of more efficient transport, with a focus on public transport.

local level. It prioritises and co-ordinates energy and climate change activities. It can improve service delivery and quality of life, save money, and reduce greenhouse gas emissions. In short, it assists the city with its overall development objectives.

**% Contribution to GHG Emissions (tons eCO<sub>2</sub>) by Sector**



# ENERGY USE

## In Ekurhuleni

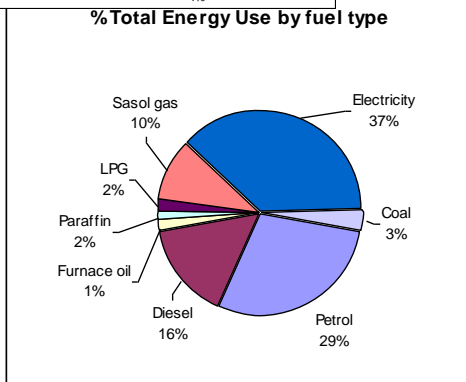
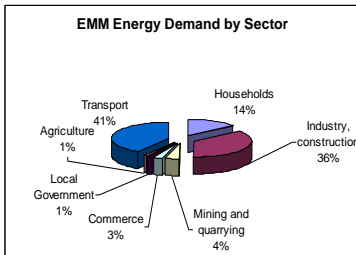
**Total energy demand** in the City of Ekurhuleni represents 5.6% of South Africa's total energy demand. The transport sector accounts for the largest use of energy in EMM, followed by industry and households. Liquid fuels is the main energy source for EMM, followed by electricity, which is used by approximately 455 500 customers from all sectors. Significant piped (Sasol) gas is also used by industrial customers. Although coal represents a relatively small source of energy, it is a significant source of air pollution.

**Renewable sources of energy** are not well utilised in Ekurhuleni. However EMM is currently assessing the potential to use landfill gas from its landfill sites, and developing options such as mass

use of solar water heaters by households and bio-fuel production and use. **Energy efficiency and Demand-Side Management** potential in Ekurhuleni is still huge, and numerous cost-effective opportunities exist for energy use reduction, including lighting efficiency, efficient building design, domestic geyser ripple control, and industrial equipment efficiency.

**EMISSIONS**

**'Local' emissions** are those that affect the air quality in the Ekurhuleni area and have local health and visual impacts. Domestic coal burning and coal fired boilers are significant sources of particularly unhealthy pollutants.



**'Global' emissions** are those that impact on climate change globally – this is widely recognised as the most critical environmental crisis facing the planet. Electricity generation is responsible for most of the CO<sub>2</sub> emissions – the principal global emission – although transport fuel is also responsible for significant global emissions.

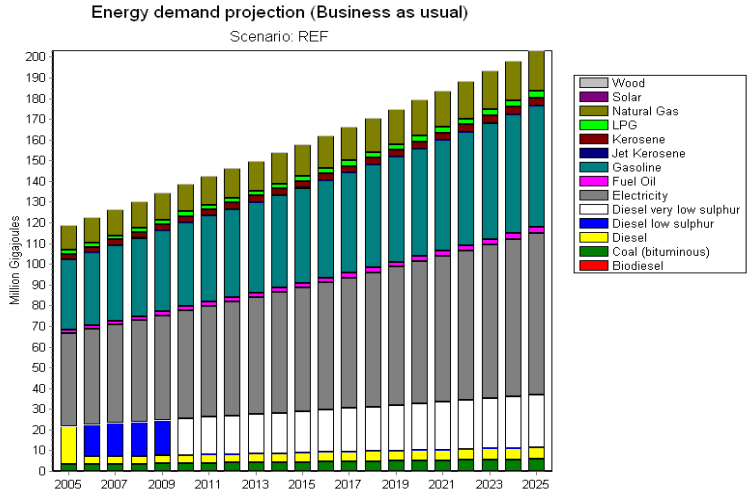
## SUSTAINABLE ENERGY FUTURE

**Key components of a sustainable energy development path for Ekurhuleni include:**

1. Economic growth through efficient use of resources rather than increased use of resources.
2. Steady reduction in fossil fuel dependence.
3. Focus on energy efficiency.
4. Steady introduction of cleaner and renewable forms of energy.
5. Efficient transport system based on public transport.
6. Increasing household access to safe, affordable, healthy forms of energy.

