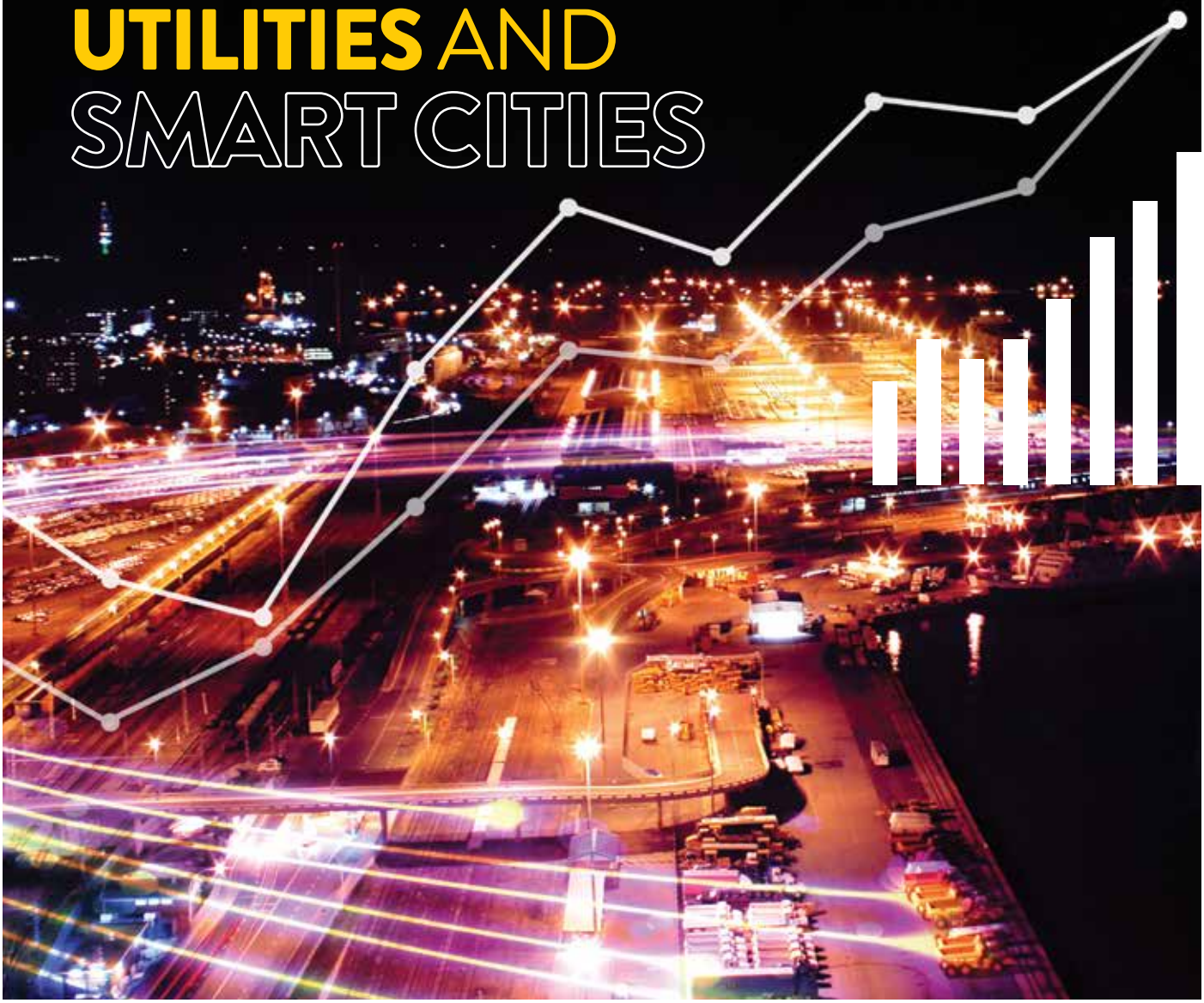
ETHEKWINI MUNICIPALITY

EDGE

14TH ISSUE SEPTEMBER 2015

ECONOMIC DEVELOPMENT AND GROWTH IN ETHEKWINI

UTILITIES AND SMART CITIES



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WELCOME TO THE EDGE

WELCOME TO THE 14TH EDITION OF THE EDGE, A QUARTERLY ECONOMIC BULLETIN THAT LOOKS AT THE ETHEKWINI ECONOMY, WITH A BRIEF OVERVIEW OF THE GLOBAL AND NATIONAL CONTEXT.

PUBLISHED BY THE ETHEKWINI ECONOMIC DEVELOPMENT AND INVESTMENT PROMOTION UNIT, THE EDGE AIMS TO INFORM STAKEHOLDERS OF THE LATEST DEVELOPMENTS AND TRENDS IN ETHEKWINI. THE THEME OF THIS EDITION CENTRES ON UTILITIES WITHIN ETHEKWINI, AMIDST THE CHALLENGES BEING EXPERIENCED THROUGH LOAD-SHEDDING AND WATER RESTRICTIONS.

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FOREWORD

Her Worship Deputy Mayor of eThekwini Municipality, Councillor **Nomvuzo Shabalala**

WELCOME TO THE 14TH EDITION.

This is the first EDGE published in the Council's new financial year, being 2015/16. This year the Council has adopted a capital budget of approximately R6 billion, which is aimed at both addressing the pressing challenge of service delivery, while maintaining and rehabilitating existing infrastructure, as well as laying the foundation for economic growth through the provision of new bulk infrastructure.

"R1,2 billion is set aside for transport which includes the Integrated Rapid Public Transport Network while R1,4 billion is committed to water and sanitation and R900 million to general engineering services, R836 million to electricity and a further R750 million to housing."

In the 2015/16 financial year alone, R1,2 billion is set aside for transport, which includes the Integrated Rapid Public Transport Network, while R1,4 billion is committed to water and sanitation and R900 million to general engineering services, R836 million to electricity and a further R750 million to housing.

We recognise that in order to attract investment in key areas we needed to invest in the extension of bulk infrastructure. Hence this budget invests substantially in water and sanitation, electricity and roads. The public transport investments are significant and anticipated to change the spatial structure of the city in the long-term while creating efficient and safe public transport in the short-term. Poor people who live in the townships spend on average about 20% of their income on travel to and from work. This is high by any standard and we need to change this model.

As you would be well aware, load-shedding has become a way of life and this, coupled with the rising costs of electricity, have had a negative impact on business and job creation. While the Municipality has moved to minimise the impact of load-shedding on industries during stage 1 and 2 load-shedding, it is inevitable that it will dampen economic growth.

While Government makes large-scale investments into infrastructure at the national sphere to address issues, such as electricity, housing, transport and logistics, this Municipality is further making large-scale investments into those areas, as well as water and sanitation. The on-going drought has brought to the fore the challenges associated with the provision of adequate clean water. But, the challenges associated with utilities are not simply about Government building infrastructure, it's also about business and the citizens playing a crucial part. The shortage of rainfall, due to the current rainfall cycle, combined with infrastructure challenges has created water shortages in the city.

Water, as a most precious resource, is often taken for granted and used by people as something inexhaustible. Despite the shortages, I still see people washing their cars with a running hosepipe and operating sprinklers in the middle of the day. This type of wastage shows contempt for the rest of society as this resource needs to be shared in a way that meets the basic needs of everyone.

On the part of infrastructure, the capturing and distribution of water, as well as the extension of bulk waste-water infrastructure requires approval on the part of the Department of Water Affairs and we appeal that matters such as the approval of water use licences, the Umhloti waste-water treatment works, as well the proposed desalination plant, are treated with urgency. Challenges associated with water are not short-term in nature and should not be treated lightly once the drought has ended, since this is a long-term challenge which will require significant investment over the long-term in order to ensure that the economic growth of the city is not stifled. Rainwater harvesting should be viewed seriously by households and industry, while industry also needs to ensure efficiency in water usage and recycling.

This issue of The EDGE brings a focus to the utilities that make the city work. We have compiled extensive statistics, trends and expert views to inform decision-making and lead us onto a path that enables economic growth and job creation. We acknowledge that working together we can achieve better results.

MESSAGE FROM THE EDITOR

THIS EDITION FOCUSES ON UTILITIES IN LIGHT OF THE PREVALENT ISSUES FACING OUR COUNTRY AND REGION. THESE ARE CHALLENGING TIMES THAT ETHEKWINI IS FACING ESPECIALLY WITH REGARD TO THE DOUBLE-WHAMMY THAT WE HAVE BEEN DEALT - **THE ENERGY AND WATER CRISES.**

Aurelia Albert
Policy, Strategy, Information and Research Department, eThekwini Municipality

"EThekwini Municipality has already started looking at smarter systems, with a number of initiatives being implemented by service departments."

The electricity crisis has reached a point where the grid is so constrained that load-shedding and the high cost of utilities has become a prominent part of our lives, forcing all citizens and businesses alike to find ways in which to curb these costs and switch to energy reduction and alternative forms of energy.

The water crisis, on the other hand, has affected many citizens and businesses in eThekwini, especially in the North. The water shortage, together with a high increase in tariffs, has constrained the citizens of eThekwini.

This edition firstly looks at the eThekwini economy which has grown slowly. Statistics regarding eThekwini's economy confirm the trend, although some positive signs are showing in 2015.

While unemployment has declined slightly, the number of discouraged work-seekers has increased, posing a real problem to the city. This could be partly due to the slow, or no growth in the productive sectors of the economy, which are generally large contributors to employment and job creation.

The EDGE also explores the concept of a Smart City, with respect to energy and water, and looks at 'smart systems' as a way to improve efficiencies, reduce costs and improve workability, liveability and sustainability. EThekwini Municipality has already started looking at smarter systems, with a number of initiatives being implemented by service departments. Research and development has been at the core of these initiatives in the hope of transforming eThekwini into a Smart City by improving service delivery using a holistic approach.

Key questions which arise during the course of this publication include:

- Are energy and water costs exorbitant, in light of their scarcity and economic value?
- Is there a more sustainable approach to tackling the issues of a constrained energy system and the drought that has further impeded growth?
- Is the Smart City approach the right one in light of the diverse economic and social landscape of eThekwini?
- How can the challenges being experienced be shared by Government and the private sector?
- Are investments in key catalytic projects going to move eThekwini out of a stagnant growth trajectory?

This 'bumper' edition is designed to help the reader think critically, while providing a balanced view of key issues. I hope that you enjoy the read!

Foreign direct investment (FDI) flows to South Africa fell by over 31% last year to

$5,72 billion

from $8,3 billion in 2013

The eThekwini economy grew by 0,9% in 2014

R248,5 billion

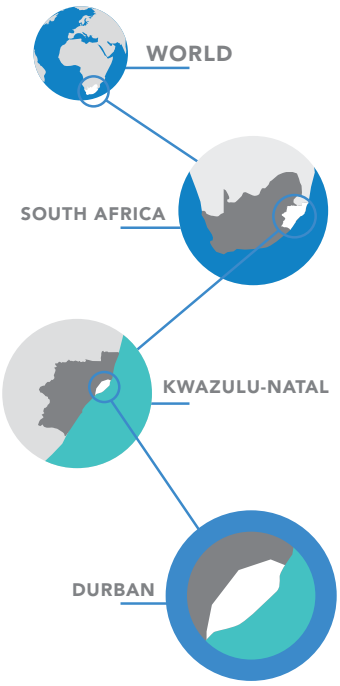
Global infrastructure spending is expected to grow to more than

$9 trillion by 2025

ECONOMIC OVERVIEW

GLOBAL ECONOMIC OUTLOOK

ACCORDING TO THE GLOBAL ECONOMIC PROSPECTS REPORT BY THE WORLD BANK (JULY 2015), THE GLOBAL ECONOMY IS EXPECTED TO GROW 2,8% DURING 2015, SLIGHTLY LESS THAN FORECAST IN JANUARY, AND WILL STRENGTHEN MODERATELY TO 3,2% IN 2016/17.



The risks to this outlook include tight global financial conditions coupled with deteriorating growth prospects, especially in commodity-exporting countries. The IMF has also cut its global forecast for 2015 to 3,3%, citing the financial market turbulence in China and Greece as the main factors.

The Report also mentions that developing countries are facing two transitions this year, as growth slows further to 4,4%. Firstly, the widely expected tightening of monetary conditions in the US, along with monetary expansion by other major central banks, has contributed to broad-based appreciation in the US dollar and is exerting downward pressure on capital flows to developing countries. Secondly, despite some improvement in the first quarter of 2015, lower oil prices are having a significant impact in oil-importing countries, the benefits to activity have so far been limited and, in oil-exporting countries, lower prices are reducing activity and increasing fiscal, exchange rate, or inflationary pressures.

NATIONAL ECONOMIC OUTLOOK

The national economy grew by 1,5% in 2014 (R4,8 trillion in constant 2010 prices) - this low growth is against the backdrop of the global impacts mentioned, especially the drop in commodity prices. As South Africa is a minerals-driven economy that relies on industrialisation through beneficiation and foreign earnings, the decline in commodity prices across the mining sector and the reduction in the demand for steel in the Chinese market are impacting negatively on the national economy. This has severely affected formal employment, which grew by a modest 2,2% in 2014 with more job losses on the cards as commodity prices continue to impinge the minerals sector. The number of unemployed people increased by 2,1% during 2014 to approximately 4,8 million, with an unemployment rate of 25%. Economists believe that lower oil prices or a stronger currency is likely to see growth exceeding 2% in the future. The local challenges, such as load-shedding by Eskom and frequent strikes in the manufacturing sector, remain a threat to higher GDP growth.

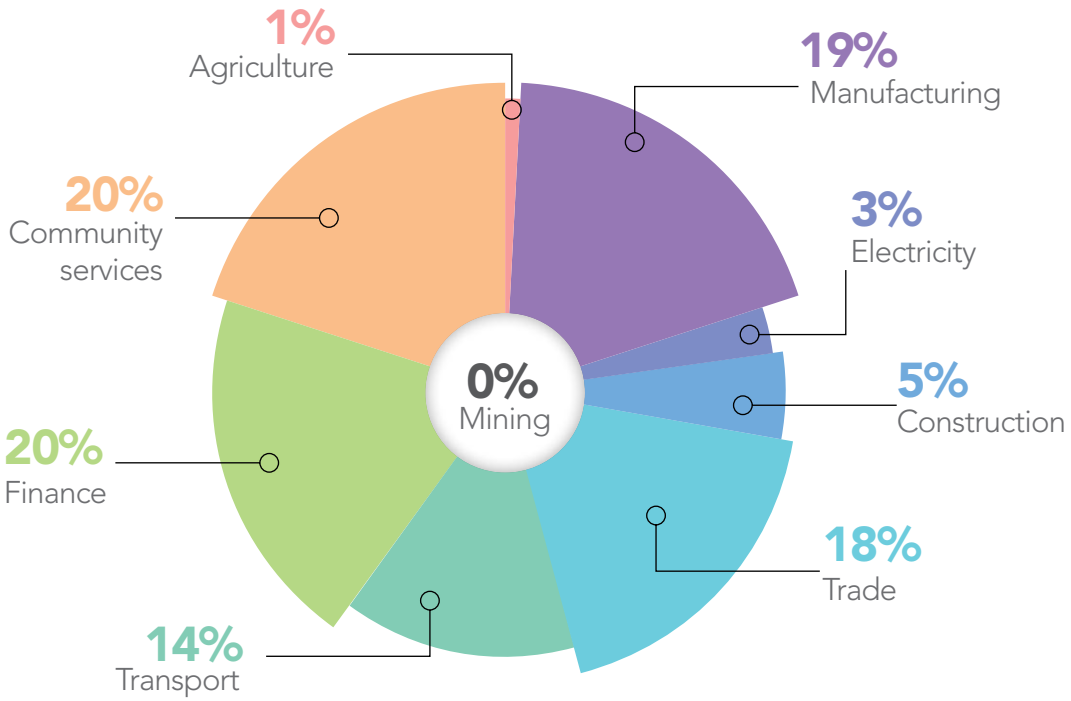
Foreign direct investment (FDI) flows to South Africa fell by over 31% last year to $5,72 billion, from $8,3 billion in 2013, according to the latest World Investment Report. The weak global FDI was attributed to the fragility of the global economy, policy uncertainty for investors and elevated geopolitical risks. Inflows to Africa, as a whole, remained flat when compared with 2013, at $54 billion. Nevertheless, the Report indicated that South Africa was still the largest FDI host economy in Africa.

LOCAL ECONOMIC OUTLOOK: ETHEKWINI

The eThekwini economy grew by 0,9% in 2014 (R248,5 billion), probably due to the mining, manufacturing and electricity sectors recording negative growth.

The agriculture, construction, transport and finance sectors enjoyed positive growth (agriculture had the highest at 4,6% with manufacturing the lowest at -0,5%). The number of unemployed people during 2014 was approximately 217 000, at a rate of 15,2%, while the number of employed (this includes informal) was approximately 1,3 million. The pie chart overleaf shows the percentage contribution of the broad sectors for 2014.

Graph 1: Sectoral Composition of GDP in 2014: EThekwini



Source: IHS Global Insight

The slow growth in the global and national economies has certainly impacted on eThekwini. ***However, the major projects planned for the city going forward will bode well for high economic growth****, most notably those that will enhance trade activity with sub-Saharan Africa and, especially, in light of the anticipated* ***GDP growth of 5% in 2016*** *for the continent. During 2014, Africa's growth has been driven mainly by agriculture, extractive industries, construction and services and on the demand side, the boost came from private consumption and infrastructure investment. According to a recent report by PricewaterhouseCoopers, global infrastructure spending is expected to grow to more than* ***$9 trillion by 2025****, a substantial portion of which is expected in the basic manufacturing sector in sub-Saharan Africa,* ***estimated at $16 billion.***

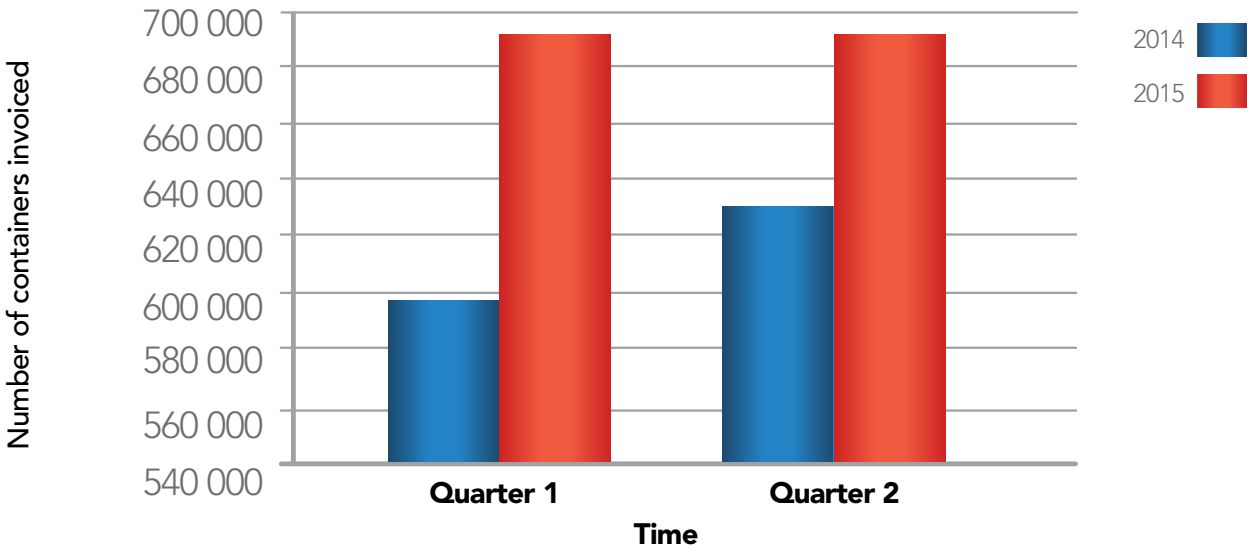
Table 1: EThekwini Municipal Region: Key Indicators: 2013/2014

INDICATOR	2013	2014	CHANGE
Gross Value Added (GVA) (Constant 2010 Prices)	R246,2 BILLION	R248,5 BILLION	0,97%
Gross Domestic Product (GDP) (Constant 2010 Prices)	R270,5 BILLION	R273,0 BILLION	0,90%
Gini Coefficient	0,63	0,64	0,01% POINTS
Per Capita Income	R51 284	R55 727	8,67%
GVA Average Annual Growth	2,2%	1,0%	0,2% POINTS
Population	3 514 199	3 544 678	0,87%
Geographic Area	2 291KM²	2 291KM²	0 CHANGE
Population Growth	0,9%	0,9%	0 CHANGE
Population Density	1 533 PERSONS/KM²	1 547 PERSONS/KM²	0,91%
Number of People Below the Food Poverty Line	752 873	780 017	3,61%
Number of Households	997 000	1 009 081	1,21%
Urbanisation Rate	84,5%	85,1%	0,6% POINTS
Percentage of People in Poverty	21,4%	22,0%	0,6% POINTS
Annual Per Household Income (2010 Current Prices)	R180 765	R195 757	8,30%
Human Development Index	0,62	0,28	0 CHANGE
Annual Disposable Income (2010 Constant Prices)	R133 277	R137 616	3,25%
Tourism Spend	R12,9 BILLION	R12,1 BILLION	-6,20%
Unemployment Rate	15,3%	15,2%	-0,1% POINTS
Annual Expenditure	R184,1 BILLION	R202,2 BILLION	9,83%
Annual Retail Trade Sales	R53,3 BILLION	R57,5 BILLION	7,73%
Total Exports	R60,7 BILLION	R68,0 BILLION	12,1%
Total Imports	R128,7 BILLION	R91,4 BILLION	-28,98%

Source: IHS Global Insight

PORT OF DURBAN:

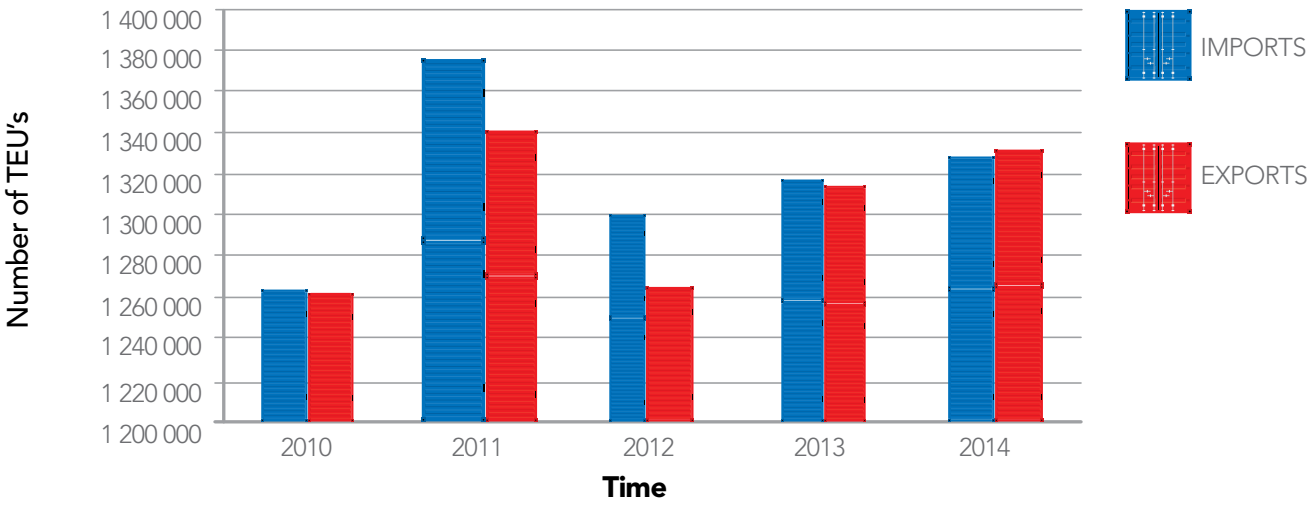
Graph 2: Containers Invoiced Quarter 1-2: 2014 vs 2015



Source: Transnet National Ports Authority

The number of containers invoiced during the first two quarters of 2015 is much higher than the same period in 2014. This reflects the increase in activity at the Port of Durban.

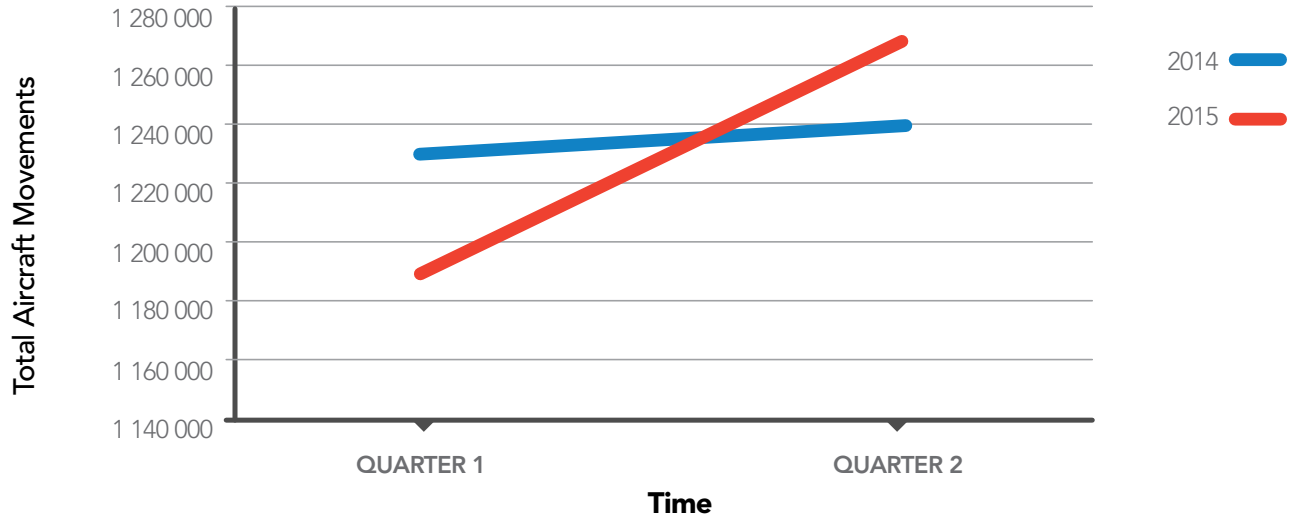
Graph 3: Imports and Exports of Containerised Cargo - Port of Durban



Source: Transnet National Ports Authority

The graph above shows the movement of containerised cargo through the Port of Durban in terms of imports and exports. One can see that the level of trade with regard to containerised cargo has decreased over the past five years, but this has picked-up somewhat since 2012. In 2014, exports were slightly higher than the level of imports, this occurring for the first time in five years.