## BUSINESS AS USUAL: Without a Sustainable Energy Strategy

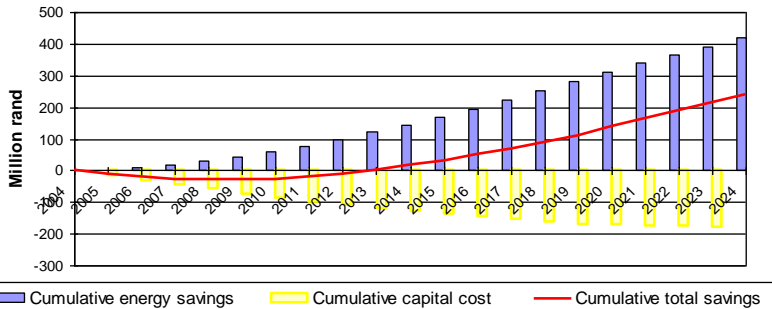
1. Escalating consumption.
2. Increased local pollution and global emissions.
3. Escalating energy costs
4. Economic inefficiency.
5. Continued household health and safety issues.
6. Polluting, expensive private vehicle-based transport system.



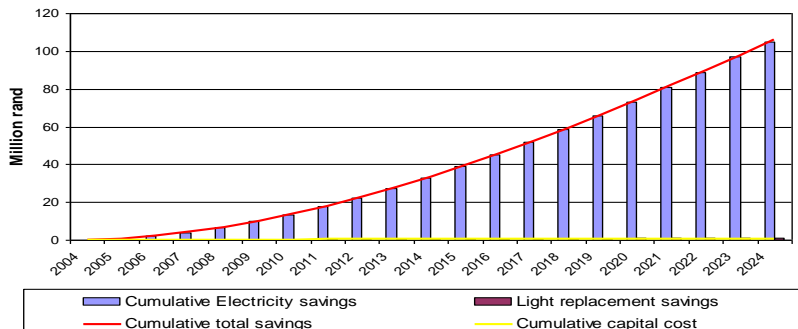
## SUSTAINABLE FUTURE: Guided by a Sustainable Energy Strategy

1. Reduced energy consumption for same energy service.
2. Economic efficiency.
3. Reduced local pollution and global emissions.
4. Financial savings.
5. Safer, affordable energy available to households.
6. Affordable, clean public transport system.

### ENERGY SAVING EXAMPLE: Economic benefit of installing Solar Water Heaters in all households that use geysers



### ENERGY SAVINGS EXAMPLE: Financial benefit of efficient lighting in all EMM-owned buildings



## EKURHULENI VISION & MISSION

**VISION:** The Smart, Creative and Developmental City.

**MISSION:** Ekurhuleni provides sustainable and people centred development services that are affordable, appropriate and of high quality. We are focused on social, environmental and economic regeneration of our city and communities, as guided by the principles of Batho Pele and through the commitment of a motivated and dedicated team.

# GOALS

## of the strategy

THE VISIONS AND GOALS of the strategy are directly related to the City of Ekurhuleni Vision and Mission Statement, as well as supporting the Growth and Development Strategy. They also take into cognisance key national and international imperatives and commitments.

STRATEGIC ENERGY VISION FOR THE <b>PHYSICAL LANDSCAPE</b>	
<b>Vision 1</b>	<b>A compact, integrated &amp; sustainable city with an efficient &amp; equitable transport system.</b>
<b>Goals</b>	<p>Provide an energy efficient integrated transport system based on (i) improved Travel Demand Management, (ii) promotion of public transport and (iii) discouraging inefficient private vehicle use.</p> <p>Compact city planning to promote transport energy efficiency.</p> <p>Promote cleaner and more efficient fuels and transport technologies.</p> <p>Core-urban areas to facilitate the use of non-motorised transport.</p>
STRATEGIC ENERGY VISION FOR THE <b>ECONOMIC LANDSCAPE</b>	
<b>Vision 2</b>	<p><b>Energy supports the local economy via:</b></p> <ul style="list-style-type: none"> <li>• <b>promoting economic competitiveness</b></li> <li>• <b>increasing employment</b></li> <li>• <b>being used and managed efficiently</b></li> <li>• <b>being used in a sustainable manner</b></li> </ul>
<b>Goals</b>	<p>Government to lead by example by improving energy efficiency.</p> <p>Increase renewable and clean energy contribution to the total energy supply mix.</p> <p>Maximise employment opportunities in the energy sector.</p> <p>Energy prices and quality supports economic competitiveness.</p> <p>Energy planning includes full economic cost of energy.</p> <p>Provide incentives for increased energy efficiency and use of renewable energy.</p>
STRATEGIC ENERGY VISION FOR THE <b>SOCIAL LANDSCAPE</b>	
<b>Vision 3</b>	<b>All people have access to affordable, safe, healthy and modern energy services.</b>
<b>Goals</b>	<p>Reduction in energy-poverty related diseases.</p> <p>Universal access to electricity throughout urban areas.</p> <p>Promote more efficient and safer energy appliances.</p> <p>Create and promote sustainable human settlements.</p> <p>Energy supports increasing level of safety &amp; security in human settlements.</p> <p>Provision of energy services and infrastructure to meet the needs of all.</p>