Graph 4: Aircraft Movements in EThekwini: Quarter 1-2: 2014 vs 2015

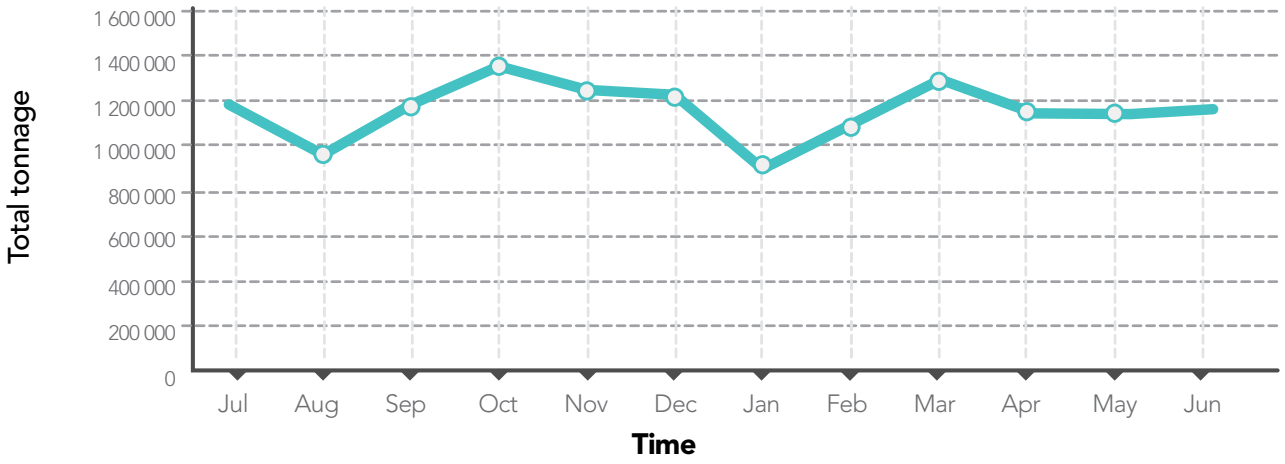


Source: Airports Company South Africa

The graph shows that aircraft movements have sharply increased from the first to second quarter in 2015. The first half of the 2014 year was rather stagnant in terms of activity.

DUBE TRADEPORT VOLUMES

Graph 5: Total Terminal Throughput: 2014 - 2015

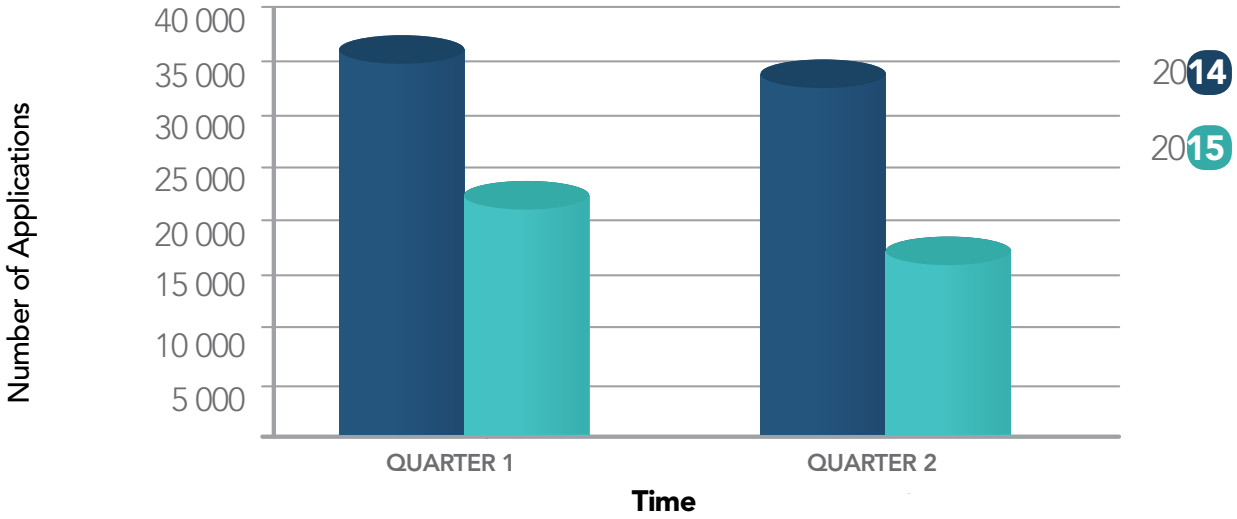


Source: Dube TradePort Corporation

The graph shows the activity at Dube TradePort with regard to domestic and international terminal throughput. The activity has been relatively consistent during the past few months, but this has increased since December 2014.

ETHEKWINI: UNEMPLOYMENT INSURANCE FUND

Graph 6: UIF Applications Quarter 1 to 2: 2014 vs 2015

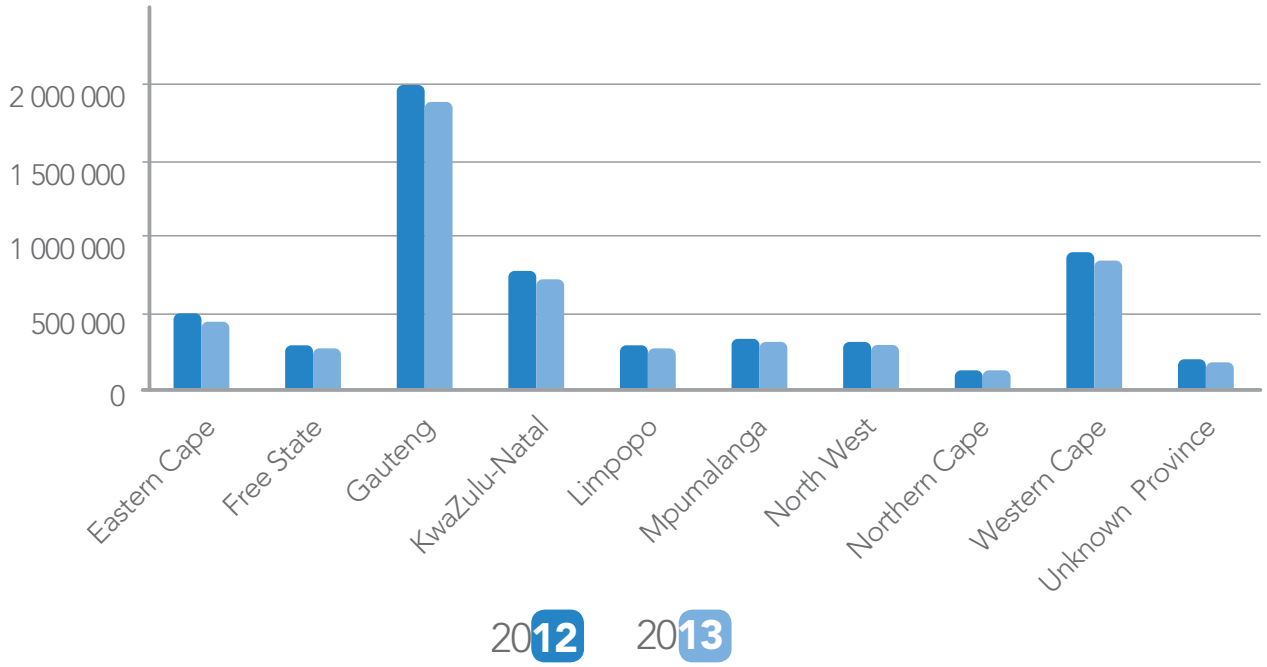


Source: Department of Labour

UIF applications were much higher in 2014 than in 2015. There has also been a slight decline in the number of applications submitted since the first quarter of the year, following a similar trend to the previous year.

SOUTH AFRICAN REVENUE SERVICE

Graph 7: Number of Individual Taxpayers, Per Province



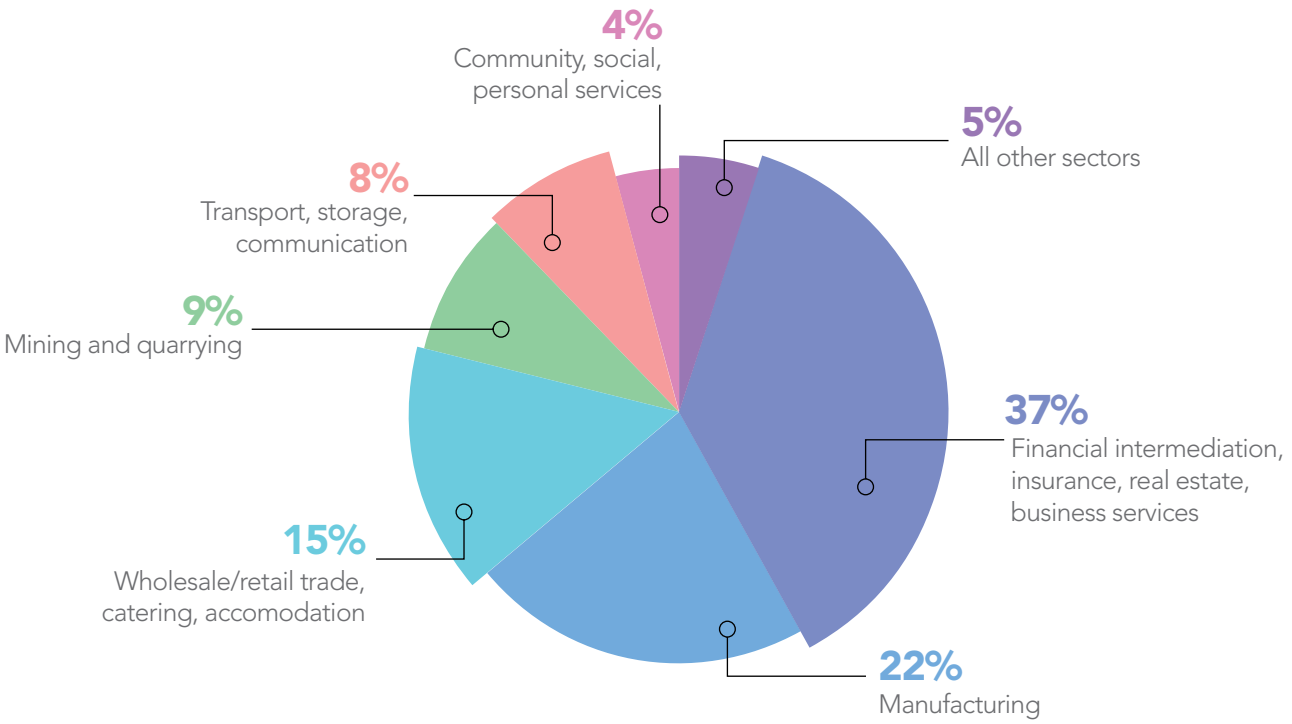
Source: South African Revenue Service

The graph above indicates the change in the number of taxpayers, per province, between 2012 and 2013. This is determined by using residential addresses declared by taxpayers in their returns (the 'unknown province' indicates taxpayers who provided insufficient information to determine in which province they reside). It is likely that migration between provinces and the lack of information about some taxpayers may explain the general decrease in the number of individual taxpayers between 2012 and 2013. Also, between 2012 and 2013, the PIT tax brackets had been increased, to partially compensate for the effects of fiscal drag or inflation.

The greatest proportion of individual taxpayers (36%) reside in the Gauteng province, followed by the Western Cape and KwaZulu-Natal with 16% and 14% respectively.

COMPANY INCOME TAX (CIT) ASSESSED, PER SECTOR (2012)

Graph 8: CIT assessed, Per Sector (2012)



Source: South African Revenue Service

Company Income Tax (CIT) is levied on the taxable income (gross income less exemptions and allowable deductions) of companies and close corporations. After PIT and Value Added Tax (VAT), CIT has been the third-largest contributor to total income revenue for the past decade. It is important to consider which sectors contribute the most in terms of CIT assessed in 2012. The graph above illustrates that the sector with the greatest national proportion of CIT assessed in 2012 was the financial intermediation, insurance, real estate and business services sector (37%), followed by the manufacturing sector (22%) and the wholesale/retail trade, catering and accommodation sector (15%).

The following tables indicate that the number of taxpayers in the eThekwini Municipality decreased between 2012 and 2013. This decrease may be attributed to outward migration, the amendments to the PIT thresholds, retrenchments or individuals voluntarily exiting the workforce. During the same period, the value of tax assessed and the average tax income has increased. This is possibly due to salary adjustments which were above inflation, possible upward social mobility and greater compliance. It can also be seen that individuals in eThekwini Municipality are responsible for more than half of the taxable income and tax assessed in KwaZulu-Natal.

Table 2: PIT Taxpayers in EThekwini Municipality

	No. of taxpayers	Taxable income (R million)	Tax assessed (R million)	Average tax income (Rands)
2012	416 787	77 567	14 596	186 106
2013	376 132	83 912	15 257	223 092

Source: South African Revenue Service

Table 3: EThekwini PIT Taxpayers as a Percentage of KwaZulu-Natal PIT Taxpayers

	No. of taxpayers	Taxable income	Tax assessed
2012	54,1%	57,4%	59,9%
2013	53,2%	57,0%	60,3%

Source: South African Revenue Service

COMPANY REGISTRATIONS - CIPC: COMPANY, CLOSE CORPORATION AND CO-OPERATIVE REGISTRATIONS

Graph 9: CIPC Registrations

Source: Companies and Intellectual Property Commission

The Companies and Intellectual Property Commission (CIPC) recorded increases in the number of companies registered from 222 146 in 2012/13 to 240 781 in 2013/14.

The number of registered co-operatives has increased significantly from 6 504 in 2008/09 to 21 330 in 2013/14. This increase may be attributed to the discontinuation of close corporation registration in 2012/13.

These increases in company and co-operative registrations are a positive sign for economic growth, as they indicate that a greater number of individuals are engaging in entrepreneurial activities and illustrate the relative ease of formally registering a business entity.

SACCI BUSINESS CONFIDENCE INDEX

The South African Chamber of Commerce and Industry (SACCI) produces a Business Confidence Index[1] (BCI), a composite weighted index, which is compiled from a number of economic and market indicators.

There are 13 sub-indicators which are used to compute the SACCI BCI.