# RESIDENTIAL

## sector energy issues

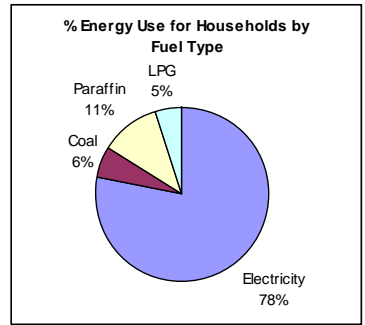
There are approximately 745,000 households in Ekurhuleni. The domestic sector accounts for 14% of the energy demand in Ekurhuleni and is one of the most promising areas for achieving energy savings. The major uses of energy in the home are for water heating, space heating, lighting, refrigeration, and cooking.

### KEY ISSUES

The strategy needs to take into account the following important issues within the residential sector:

- The cost of meeting a household's energy needs is a significant burden on poor households and a major contributor to poverty.
- Use of coal fires and paraffin for cooking and heating resulting in fire and health problems, and ambient pollution.

- Many households use energy very inefficiently, particularly within the mid-to high-income sector.
- Informal unelectrified households comprise around 22% of the population. Lack of electricity supply in these areas leads to illegal connections, which poses a safety risk.



### AIR QUALITY MANAGEMENT PLAN

The Air Quality Management Plan for the City of Ekurhuleni includes a number of identified initiatives for improved energy-efficiency in housing and the promotion of renewable/clean energy sources for household energy use. It also includes the establishment of the City's urban air quality dispersion model to simulated air pollution concentrations associated with domestic fuel burning emissions.

#### FOCUS AREAS OF THE STRATEGY in the RESIDENTIAL SECTOR

1. Efficient lighting in all households (compact fluorescent lights).
2. Promoting solar water heaters in all households.
3. Mandatory energy efficiency improvements in mid and high-income households.
4. Building all new houses to be more energy efficient.
5. Facilitate the use of safer, cleaner fuels in low-income households, including ethanol gel, and safer appliances.
6. Disseminate information on efficient appliances, solar water heaters, efficient building etc to all City residents.



The City accounts for 1% of the total energy consumed in Ekurhuleni. The City is responsible for providing services to a population of about 2,5million people and controls, or has a direct impact on, a host of energy functions and activities. The City is a major user of energy as its services and operations encompass a range of activities such as road construction, waste management, street lighting, park maintenance and operation of public buildings. The City can influence community behaviour by setting an example or by regulation and incentives.

## KEY ISSUES

The strategy needs to take into account the following important is-

sues:

- The City owns and manages many buildings, facilities, and vehicles, which they can cost-effectively make more energy-efficient.
- There is currently limited capacity to address energy efficiency and there is no designated position responsible for this area.
- The City owns facilities like waste treatment plants and landfills that are major sources of methane, a greenhouse gas which can be cost-effectively harnessed.
- The City is in a position to implement far-reaching energy efficiency programmes as it is a large employer and the service provider for the entire metropolitan area.

- Land-use planning strongly influences the level of local energy use, and the City has control over this.

## LEADING BY EXAMPLE: AUDITS OF EMM BUILDINGS

An energy audit was conducted for the Germiston Civic Centre and the EGSC Building within the City. The findings highlight a number of ways to improve management practices, reduce resource use and expenditure, minimise waste generation and reduce impact on the environment. Calculations indicate that simple technical retrofits and behavioural change energy management in the buildings can save up to 15% of energy use in each building.

### FOCUS AREAS OF THE STRATEGY in EMM

1. Procurement policies for equipment and vehicles to consider energy efficiency.
2. Renewable energy and energy efficiency demonstration projects implemented.
3. Development of efficient building policy and standards.
4. Appoint an ESCO to undertake efficiency projects in the City, and retrofit all existing buildings to improve efficiency.
5. Develop and disseminate information to all City staff, and build their capacity around energy issues.
6. Install solar water heaters in new City buildings.
7. Retrofit all traffic lights with efficient LED lights, and install low-energy streetlights.
8. Make video/tele-conferencing available to all City staff to reduce travel requirements.

# TRANSPORT

## sector energy issues

The transport sector was the highest consumer of energy in Ekurhuleni in 2003, representing 41% of the total energy consumption in the municipality. As with all cities in South Africa, the city has an inadequate public transport system, and urban sprawl makes development of cost-effective public transport difficult.

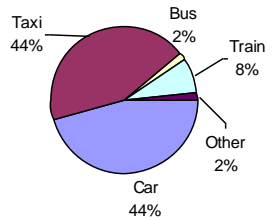
Three main public transport modes operate in the Ekurhuleni area, namely trains, buses and minibus taxis. The train service is underutilised, despite the fact that this is considered the backbone of public transport. Taxis and private vehicles dominate the share of transport modes.

### KEY ISSUES

The strategy needs to consider the following issues, amongst others:

- Bus services have a low market share of public transport, and there is no co-ordination of services between the three different bus operating entities.
- More than 50% of all taxi routes are over supplied.
- Congestion on freeways is increasing, with heavy freight vehicles becoming an ever-increasing proportion of the traffic.
- An increase in the use of private cars is expected, posing a significant challenge to the intended promotion of a more efficient, public-transport based system.
- Multiple jurisdictions amongst many levels of authority have led to

**Transport Modal Split for Ekurhuleni**  
(excl walk & cycle)



tation and lack of ability in the transport sector.

### The City's STRATEGIC INTEGRATED TRANSPORT PLAN

The SITP aims to direct the future of transport in the City of Ekurhuleni during the period 2003-2008. The establishment of a Transport Authority will be a first significant step towards empowering the City for its challenging task of optimising transport resources to the benefit of all stakeholders. The comprehensive ITP is under development, and will be completed by March 2007.

#### FOCUS AREAS OF THE STRATEGY in the TRANSPORT SECTOR

1. Promotion of public transport, and shifting passengers from private vehicles to public modes such as bus and train.
2. Coordination with the urban planning function to promote mixed use zones and ensure that urban development supports public transport efficiency.
3. Promotion of 'road to rail' for both freight and passengers.
4. Promoting non-motorised transport where feasible.
5. Developing bus and High-Occupancy Vehicle lanes on main routes.
6. Developing information and disseminating to the public.
7. Building the energy capacity of staff within relevant City departments.
8. Improving the efficiency of City transport fleet.
9. Supporting a range of Travel Demand Measures.



# INDUSTRY, MINING & COMMERCE

## sector energy issues

Ekurhuleni contributes some 23 % to the Gross Geographic Product of the Gauteng Province. Approximately 40 % of all industrial activity in Gauteng derives from Ekurhuleni – which comprises the largest industrial area in the country.

**Industry and construction:** This sub-sector consumes 36% of the total energy demand in Ekurhuleni.

**Mining:** Gold mining is the primary mining activity within Ekurhuleni. The mining sector accounts for 4% of the total energy demand.

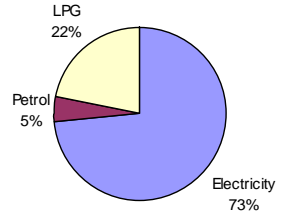
**Commerce:** This sub-sector represents 3% of the total energy consumed.

### KEY ISSUES

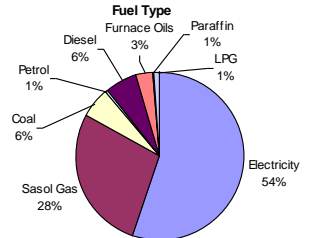
The strategy needs to consider the following issues:

- Industry, mining & commerce are significant contributors to local air pollution and greenhouse gas emissions.
- The low cost of electricity means that there has been little incentive to be more energy efficient.
- There are a number of cost-effective opportunities for improving energy efficiency in the sector.
- Energy efficiency in industry and commerce will increase Ekurhuleni's competitive advantage internationally.

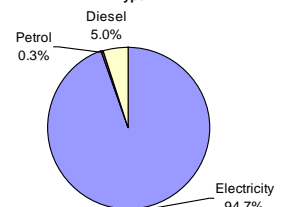
% Energy Use of Commerce by Fuel Type



% of Energy Use for Industry/Construction by Fuel Type



% of Energy Use for Mining/Quarrying by Fuel Type



### FOCUS AREAS OF THE STRATEGY in the INDUSTRY, COMMERCE & MINING SECTOR

1. Development of information and capacity around efficiency and renewable energy.
2. Move towards mandatory energy audits and efficiency retrofitting of all operations.
3. Promoting the use of cleaner options such as natural gas by industry.
4. Developing high profile renewable energy demonstration projects.
5. Improving the energy efficiency of buildings in the sector, particularly new buildings.
6. Implementing voluntary incentives for commerce and industry to improve energy performance, such as prestigious awards.