This index, thus, reflects the prevailing market-related business climate, i.e. it does not reflect the opinions of businesses, but rather, it reflects what businesses are experiencing and how they are reacting to economic developments in the market.

The index, thus, reflects the net results of positive and negative developments in the general market and economy.

As at the end of June 2015, business confidence decreased by 2,3 index points to 84,6 points (this is a decrease from 86,9 points in May 2015), reflecting a continuation of the downward trend in business confidence, as illustrated in the adjacent graph. As compared to June 2014, the BCI in June 2015 is 5,1 points lower.

Most importantly, the June 2015 BCI is the lowest level of business confidence since the low of 83,9 in January 1999 (a 16-year low). The June 2015 BCI is 37 index points lower than the highest recorded index of 121,9 of December 2006.

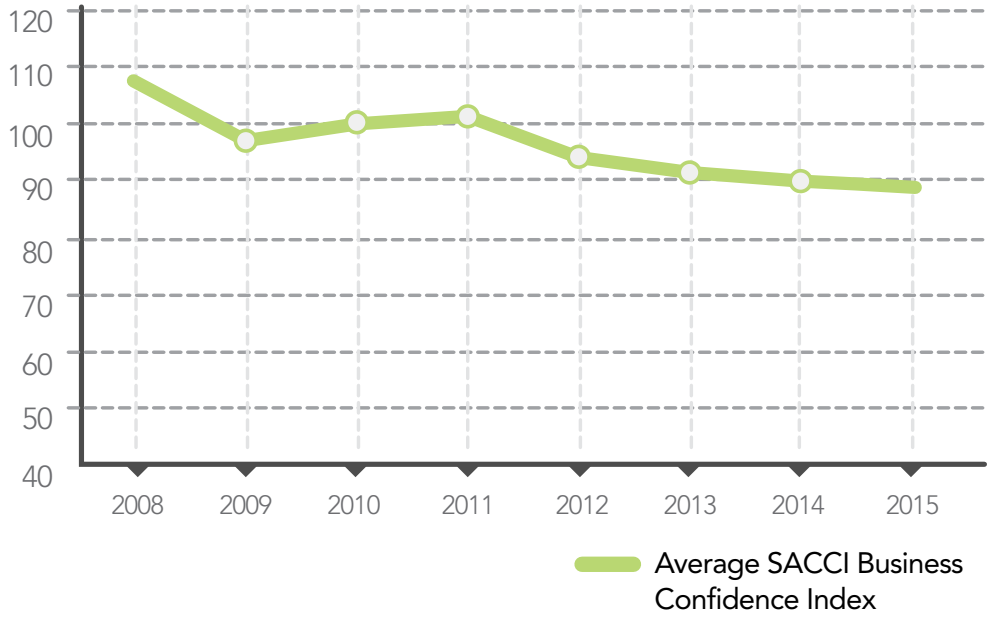
This significantly low level of business confidence may be attributable to a host of factors, namely:

- The notable Balance of Payments (BoP) deficit;
- The slowing of net financial inflows;
- The notable depreciation of the Rand (between May 2015 and June 2015, the Rand depreciated by 3,1%, as opposed to depreciation between June 2014 and May 2015 of 0,6%);
- The combination of a slowing economy and high Government and household debt levels, which have both contributed to restraint in recurrent spending;
- The slowing of real gross domestic fixed investment. This is a serious concern, as this type of investment is essential to enhancing infrastructure investment and ensuring that infrastructure projects are completed on time; and
- Load-shedding, delays in bringing new electricity capacity onto the grid and the inflationary impact of a substantial electricity tariff increase.

[1]The SACCI Business Confidence Index was first published in 1985 and its method of calculation has been updated numerous times since then, with the latest revision occurring in February 2010.

SACCI BUSINESS CONFIDENCE INDEX (AVERAGE)

Graph 10: Average SACCI Business Confidence Index



Source: South African Chamber of Commerce and Industry

PATENTS

The number of patent applications in a country is indicative of the amount of investment which has occurred in research and development activities.

A high number of patent applications may also illustrate an environment of innovation.

The graph below illustrates the number of patent applications for South Africa and differentiates between applications which were lodged locally, i.e. resident applications, and those which were lodged internationally, i.e. abroad.

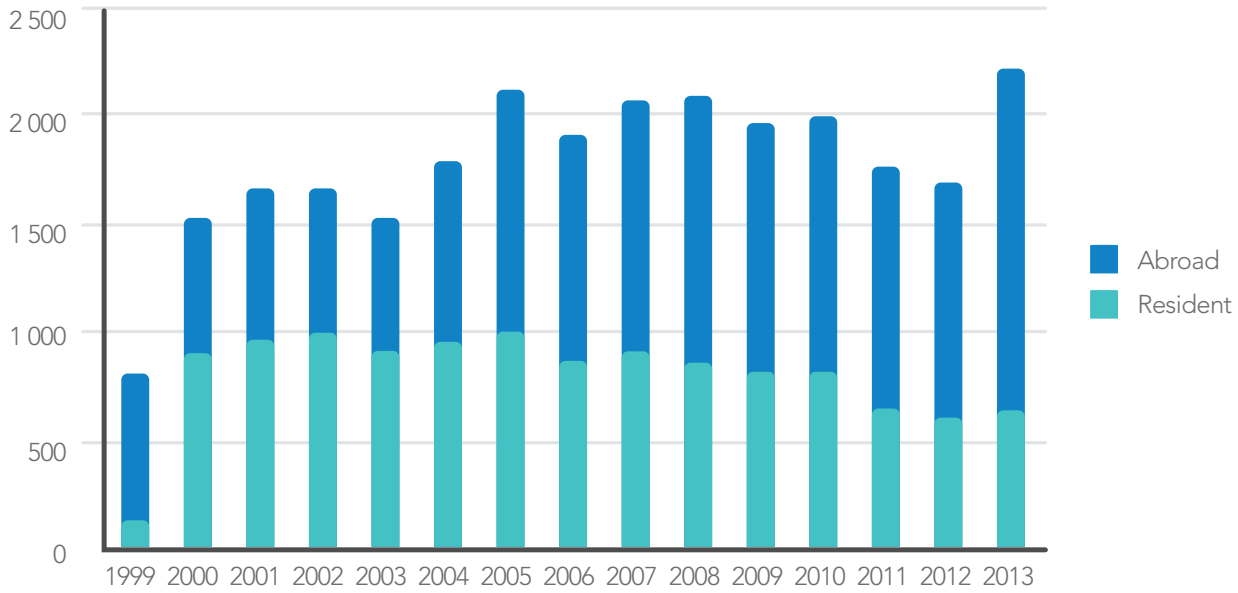
While the total number of patent applications has appeared to increase, most notably between 2011 and 2013, the number of applications lodged abroad has increased significantly, as opposed to those lodged locally.

The graph that follows illustrates South African patents per field of technology. It indicates that there is not a specific sector where the vast majority of patents are granted, as almost 47% of patents fall outside the traditional sectoral categories.

The most prominent sectors for South African patents are civil engineering (7%), materials and metallurgy (6%), chemical engineering (6%), basic materials chemistry (6%) and medical technology (6%).

PATENT APPLICATIONS

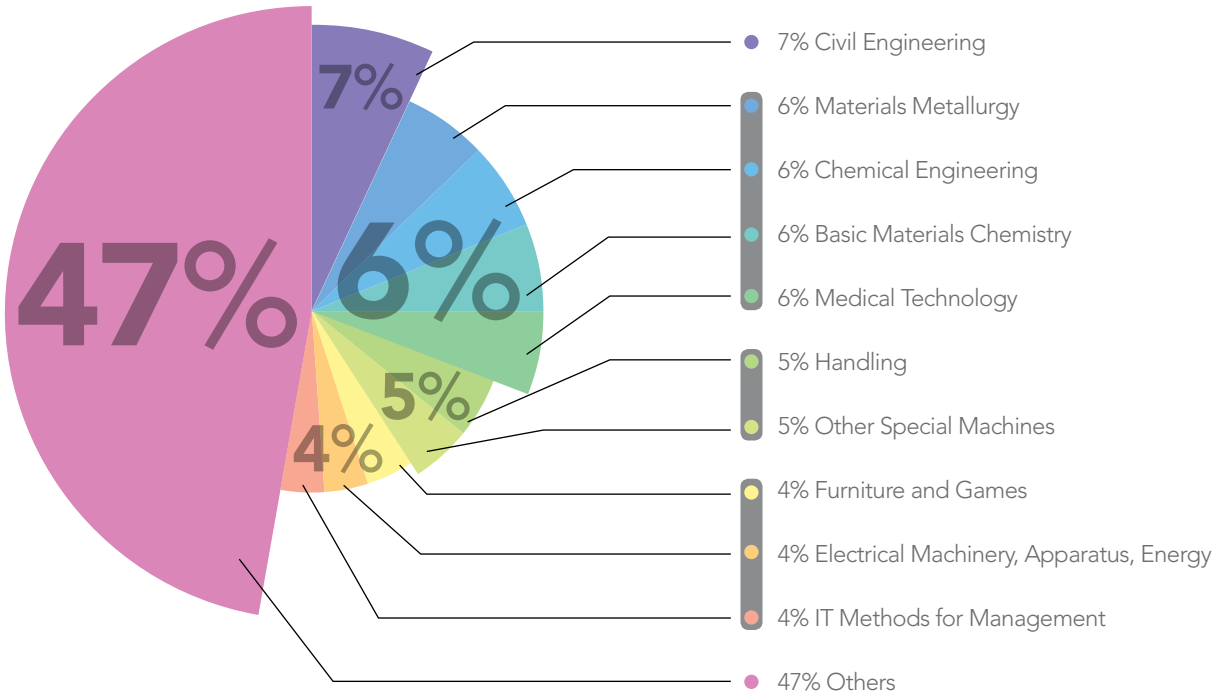
Graph 11: Number of Patent Applications in South Africa[2]



Source: World Intellectual Property Organisation

SOUTH AFRICAN PATENTS (BY FIELD OF TECHNOLOGY)

Graph 12: South African Patents Filed (per Field of Technology)



Source: World Intellectual Property Organisation

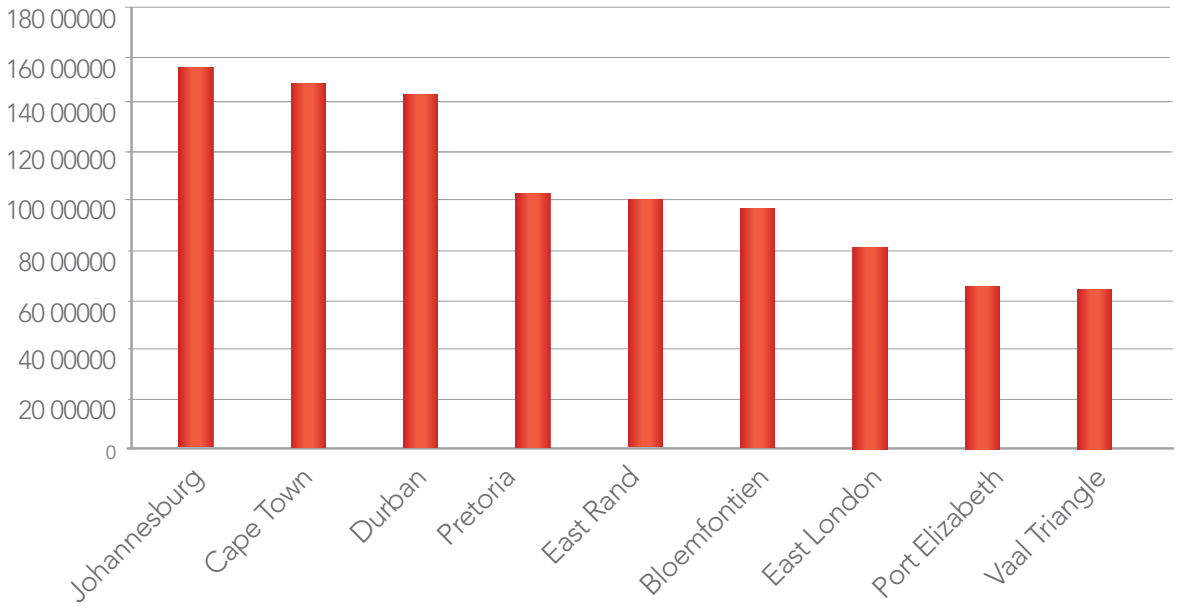
[2]This data was obtained from the World Intellectual Property Organisation (WIPO), and as the data requires verification, it may only be supplied with a two-year lag.

REAL ESTATE

Average Home Prices

A recent analysis by HomeBid of some 136 000 homes, transferred in the various deeds offices during the first half of 2015, revealed that the average home price in Johannesburg is the most expensive at R1 566 017, followed by Cape Town at R1 492 551. Average home prices in Durban closely follow Cape Town at R1 448 251.

Graph 13: Average South African Home Prices (Rand)



Source: HomeBid (2015)

OFFICE VACANCY RATES

Office vacancy rate data from SAPOA reveals that eThekwini Municipality has the second lowest office vacancy rate amongst the five major municipalities, with a vacancy rate of 10,2%, at the end of June 2015. This is an improvement on the previous year. It shows increasing confidence in the Durban CBD. The City of Cape Town boasts the lowest office vacancy rate of 8,3%.

Table 4: Office Vacancy Rates Across South African Metropolitan Municipalities

LOCATION	OFFICE VACANCY RATE (%)
Nelson Mandela Bay Municipality	14,7%
City of Johannesburg	11,3%
City of Tshwane	10,6%
eThekwini Municipality	10,2%
City of Cape Town	8,3%

Source: SAPOA (2015)

A CLOSER LOOK AT UTILITIES AND SMART CITIES

SMART CITIES GLOBALLY

Cities are defined as 'smart' when substantial investments are made in human and social capital, including both traditional and modern services, all of which is meant to ensure sustained economic development and a high quality of life. A global awareness that our natural resources are finite, together with the anticipated impacts of climate change and a growing population that is placing increasing burdens on cities has pushed the 'smart city' concept onto centre stage. There appears to be a collective paradigm shift on how we think about utilising scarce resources in a smart or meaningful way. At a built environment metropolitan level, there are six core systems, comprising people, business, transport, communication, water and energy.

In a smart city, therefore, these six core systems and other key services would be managed harmoniously to support the smooth operation of critical infrastructure, while providing for a clean, economic and safe environment in which to live, work and play. Globally, there is an outpouring of initiatives from cities, regional blocs, international institutions (such as the World Bank and OECD) on smart city concepts. According to the World Bank, 75% of the infrastructure that will exist in 2050 is yet to be built, so the actions taken now will shape urbanisation patterns and quality of life for many decades.

SMART CITIES NATIONALLY

The National Development Plan (NDP) has identified all the components of a 'smart city' as key developmental points that will position the country as a globally competitive location. Some of these include the establishment of effective, safe and affordable public transport, producing sufficient energy to support industry, while reducing carbon emissions and interventions to ensure environmental sustainability and resilience to future shocks. The Energy Efficiency Demand Side Management (EEDSM) Programme was also initiated by National Government for the purpose of achieving greater energy efficiency. The programme is funded by National Treasury and focuses on reducing energy consumption in municipal-owned and operated infrastructure. To date R115 million has been spent on eThekwini-owned facilities. These include traffic and building lighting.

The major cities in the country have embarked on significant initiatives in the transport and ICT sectors to enhance movement and communication. The City of Johannesburg has taken control of its broadband network after the Council approved the creation of a municipal-owned entity to roll-out free, high-speed internet to townships and in all public spaces in order to unleash entrepreneurial potential and to create jobs.

The City of Cape Town launched the Smart Cape project more than a decade ago, with the goal of ensuring that all residents have free access to basic information and communication technologies. To date there are 3 000 registered Smart Cape users and the initiative was awarded the $1 million Bill & Melinda Gates Access to Learning Award in 2003.

There are several other 'smart' ideas undertaken by numerous entities in both the private and public sectors to make operations and service delivery more efficient in their region. These are mentioned elsewhere in this publication.

SMART CITIES LOCALLY

The eThekwini Municipality has several smart city initiatives on the go. These include energy, transport, ICT and learning. In many instances, the city strives to address the injustices of the past in tandem with smart city concepts that relate to skills enhancement, land reform, alternative energy sources for human settlements and industry and to ensuring that historically disadvantaged townships are synergised with the main-stream economy.

The eThekwini Municipality's Energy Office (EO), established in 2008 is mandated to address climate change mitigation and is considered a leader in this sector at a Local Government level and is currently involved in a comprehensive suite of activities:

- The EO has determined that the municipal region emitted approximately 29 billion tons of carbon dioxide equivalents (tCO_2e) from transport, industrial, residential and commercial activities during 2012. The EO has introduced key measures to decrease emissions in order to reach the targets set in the eThekwini Municipal Energy Strategy of 2008. These include the Durban Climate Change Strategy that aims to provide guidance for the city as a whole, to mitigate against and adapt to climate change. Another project relates to the eThekwini Eco-Industrial Park that aims to establish an eco-industrial park that will serve as a dedicated commercial and industrial zone within the Cornubia development. This project has two objectives, namely to develop a climate-neutral eco-industrial park within eThekwini that promotes cleaner production, pollution prevention, energy efficiency, renewable energy and inter-company partnering and, in addition, to promote the green technologies and services sector to supply directly into the broader Southern African Development Community (SADC) region.

- Another initiative of the EO relates to wind re-powering. This is a collaborative exercise between the Bremen Overseas Research and Development Association (BORDA) and the Municipality. It involves the transportation and installation of two 150kW turbines from Bremen to Durban. They will be used to assess the impact of wind energy on the local grid infrastructure and to better understand the environmental impacts of wind energy within the local context, which will provide useful data for wind energy development in KwaZulu-Natal.

- A project named Eos (named after the Greek Goddess of the Dawn) is aimed at promoting the use of embedded rooftop solar photovoltaics (PV) in eThekwini. The project will allow the Municipality to obtain first-hand knowledge in understanding the barriers to PV from which to test local policies and regulations.

- The Durban Solar Map is an interactive tool linked to the Durban Solar City Framework that allows one to view an aerial image of one's property, where the tool is able to automatically calculate basic technical information, such as size, cost, and the like for a PV installation (http://www.durbansolarmap.co.za/viewer/).

EThekwini is also trying to revolutionise its transport sector to provide a flexible, safe and cost-effective transport service for people with the launch of Go!Durban. This is the Integrated Rapid Public Transport Network (IRPTN) that will make transport universally accessible to Durban's citizens.

The core objective is to provide seamless transfers across transport modes, by creating ease of access at stations and precincts and by using electronic ticketing and providing passenger safety and security. The provision of transport is intrinsic to the creation of a vibrant, liveable and sustainable city, in line with the City's vision.

The eThekwini Municipality has ensured that it adheres to technological advantages in the communications field by launching the Smart Community initiative, which is a smartphone application that allows customers to interact with the Municipality.

Residents who own smart phones or tablets are able to download this app from Google Play and the Apple Store which they may then use to report faults using GPS to record accurate locations, view emergency contact numbers and receive their revenue balances and municipal alerts.

LOOKING AHEAD

- What could cities do to become smarter? The IBM Institute for Business Value presents an excellent set of recommendations in its 'A Vision for Smarter Cities'. Firstly, it mentions that there is recognition that cities must work seamlessly across their own organisational boundaries and partner with other spheres of Government, as well as with the private sector and civil society. Secondly, cities need to be more than just focused or efficient; it will require the next generation of city to emerge - one based on smarter systems that are interconnected and where people and objects interact in entirely new ways. Thirdly, the smart city must target all the inter-relationships between systems and requires a holistic strategy that addresses all factors.

- The smart city scenario is not without its challenges, especially for South African cities still feeling the impact of apartheid planning, poverty, lack of employment opportunities and low skills levels. The eThekwini municipal region is also 60% rural, which means that a huge social burden is placed on the urban centres as people continually migrate there in search of employment. The focus to implement smart ideas for urban areas may also ignore the potential to seek sustainable initiatives in rural regions.

- Smart city concepts rely heavily on the application of information communication technologies (ICT) that may incur huge set-up costs which may be quickly rendered obsolete, given the dynamic pace at which things change in this sector. This may place a financial burden on cities to constantly adhere to these technological changes over time.

- Another challenge is the high level of big data collection and analysis required for smart city planning. These may have negative impacts on privacy, due to predictive policing and may infringe basic human rights.

- Smart cities will need a highly literate population with technological savvy. Until all are techno-savvy, what happens to those who are not?

SMART CITIES IN UTILITIES: A BROAD FRAMEWORK - WHAT, WHY AND HOW?

The International Smart City Council acknowledges that the smart city sector is without a universally agreed definition; it is still in the 'I know it when I see it' phase[3].

While there is still indistinctness in the definition or exact denotation of a smart city, the global, intuitive understanding, is that a smart city is one that services its population using innovative and smart technologies, through smart human resources.

Why is this important in eThekwini? The World Economic Forum reports that more than half of the world's population now lives in urban areas[4].

This is likely to grow to two thirds of the world by 2050[5].

EThekwini Municipality, being a metropolitan municipality surrounded by rural catchments, can only expect to attract much of the rural to urban in-migration.

With fixed land space and resources and increasing populations, Local Governments and cities globally have been struck with an urgency to provide systems to cater for migration of this nature.

EThekwini is certainly no exception and the increasing population calls for a deviation from the business-as-usual provision of services, to smarter forms of service delivery.

The following graph indicates the pressure on service delivery as eThekwini's household population increases.

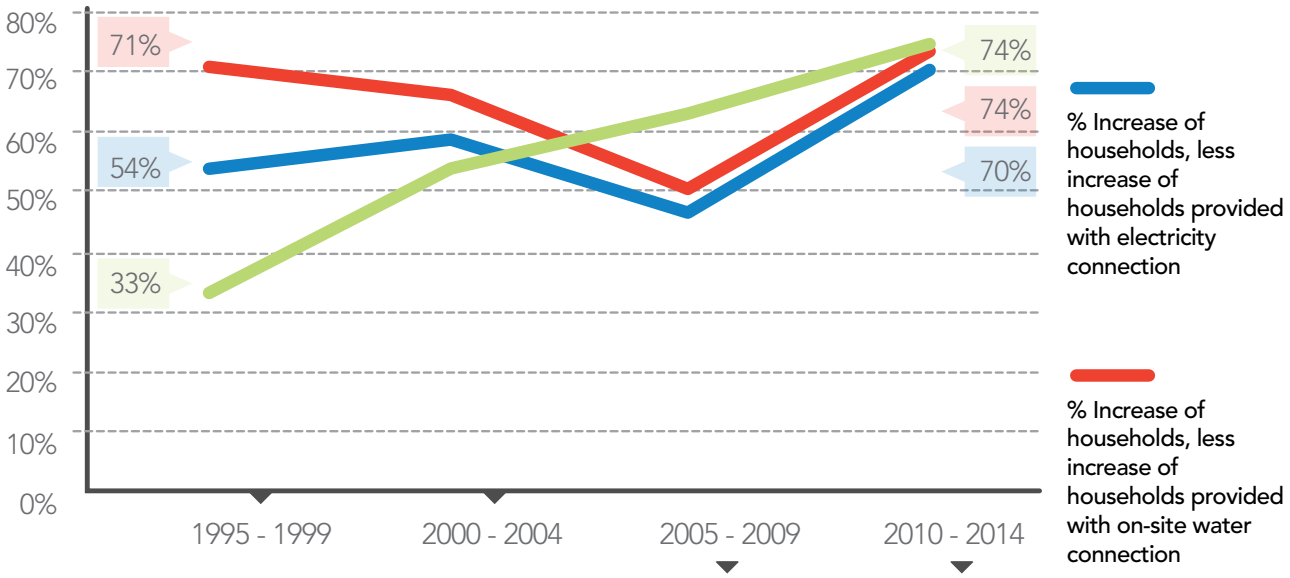
The graph illustrates the increasing percentage of households not serviced with utilities.

The increase throughout the years is an indication of the high in-surge of (and internal growth of) households in eThekwini.

It indicates that between 2010 and 2014, 70%, 74% and 74% of the additional increase in households were not serviced for weekly refuse removal, electricity and water respectively, although not all households were formal structures[6].

Nonetheless, the increase in new households not adequately serviced with utilities has been on the rise since 2009, setting a clear case for the development of innovative and smarter methods in utilities provision.

Graph 14: EThekwini Service Delivery Pressure Indicator



Source: Quantec Development Indicator Data, 2015

[3]http://smartcitiescouncil.com/smart-cities-information-center/definitions-and-overviews

[4]Part 2: Risks in Focus: 2.3 City Limits: The Risks of Rapid and Unplanned Urbanisation in Developing Countries; http://reports.weforum.org/global-risks-2015/part-2-risks-in-focus/2-3-city-limits-the-risks-of-rapid-and-unplanned-urbanization-in-developing-countries/

[5]Part 2: Risks in Focus: 2.3 City Limits: The Risks of Rapid and Unplanned Urbanisation in Developing Countries; http://reports.weforum.org/global-risks-2015/part-2-risks-in-focus/2-3-city-limits-the-risks-of-rapid-and-unplanned-urbanization-in-developing-countries/

[6]Informal structures; e.g. informal settlements; are by nature unplanned by the City, and often erected on difficult terrain. They are therefore predominantly both unserviced, and difficult to service, where resources to do so become available. This decreases the ability of the City to adequately provide utilities to these households; therefore decreasing their possibility of ever being serviced. This may skew the percentage of the increase in households not serviced.

ELECTRICITY

The state of electricity supply and distribution in eThekwini Municipality is as follows.

THE COST OF ELECTRICITY

The under-investment in generating capacity, combined with economic growth and the extension of electricity to previously under-serviced areas, has resulted in demand outstripping supply.

Now, while municipalities only have a constitutional mandate to distribute electricity, the consequence of this historic under-investment in electricity generation capacity has manifested itself in the form of increased electricity tariffs. This is evidenced by the 78% increase, in real terms, of the price of electricity between 2008 and 2011[12].

The table below shows the increase in electricity prices over the past five years and the table that follows shows estimated increases for the next five years. It must be stated that the forecasts are purely deductions, based on past trends and should not be deemed accurate in any way.

However, should these figures materialise in the future, the eThekwini Municipality increase would be realistic.

Table 5: Percentage Tariff Increase

Percentage Tariff Increase

Financial Year	EThekwini: 01 July	Eskom: 01 July
2015/16	12,2	14,24
2014/15	7,39	8,06
2013/14	5,50	8,00
2012/13	11,00	13,50
2011/12	19,80	26,71
2010/11	25,00	28,90

Source: EThekwini Electricity Unit

Table 6: Percentage Tariff Increase

Scenario: Projected Percentage Tariff Increase

Financial Year	EThekwini: 01 July	Eskom: 01 July
2016/17	8,0	8,0
2017/18	8,0	8,0
2018/19	14,0	16,0
2019/20	14,0	16,0
2020/21	14,0	16,0
2021/22	14,0	16,0

Source: EThekwini Electricity Unit

[12] Eskom. 2012. Overview of multi-year price determination, 2013/14-2017/18. Available online: http://www.eskom.co.za/CustomerCare/MYPD3/Documents/1MYPD3PartOne19102012Website.pdf

These increases are only estimates and will change, based on costs, as approved by the Municipal Council and/or the Regulator.