# ENERGY SUPPLY

## overview

**Electricity:** The City purchases most of its electricity from Eskom. The City electricity distribution is currently split between Eskom and the City, but will shortly be fixed under a regional Electricity Distributor, as part of the national electricity industry.

**Renewable energy:** There is significant potential in Ekurhuleni for the use of solar power – particularly solar water heaters. Passive solar designs for building is another critical area of focus for Ekurhuleni.

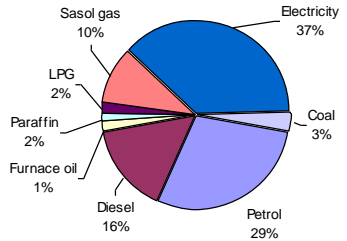
### LANDFILL METHANE GAS FEASIBILITY STUDY

The uncontrolled release of landfill gas give rise to health and environmental problems. Of particular importance is global warming impact. This gas can be recovered for energy beneficiation since it contains more than 50% methane. EMM has commissioned consultants to evaluate the landfill gas potential at four of its sites.

**Liquid fuels:** Ekurhuleni has limited role regarding liquid fuels supply (such as transport fuels), but can consider promotion of emerging cleaner fuel supply, such as biodiesel.

### KEY ISSUES

% Total Energy Use by fuel type



- Electricity use accounts for the majority of CO<sub>2</sub> emissions (74%).
- Illegal connections are serious a problem that have cost, availability of supply, and safety implications.
- There is significant potential in Ekurhuleni for the use of solar water heaters, yet it is currently underutilised.
- Renewable energy generally has a high employment creation potential, and Ekurhuleni should consider becoming a manufacturing and supply hub for technologies such as solar water heaters.

### FOCUS AREAS OF THE STRATEGY in the ENERGY SUPPLY SECTOR

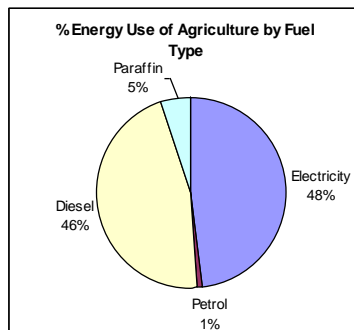
1. Continued electrification of households, and making efforts to formalise illegal connections.
2. Ensuring adequate supply quality to promote investment and economic growth.
3. Facilitating the introduction of cleaner, renewable energy sources such as solar water heaters, biodiesel, and landfill gas exploitation, and explore carbon financing to support these.
4. Encouraging the introduction of natural gas where feasible.
5. Undertaking Integrated Resource Planning to ensure optimum supply mix, including prioritisation of efficiency and Demand-Side Management above new supply sources.

# AGRICULTURE

## sector energy issues

In 2003, agriculture consumed 1% of the total energy consumed in Ekurhuleni. Electricity and diesel use account for the bulk of energy use for this sector. Climate change could impact on agricultural production and adaptation measures will need to be researched for the area.

- A high percentage of electricity use is for irrigation and therefore water-saving measures (such as drip irrigation) can result in significant energy-savings.
- The agriculture sector could have opportunities for the production of bio-fuel crops.
- A significant percentage of the high-potential



agricultural land in Gauteng falls within Ekurhuleni. The use of this land should be supported by energy and transport planning.

### KEY ISSUES

#### FOCUS AREAS OF THE STRATEGY in the AGRICULTURAL

1. Promoting irrigation efficiency, and thereby energy efficiency.
2. Auditing of large agricultural operations to support the national government agricultural energy efficiency improvement target.
3. Exploring the potential for bio-fuel production.
4. Ensuring that energy supply supports food security of small farmers.

Ekurhuleni Statistics	
Total Population (2001)	2 480 277
Total Population (Estimated: 2010)	3 200 000
Number of households	745 115
Unemployment Rate	26 – 32%
Date of Metro Establishment	5/12/2000
Cities and towns amalgamated	9
Industries	8 000
Supporting Enterprises	5 000
Commercial Enterprises	19 000
GVA (% of national, 2001)	8%

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Ekurhuleni  
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