To ensure a stable electricity price path in South Africa, Eskom has implemented a Multi-Year Price Determination. This means that Eskom forecasts its costs and income for a five-year period and, based on these assumptions, details a price increase for the next five years. This ensures that there is predictability and certainty in electricity prices in the country. MYPD3 was the last determination and was capped at 8% per annum from 2013 to 2018.

Eskom has found itself cash-strapped and applied to the regulator for a selective re-opener to the MYPD3 in May 2015. The motivation underpinning the application was for a further increase in tariffs to purchase additional diesel that could be used to operate the Open Cycle Gas Turbines (OCGT) for longer durations during the day. This will allow for a reduction of load-shedding in the country.

Rising electricity tariffs have significant implications on the budget and operations of Municipalities. It is well-known that Municipalities generate a significant amount of their revenue from the distribution of electricity (in eThekwini Municipality, electricity charges are the largest revenue source at R11,8 billion, or 35,6% of total revenue), but Municipalities also spend a significant amount of their operating budget on the provision of electricity services.

Since the price at which Municipalities distribute electricity is regulated, Municipalities are constrained with regard to the extent that the higher bulk purchase price, paid to Eskom, may be passed-on to consumers and this, in turn restricts the municipal capital budget available to invest in new electricity infrastructure.

When this is considered in conjunction with the mounting theft of electricity, as a result of illegal electricity connections, and the social mandate of Municipalities to provide free basic electricity, the ability of Municipalities to supply electricity which is secure, stable and affordable is severely diminished.

The eThekwini Municipality's electricity tariff increase for the 2015/16 year has been set at 12,2%, while Eskom's bulk purchase increase for the same period is 14,24%. The lower municipal tariff is indicative of the Municipality's commitment towards drawing-up a pro-poor budget.

Table 7: EThekwini Municipality and Electricity: Fast Facts

Number of electricity customers	738 593 (2 000 square kilometre area)
Total electricity sales	11 412 GWh
Maximum electricity demand	1 800 MW
Voltage	275 kV
Electricity infrastructure spend (major capital programme in the 2015/16 medium-term capital budget)	R836,5 million
Electricity infrastructure maintenance budget	R1 032,3 million
Provision of new staff	R15 million
Eskom electricity tariff increase	14,24%
EThekwini Municipality electricity tariff increase	12,2%
Loss in distribution	6,1%
Collection rate	97,5%

Source: EThekwini Electricity Unit

CHALLENGES IN THE DISTRIBUTION OF ELECTRICITY

Electricity distribution by Municipalities is often fraught with challenges, mostly stemming from the need to balance revenue generation with the costs of distribution and infrastructure maintenance. Hunsley[13] (2014) identifies eight key challenges experienced by eThekwini Municipality's Electricity Department:

1. Provision of electricity to customers located in informal settlements;
2. Theft of infrastructure;
3. Theft of electricity;
4. Ageing networks, with increasing maintenance costs and poor maintenance practices;
5. Unplanned outages as a result of overloaded networks;
6. Lack of institutional memory;
7. Legacy information technology systems, with fragmented applications; and
8. Increasing compliance requirements with respect to the quality of supply and service, finance, health, safety and environment.

In addition, a frequent concern raised by the private sector is the difficulty experienced in obtaining a new electricity connection.

The World Bank's Doing Business in South Africa 2015[14] study finds that across South Africa, obtaining an electricity connection requires five procedures and takes approximately 141 days.

The cost of obtaining this connection is 472,8% of national income per capita. While the number of procedures it requires to get a connection in South Africa is on par with OECD high-income countries, the time taken to complete the procedures is twice as long as in OECD high-income countries. While the process for obtaining a new electricity connection for businesses is fairly standardised across South African Municipalities, there are differences in the length of processes and the cost of connections. In Mangaung, (South Africa's best-performing Municipality, in this study) obtaining an electricity connection requires four procedures, takes 80 days and costs 383,2% of income per capita, while in eThekwini, obtaining a new electricity connection requires five procedures, takes 98 days and costs 380,2% of income per capita.

In recent years, however, two key concerns for the eThekwini Municipality have been the theft of electricity and load-shedding.

With regard to the cost of electricity, it is estimated that illegal connections cost the Municipality about R150 million per annum.

This may be attributed to the fact that the existing electricity service backlog is 265 989 houses, as well as the expansion of informal settlements adjacent to key economic nodes. In a bid to mitigate the theft of electricity, the City has attempted to minimise the losses of electricity through an interim services programme, with the objective of electrifying informal settlements.

LOAD-SHEDDING AND ITS IMPACT ON THE PRIVATE SECTOR

Load-shedding occurs when there is insufficient electricity generation capacity to meet the demand for electricity.

To cope with this in an ordered fashion, Municipalities have devised rotational schedules to spread the burden of load-shedding amongst its electricity customers. Early in 2015, the Department of Public Enterprises estimated that the cost of load-shedding to the national economy was between R20 billion and R80 billion per month[15].

[13]Hunsley, J. 2014. Journey towards a smart utility: an eThekwini Electricity perspective. Available online: http://www.ameu.co.za/Portals/16/Conventions/Convention%202014%20Papers/Jonathan%20Hunsley,%20eThekwini%20Municipality.pdf
[14]The World Bank. 2015. Doing business in South Africa 2015. Available online: http://www.doingbusiness.org/SouthAfrica
[15]Mahomed, N. 2015. The effects of load shedding, July 2015. Draft paper, Trade & Investment KwaZulu-Natal.

These losses to the economy are dependent on the stage of load-shedding, with stage 1 being 10 hours of blackouts for 20 days per month, costing R20 billion per month, stage 2 costing R40 billion per month and stage 3 costing R80 billion per month.

It is difficult to quantify the exact costs of load-shedding to the private sector, as the losses go beyond lost units of production.

The losses experienced by the private sector include inconveniences caused by delays, idle staff, spoiled stock, lost sales and, essentially, the opportunity costs of time wasted.

In June 2015, BDO South Africa[16] released the results of a load-shedding survey, administered to businesses[17] of varying sizes, in the Durban area. The key findings of the survey are captured in the table below:

Key findings of the BDO load-shedding survey in Durban

- All firms which were surveyed believed that concerns about the future security of South Africa's electricity supply impacted negatively on investor confidence.
- 47% of firms reported that electricity disruptions had a negative effect in their operating costs and 59% of firms reported that electricity disruptions had an adverse impact on service delivery.
- With regard to the frequency of load-shedding, for 86% of firms, the average period of load-shedding lasted two to four hours and for the remaining 14% of firms, load-shedding lasted less than two hours.
- 41% of firms reported losing between five and 20 operating hours in the past three months, 37% of firms reported losing 21 to 40 hours and 7% of firms reported losing more than 100 hours.
- Load-shedding was found to have a high or medium impact on the turn-over of 42% of businesses and on the competitiveness of 56% of firms.

The survey also recorded trends in coping strategies adopted by businesses to manage the impact of load-shedding on their operations. The survey found that 86% of firms now made use of Uninterruptible Power Supply (UPS) battery back-up systems, while 47% of firms had installed generators. It was also found that 42% of businesses were engaging in contingency plans, which included adopting flexible working hours and enabling staff to work from home, and 11% of firms had reduced their total number of operating hours. In terms of long-term strategic interventions, more than half the firms stated that renewable energy is now something that their companies were looking to pursue.

RENEWABLE ENERGY GENERATION: AN OPTION FOR ETHEKWINI?

While it would seem appropriate for the Municipality to encourage the private sector to engage in renewable energy production to mitigate the costs associated with load-shedding, the broad-based adoption of renewable energy technologies by municipal electricity customers could have a potentially negative impact on municipal electricity revenues and municipal revenue in general. In February 2014, Sustainable Energy Africa released a report entitled, the Impact of Localised Energy Efficiency and Renewable Energy on eThekwini Finances over the Next Ten Years[18].

The Report found that the installation of photovoltaic technologies in all sectors is only likely to occur in the eThekwini Municipality from 2024, as the costs of the technology become financially feasible for consumers to install. The report states this will result in expected operational revenue losses for the eThekwini Municipality in the range of 8% to 15%, less than business-as-usual, and these losses are only expected to occur in 10 years. With growing support for carbon-conscious economic growth, the Municipality must support the move towards the generation of renewable energy.

[16]BDO South Africa. 2015. Durban firms hit hard by load shedding fear lower investor confidence and lower global competitiveness. Available online: http://www.bdo.co.za/load-shedding-survey/BDO-Survey-gauges-Load-shedding-Impact-Durban.pdf

[17]Of the organisations surveyed in the Durban region, 69% were classified as small with up to 100 employees, 25% were medium-sized, employing between 101 and 2 000 people, and 6% were large with between 2 001 and 25 000 employees

[18]Sustainable Energy Africa. 2014. Impact of Localised Energy Efficiency and Renewable Energy on eThekwini Finances over the Next Ten Years. Available online: http://www.durban.gov.za/City_Services/energyoffice/Documents/eThekwin%20Revenue%20Impact%20Report.pdf

However, it must do so in a prudent fashion to ensure that electricity revenues are proactively managed.

There are three strategies mentioned in the Sustainable Energy Africa Report to protect electricity revenue for the eThekwini Municipality, namely:

1. A decoupled electricity tariff, where the consumer pays an energy charge (which will cover Eskom charges) and a fixed charge (to cover the Municipality's cost of distribution). This option is favourable as it secures the eThekwini Municipality's business model, while simultaneously encouraging private sector investment in energy efficiency technologies and renewable energy production.
2. A national feed-in tariff (NETFIT), funded through the Renewable Energy Independent Power Producer Programme (REIPPP), which would be managed by Eskom. This will allow the Municipality to be compensated for any lost revenue as a result of photovoltaic installation, and recompense any excess generation from photovoltaic customers.
3. Grow the customer base for electricity in the eThekwini Municipal region.

ESKOM APPLICATIONS TO NERSA

In April 2015 the National Electricity Regulator in South Africa (NERSA) announced the approval of an average annual price increase for electricity.

NERSA has also approved Eskom's request to change the time of use (TOU) peak period during winter.

Subsequently, an additional appeal from Eskom was submitted to NERSA to increase the price again by 9,58%, in order to contribute to the more than R40 billion needed by Eskom to supplement its generation capacity with open-cycle gas turbines, and R19,9 billion for its short-term power-purchasing programme.

This proposed increase, if approved, would have amounted to 22,27% for the 2015/16 year.

However, the approved changes for non-local authority tariffs commenced on 1 June 2015 and on 1 July 2015 for local-authority tariffs.

This is shown in the table below.

Table 8: Changes to Time of Use Periods

Previous morning TOU peak period	Current morning TOU peak period
07H00 - 10H00	06H00 - 09H00
Previous evening TOU peak period	**Current evening TOU peak period**
18H00 - 20H00	17H00 - 19H00

Source: National Energy Regulator of South Africa

ETHEKWINI ELECTRICITY UNIT – CHALLENGES AND OPPORTUNITIES

EThekwini Municipality's Electricity Unit supplies more than 700 000 customers. Large electricity users within eThekwini Municipality make up 44% of electricity consumers, with the Municipality generating 38% of revenue from sales in the 2013/14 financial year. Large customers pay fixed charges and this will possibly be implemented for residential customers at a later stage.

EThekwini Electricity faces numerous challenges, such as illegal connections, cable theft and vandalism of infrastructure, non-paying customers and ageing infrastructure.

Cable theft and vandalism of infrastructure is very costly to the Municipality. The City has researched and reported that offenders of most of the vandalism and theft cases are both amateur cable thieves, referred to as 'bread and butter' offenders, as well as syndicates. The amateur thieves steal short cable lengths, whereas syndicates steal longer lengths. The hotspots for cable theft constantly change throughout the City.

Durban is currently the third ranked city in South Africa with regard to cable theft incidents. Cable thieves export the cables from South Africa to other parts of the world and this has negatively impacted the economy. The indirect cost of this is estimated at about R5 billion a year.

Transnet reported that from 2008 to 2009 there were 6 917 incidents of cable theft, valued at R95,5 million, resulting in exports. Due to the large loss and decline in GDP, in 2008 the South African Revenue Service introduced a mobile x-ray scanner located inside the Durban Container Terminal precinct as part of South Africa's participation in the US Container Security Initiative. Every container moves through the scanner before shipment.

EThekwini Municipality is also attempting to implement various solutions to reduce vandalism and cable theft.

The following are some of the solutions in place:

- Installed alarm and pepper gas system over the past three years in sub-stations;
- SCADA devices to detect faults;
- Vibration monitoring systems have been installed on pylons - detects frequency when someone tries to cut into it.

Table 9: Costs and Incidents

Year	Cost of infrastructure	Incidents
2012/13	R60 542 587	13 471
2013/14	R22 797 395	3 619
2014/15	R30 924 335	8 573

Source: EThekwini Electricity Unit

The table above shows that since 2012/13 there has been a radical change with regard to cable theft. The number of incidents is likely to decline in the future as a result of the measures that the City is implementing.

INNOVATIVE SOLUTIONS

As eThekwini Electricity embarks on the journey towards achieving smartness/ modernisation of its grid, it is important to get the building blocks right. Fundamental to this is having an appreciation, as a utility, for the ownership of its assets, where they are located, their condition and their useful life.

The utility has observed that the creation of a framework to manage and monitor the performance of these assets is vital.

With these fundamentals in place, a utility may then begin to consider introducing smartness into the grid, such as:

1. Introduction of intelligent devices and sensors (automation);
2. Installation of various communication mediums between on-site devices and the back-end (Control Centre);
3. Modernised metering infrastructure to enhance the customer experience; and
4. Exploring different forms of generation and their impact on the grid.

Advanced Metering Infrastructure

The Advanced Metering Infrastructure (AMI) programme is responsible for the implementation of Smart Metering, which entails the installation of smart meters and associated equipment.

This initiative will enable eThekwini Electricity's efforts to achieve its broader objective of implementing a smart grid in its areas of electricity supply.

Some Of The Benefits To The Customer Include:

1. Greater consumer control over bills;
2. Maximised operational efficiencies - Achieve improved billing accuracy through automated reading;
3. Increase sustainability - Reduce city's distributor purchase costs.

Communications Infrastructure

In considering the role of communication networks in the smart grid, it is important to emphasise that the first enables the second.

Adding intelligence to the electricity grid primarily means automating various grid functions and automation is not possible without communications networks that enable a two-way flow of data.

EThekwini Electricity Unit's communication network strategy is to establish a private, integrated multi-tier, hierarchical communication network.

Distribution Automation

EThekwini Electricity has a long-term goal to obtain full Supervisory Control and Data Acquisition (SCADA) visibility throughout the distribution network, thereby aiming to install intelligent devices to remotely manage and control all medium voltage equipment in the distributor sub-stations, ring main units, autoreclosers, mini sub-stations and kiosks, to ensure network reliability.

EThekwini also aims to install fault indicators to monitor the overhead mains (OHM).

Some Of The Benefits Include:

1. Improved data acquisition;
2. Improved network performance by the reduction in system outages and the greater security of supply;
3. Improved operator efficiency and safety;
4. The intelligent devices allow for early detection of equipment failure and assist in fault location, hence improving restoration times;
5. Enhanced overall customer service, with improved detection and restoration of faults.

Advanced Distribution Management System (ADMS)

Controlling the network and managing the people working on a power system is fundamental to ensuring a safe and reliable power system. The Advanced Distribution Management System (ADMS) being implemented by eThekwini (PowerOn Advantage) delivers increased productivity and efficiency with active network optimisation and control.

PowerOn Advantage is all about keeping the lights on, preventing and responding to outages and maximising return on network investment in the dynamic and ever-changing distribution environment.

RENEWABLE ENERGY AND ENERGY EFFICIENCY

The EThekwini Energy Office within the Municipality is responsible for introducing policies, structures and processes that will promote and facilitate the installation of renewable energy technologies in eThekwini. The EThekwini Energy Office encourages electricity consumers to install solar water heaters, heat pumps, solar photovoltaic (PV) panels and wind turbines.

Solar Water Heaters

Solar water heaters consist of two main objects, tanks and flat plate collectors. The size and type of solar water heater differs depending on the pressure that is required to produce hot water.

The pricing of the product also depends on the pressure. Low pressure solar water heaters are ideal for a low demand of hot water. The standard product cost of these heaters is approximately R6 000. Eskom has installed a number of low pressure solar water heaters, at no cost, in low-income households in order to reduce electricity demand.

The estimated cost of a full pressure solar water heater that would supply a household of four people is R30 000. Full pressure solar water heaters supply a high demand of hot water. Solar water heaters can last up to 20 years.

Heat Pumps

Heat pumps are an alternative to solar water heaters and, in most cases, may be installed outdoors. The difference between the two is that a heat pump requires electricity at all times and a solar water heater requires electricity when there is no sunshine for a number of days. Although heat pumps use electricity, they are energy-efficient because they use far less electricity than normal hot water geysers.

Solar Photovoltaic Panels

Solar photovoltaic (PV) panels absorb light and heat from the sun and convert this into electricity. In order to obtain light and heat directly from the sun, the solar PV panels are installed on the roof-tops of buildings.

Wind Turbines

Wind turbines use the kinetic energy of the wind to generate electricity. There are two common types of wind turbines; small and large. Small wind turbines are used for small-scale electricity generation for household purposes, whereas, large wind turbines are mounted on approximately 100m high towers to receive strong wind pressure. The large wind turbines feed into the grid as a result of the large electricity output.

Other Alternative Forms Of Energy

EThekwini Municipality already processes a substantial amount of the City's sewage and waste-water in digesters, producing sludge and methane gas and some of this is used for re-heating the digesters.

Another important opportunity for energy production comes from the solid sludge itself. EThekwini has already experimented with the production of pellets from the sludge at a few locations, but so far has had little success in selling or otherwise disposing of these pellets. According to department staff, substantial quantities of pellets and dried sludge are accumulating with no clear plan for disposal. This presents an excellent source for charcoal production which, in turn, can provide an alternative or transitional fuel for use in cooking and heating in rural/peri-urban areas in eThekwini which presently have a high reliance on wood and charcoal.

References:

- EThekwini Electricity Unit
- www.durban.gov.za/Engenv/eThekwini%20Municipality%20%20Energy%20Strategy/eThekwini%20RE%20Report%20Complete%20Draft%2010%20May%2007.pdf
- www.durban.gov.za/city_services/energyoffice/Pages/defaults.aspx

CREATION OF A SMALL-SCALE EMBEDDED GENERATION FRAMEWORK FOR ETHEKWINI MUNICIPALITY

The electricity supply industry in South Africa has undergone considerable restructuring since 2008 when the national electricity supplier (Eskom) had to implement forced load-shedding in order to maintain the stability of the national electricity network. Since then, the reserve margin between the supply and demand of electricity has been tight and the possibility of rolling black-outs currently hangs in the balance.

South Africa was historically the cheapest electricity supplier in the world and this position has evolved within the past five years as a result of new generation plants being built within the country, forcing electricity prices in the country to double over the past five years. Coupled with the price increases, was the decision of the country to move towards cost-reflective pricing policies.

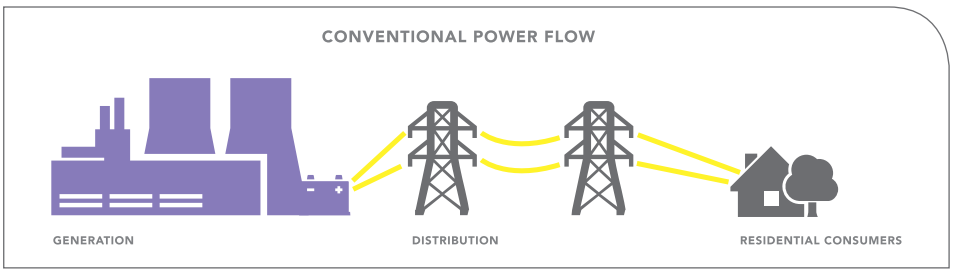
This is a new methodology of pricing within municipalities and the implementation of such a policy has far-reaching financial impacts on the Municipality and end customers. This is a new concept that needs to be integrated within the municipal environment with due cognisance for the financial sustainability of the Municipality.

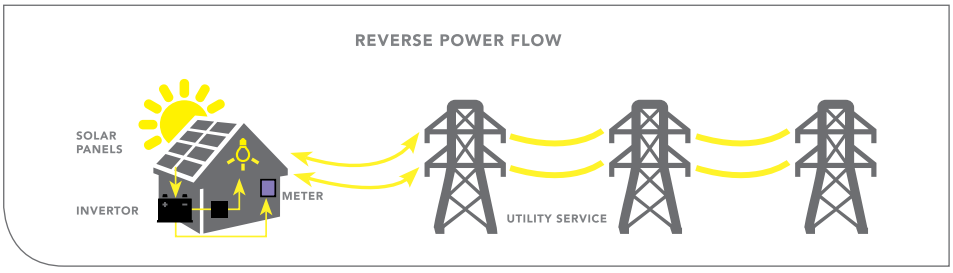
Load-shedding and the lack of electricity in the country has hurt the economy dearly and the nation is now more aware of the concepts of electricity usage and is continuously seeking innovative ways of reducing consumption. Many are turning to energy efficiency projects, whilst others are looking into the feasibility of small-scale embedded generation. With electricity prices soaring in the country, the pay-back periods and viability of small-scale generation projects is becoming more feasible. Small-scale generation projects, especially rooftop PV, are becoming a well-known sight within eThekwini Municipality. Customers are procuring pre-packaged solutions, either locally or shipped from international suppliers. With a little technical knowledge and good handyman skills, the pre-packed plug-and-play solution becomes a kilowatt generating machine as it absorbs the sun's rays that shine down upon the City.

There seems to be a reluctance to couple batteries to the PV system and, instead, there is a tendency to want to synchronise the system to the municipal grid. There are numerous advantages to such a scheme, as it allows for the grid to act as a virtual battery when the local generating plant produces more kWh's than the household requires. This then eliminates the need for expensive battery technologies and related maintenance/disposal procedures.

Whilst the advantages make synchronisation a logical choice, the municipal framework is not designed to facilitate this.

The municipal core function is to procure power from source, transform it, reticulate it and distribute it to end-users. Power flow is from source to end-user and all technical, administrative, regulatory and legal aspects are structured to support this direction of power flow.





The introduction of small-scale embedded generators poses a challenge as the direction of power flow is now reversed.

None of the current technical, administrative, regulatory or legal frameworks support the ease of introduction of small-scale embedded generation with reverse power flow. There are numerous barriers that inhibit the promotion of small-scale embedded generators within the City.

These include technical, commercial, regulatory and legal aspects. A brief summary of the barriers follows:

THE REGULATORY FRAMEWORK FOR SMALL-SCALE EMBEDDED GENERATORS

With the electricity supply industry being highly regulated within the country, one of the first steps prior to implementing generation projects is to assess the relevant regulatory requirements. Regulation in this regard falls under the scope of the National Energy Regulator of South Africa (NERSA).

The key question to be answered is: Do small-scale embedded generators require a licence to generate electricity or not?

The National Energy Regulator released a document titled: Standard Conditions for Embedded Generation within Municipal Boundaries. The document was drafted in response to the above question, which the Nelson Mandela Bay Metro and the City of Cape Town posed to the Regulator.

The Regulator's response was in favour of such generation, coupled with a few binding criteria for the Municipality and the Generator. The Regulator highlights its view that it has no intention to regulate this sector of micro-generating capacity and this should fall within the scope of the relevant Municipality. Whilst the document supports small-scale generation, there is no clear answer in terms of whether a licence is required or not.

To ensure clarity in this regard, members of the Associate Municipal Electricity Undertaking (AMEU), South African Local Government Association (SALGA), and other key industry stakeholders have come together and drafted a request to the Regulator to clarify the position in terms of a licence condition and the exact regulatory requirements that apply to small-scale embedded generators.

Currently, the Municipality will consider applications for the connection of small-scale embedded generators to the network on the proviso that all technical and safety criteria have been met.

Municipal approval does not abdicate the applicant's responsibility in terms of following any regulatory process or protocol in this regard. Municipal approval is not a regulatory approval, it is focused on ensuring correct technical and safety aspects.

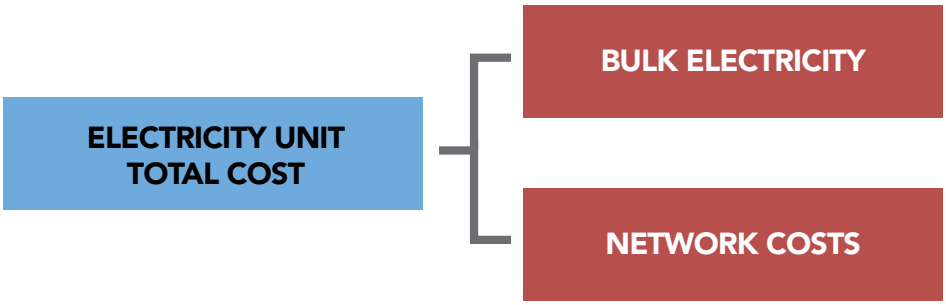
Applicable Tariff for Small-scale Embedded Generators – Residential

The eThekwini Electricity Unit is responsible for electrical services within eThekwini Municipality and surrounding areas.

In providing a service, the Unit will levy charges by way of tariff structures to recover the costs incurred in providing such a service.

There are a variety of costs. However, for the purposes of simplicity within the context of this discussion, the costs may be viewed as follows:

Table 10: Costs



Bulk Electricity Costs
This refers to the costs that are paid to the generator of electricity, i.e. Eskom.

Network Costs
This refer to the fixed costs of the Unit, such as repairs and maintenance, salaries, meter-reading costs and related expenditure.

It can be concluded that there are fixed and variable costs associated with a supply point, irrespective of the direction of power flow.

As a result, any supply point that is made available to a user must be able to recover the costs described above.

Due to past pricing regimes, the above principle was not vastly inherent within residential tariffs.

Residential users currently pay for both costs (i.e. bulk electricity and network costs) via a single rate energy charge (per kWh).

Herein lies the difficulty in recovering fair network costs from individual users.

As a result, selling or buying electricity must conform to the new pricing regime and must include fixed network charges, as well as variable energy rates.

This ensures that the network costs are adequately and fairly recovered from all customers, ensuring that unnecessary cross-subsidisation is avoided. Positioning embedded generators in this context, it must be acknowledged that a fixed network charge will be payable for embedded generators as the direction of power flow does little to reduce fixed costs.

These costs are borne by the Municipality in making the network available.

The embedded generator synchronises to the network in an effort to use it as a virtual battery.

In theory, this then allows the network to store energy on the generator's behalf in times of low load requirement and return it to the generator when load demand increases.

Whilst the concept is simple, it becomes more complicated, as the Municipality buys electricity based on time of use pricing principles.

There can be a situation where the generator generates electricity in a low priced time period and re-uses it in a high priced time period and vice versa.

With the primary intention of introducing a simplified model to allow for the storage of kWhs, eThekwini has decided to introduce a single rate kWh charge and the principle of 'netting off' imported and exported at differential rates.

RESIDENTIAL NET METERING TARIFF

Table 11: Residential Embedded Generation Scale 15 (subject to regulatory approval)

Description This is a bi-directional (import/export) tariff structure reserved for residential customers only.

Typical Customers Residential customers with embedded generation up to maximum of:
Single Phase: 4,6 kVA
Three Phase: 13,8 kVA
Note: This is an interim tariff structure that may be superceded when national regulatory frameworks/guidelines/standards are introduced. EThekwini Municipality reserves the right to restructure and re-price this tariff as market conditions vary.

Energy that the customer consumes from grid	ENERGY IMPORTED			
	Description of Charge		c/kWh	VAT incl
	Energy Rate	IMPORT	129,39	147,50

Energy that the customer generates onto the grid	ENERGY EXPORTED			
	Description of Charge		c/kWh	VAT incl
	Energy Rate	EXPORT	62,00	___

NETWORK CHARGES		
All Seasons	R/Month	VAT incl
	220,00	250,80

Energy Charge Import energy refers to energy consumed from the grid. Export energy refers to energy generated onto the grid.

Network Charge The network charge is a fixed charge and is charged on a monthly basis per point of supply.

General Exported energy will only be off-set to a maximum of the imported energy in financial terms. Any excess exported energy will be forfeited. Off-sets are applicable on a monthly basis. No carry-overs are allowed.

Metering Customers must read their meters and upload the readings on a monthly basis. Where readings are not available, the import energy will be estimated, based on previous history. However, the export energy will deemed as zero.

The above tariff has been submitted to the Regulator for approval earlier this year. EThekwini Municipality is currently awaiting a decision in terms of implementation.

THE METERING SYSTEM

There are a variety of metering systems available in the market place, each varying in price, based on the capabilities of the meter. In view of keeping costs to a minimum and implementing a simplistic solution, eThekwini has decided to adopt a two register electromechanical meter to measure energy imported and exported by residential embedded generators. These meters are relatively cheap and readily available in South Africa.

There is also an option of using two electromechanical meters to carry out this function. The meters will have to be configured and connected to allow for the correct recording of forward and reverse power flow.

The ideal metering solution would be an electronic online bi-directional system that is capable of import and export readings. This solution further offers the benefit of profile recording, as well as maximum demand recording. However, the system would require an integrated back-end support structure to facilitate the communication and data applications. The Municipality is currently implementing a smart grid project, with Phase 1 being the implementation of smart metering systems, supported by the relevant communication and data infrastructure. The project is expected to go live within the next year. In view of this, it was decided that electromechanical meters would serve as a temporary measure until the smart metering solution is implemented.

The Application Process

Anyone intending to use a generating system synchronised to the network must apply to the Municipality prior to any form of work being carried out or any form of network connection. Failure to do so will result in a bylaw contravention and the offending party will be penalised accordingly.

To reduce the administrative burden placed upon the Municipality, as well as the customer, the information requested in the application form has been kept to a minimum and the application process has been streamlined to be quick, efficient and easy.

STEP 01
APPLICATION FORM

The application form will be available on www.durban.gov.za - The form will be an editable version of a pdf document. This allows the user to type in the necessary information. Once completed, the applicant must print the completed application form, sign and email it, together with the supporting documents to the customer service consultant.

STEP 02
PROCESSING APPLICATION

Once the application has been received, the customer service consultant must capture the application and process to Planning. Planning then assesses, costs and approves the application. A pro-forma invoice will be generated and the permission or denial to connect to the grid, subject to compliance to all commercial, technical and safety criteria, will be supplied.

STEP 03
CONFIRMATION OF CONNECTION

Customer Service must migrate the customer account to the relevant tariff structure and arrange for metering installation. Failing to receive COC and technical compliance on the installation, the supply must be switched off. Information must be sent to the drawing office for capture on GIS. All connections must be checked and signed-off by a suitably qualified person, eg. ECSA registered engineer.

WATER

WATER SHORTAGES IN ETHEKWINI

Few people need to be reminded of water's importance. Along with energy, it is essential for everyday life. Water provides sustenance, supports industry and irrigates fields.

EThekwini Municipality has declared a status of drought in the region due to low water levels, especially at the Hazelmere Dam. The impact of the drought is being experienced throughout the region with some areas, mainly in the north, facing water restrictions since September 2014.

This has a major impact on the productivity of many sectors in the economy, from agriculture through to manufacturing. It is also likely that the price of basic food products will increase as a result of the drought.

Businesses and farmers in KwaZulu-Natal have been badly affected by the drought, more especially in the agricultural and sugar sectors. This could possibly lead to job losses and stagnant growth in many sectors.

The water shortages are expected to last for at least the next two months. A business that has been deeply affected by the drought is Illovo Sugar (Pty) Ltd, which has decided to temporarily close the Umzimkhulu Mill during sugar milling season in 2015.

This means that Illovo's Sezela Mill will now take over the processes that the Umzimkhulu Mill was previously undertaking.

In terms of food productivity, there has been a decline, with the most notable changes being:

- Maize production has decreased by 4 585 million tons;
- The sunflower crop has decreased by 31%; and
- Soya beans production has decreased by 1%.

COST OF WATER IN ETHEKWINI

Table 12: Water Tariffs for EThekwini, Effective 1 July 2015

1.	DESCRIPTION For exclusive domestic consumption where all water is consumed through a break pressure tank, supplied by the eThekwini Municipality, per connection, calculated on a daily basis:	CURRENT TARIFF (Excl VAT, R)	PROPOSED TARIFF (Excl VAT, R)	% Increase	PROPOSED TARIFF (Incl VAT, R)
	1. Monthly consumption up to 9 kls per month - per kl	Nil	Nil		Nil
	2. Monthly consumption greater than 9 kls up to 25 kls - per kl	9,20	10,07	9,5	11,48
	3. Monthly consumption greater than 25 kls up to 30 kls - per kl	12,59	13,79	9,5	15,72
	4. Monthly consumption greater than 30 kls up to 45 kls - per kl	27,74	30,38	9,5	34,63
	5. Monthly consumption greater than 45 kls - per kl	30,52	33,42	9,5	38,10

2.	DESCRIPTION For exclusive domestic consumption where all or part of the water through a connection is supplied without the intervention of individual break pressure tanks supplied by the eThekwini Municipality, per dwelling unit, calculated on a daily basis:	CURRENT TARIFF (Excl VAT, R)	PROPOSED TARIFF (Excl VAT, R)	% INCREASE	PROPOSED TARIFF (Incl VAT, R)
	1. Monthly consumption up to 9 kls - per kl for property rateable values less than or equal to R250 000	Nil	Nil		Nil
	2. Monthly consumption up to 9 kls - per kl for property rateable values greater than R250 000	11,43	12,52	9,5	14,27
	3. Monthly consumption greater than 9 kls up to 25 kls/month - per kl	13,51	14,79	9,5	16,86
	4. Monthly consumption greater than 25 kls up to 30 kls/month - per kl	17,99	19,70	9,5	22,46
	5. Monthly consumption greater than 30 kls up to 45 kls/month - per kl	27,74	30,38	9,5	34,63
	6. Monthly consumption greater than 45 kls per month - per kl	30,52	33,42	9,5	38,10
3.	For all other classes of consumer other than domestic consumers:				
	• Consumption - per kilolitre	16,47	18,59	12,9	21,19
	• Monthly fixed charge calculated on a daily basis, based on connection size (mm):				
	1. Less than or equal to 20 mm	131,61	148,59	12,9	169,39
	2. Greater than 20 mm, but less than or equal to 25 mm	200,82	226,73	12,9	258,47
	3. Greater than 25 mm, but less than or equal to 40 mm	514,21	580,54	12,9	661,82
	4. Greater than 40 mm, but less than or equal to 50 mm	803,42	907,06	12,9	1 034,05
	5. Greater than 50 mm, but less than or equal to 80 mm	1 807,50	2 040,67	12,9	2 326,36
	6. Greater than 80 mm, but less than or equal to 100 mm	3 213,18	3 627,68	12,9	4 135,56
	7. Greater than 100 mm, but less than or equal to 150 mm	7 229,65	8 162,27	12,9	9 304,99
	8. Greater than 150 mm	12 852,75	14 510,75	12,9	16 542,26
	Connections identified as Body Corporate/ General Use, which are used solely for domestic use, are exempt from the monthly fixed charge.				

Source: EThekwini Water and Sanitation Unit

The table above shows that the increase in water tariffs is much higher for non-domestic customers in eThekwini.

The price of water in eThekwini has been a point of contention in recent years, with business and residents complaining that the increase in the cost of water is too high, impacting negatively on households and business. These increases are above inflation rates. The water restriction problem, poses a challenge to the Municipality, but the City has come up with some innovative ways to deal with these challenges, being recognised as one of the most innovative Water and Sanitation departments in South Africa.

EThekwini's Water Supply System
The eThekwini region is supplied potable water from 11 treatment plants, six of which are managed by Umgeni Water (including Hazelmere) and the remaining five are managed by eThekwini Water and Sanitation.

The low water levels at the dams are of great concern. The state of the dams is depicted below:

Table 13: The State of the Dams

System	Dams	Capacity Million m^3	Percentage	Outflow (m^3)	Rainfall (mm)	Last updated
Mooi/Umgeni	Albert Falls Dam	290,1	59,68%	4,31	0,0	9 July 2015
	Inanda Dam	251,6	98,98%	0,65	0,0	9 July 2015
	Mearns Dam	5,11	86,24%	1,0	0,0	9 July 2015
	Midmar Dam	235,4	70,87%	0,92	0,0	9 July 2015
	Nagle Dam	24,6	85,53%		0,0	9 July 2015
	Spring Grove	139,5	96,62%	0,02	0,0	9 July 2015
	Hazelmere Dam	17,9	27,4%		0,0	9 July 2015
	Henley Dam	1,52	102,23%		0,0	9 July 2015
	Ixopo Dam	0,56				9 July 2015
	E J Smith Dam	0,98	36,03%		0,0	9 July 2015
	Nungwane Dam	2,22	44,62%		0,0	9 July 2015
	Umzinto Dam	0,48	20,38%		0,0	9 July 2015

Source: EThekwini Water and Sanitation Unit

The Hazelmere Dam can no longer supply water, as per previous terms, as only 15% of the water is useable. Residents and businesses of the affected areas of the north: Katzkop, La Mercy, Ndwedwe, Dube TradePort, Umhlali, Ballito, Verulam, Tongaat and Westbrook have been requested to co-operate with the Municipality with regard to the water restrictions in place. The City is aware of the economic and social impact that the drought may cause.

EThekwini Municipality has a number of interventions in place during the drought. EThekwini's Water and Sanitation Unit has put in an alternative source of water supply to lessen the load on Hazelmere Dam. Pressure Reducing Valves (PRVs) have been installed to reduce water pressure and losses. In addition, restrictor washers have been placed at approximately 20 000 consumer connections and this has had the effect of reducing demand.

Council authority has been sought to impose stiff penalties against those consumers who are observed not to be heeding the call to reduce demand. It is critical that DWS approve and action the building of Smithfield Dam.

A number of short-term options are being considered (desalinisation and re-use of water), but the dam is still required to meet future demand.

The Northern Aquaduct project is being fast-tracked to decrease the load on Hazelmere Dam. Affected areas in the north are being supplied by water tankers, with top water users notified to conserve and recycle water where possible.

The assurance of water supply from Umgeni Water has dropped from 99% to 94% and delays have been experienced with the proposed Spring Grove and Hazelmere schemes. Poor rainfall has fallen in the region and this has put severe strain on the water supply systems in the North. In order to assure supply to current and future consumers, the current water demand needs to be held at approximately 910 Ml/day.

One of the key projects in the province is the Lower Tugela Bulk Water Infrastructure Project. This project, if successful, will be a great source of alternative water supply. The project includes a 29km pipeline that will supply water to towns along the north coast of KwaZulu-Natal and is expected to start supplying water in April next year. It is proposed that it will initially supply 55 mega-litres of water a day, eventually reaching a capacity of 110 mega-litres. A lot of pressure will be taken off the Hazelmere system as water has been diverted to northern residents from the Umgeni system and the Lower Tugela Bulk Infrastructure Project.

Water and Sanitation – Challenges and Opportunities

EThekwini Water and Sanitation supplies water to more than 3,5 million people. There are a number of challenges that the City faces related to ageing infrastructure, burst pipes, water pressure, vandalism and illegal water connections, theft of infrastructure, unreported leaks, water-borne diseases and access to water.

One of the key objectives of the department is to reduce Non-Revenue Water (NRW). This refers to water that has been produced and is 'lost' before it reaches the customer.

Losses can be real losses (through leaks, sometimes also referred to as physical losses) or apparent losses (for example through theft or metering inaccuracies).

This significantly affects water sales and although the number of water connections has increased, water sales have remained stagnant over the past 10 years.

Table 14: Breakdown of NRW for the 2014/15 Financial Year

(2014/15 FINANCIAL YEAR) NON-REVENUE %

COMPONENT	AVG (KL/day)
Total System Input Volume	926,683
Billed Authorised Consumption	558,647
Apparent/Commercial Losses	74,456
Real Losses	248,910
Water Losses	323,366
Non-Revenue Water	335,057
Real Losses %	26,6%
Water Losses %	34,89%
Non-Revenue Water %	36,16%

Source: EThekwini Water and Sanitation Unit

The eThekwini Water and Sanitation Unit has an established record and history of focusing on the reduction of Non-Revenue Water (NRW) as part of its overall Water Conservation/Water Demand Management Strategy. The Unit's first large-scale implementation of a NRW Reduction Programme commenced in March 2008 with the intention of reducing the levels of NRW from the then 36,4% by volume to a targeted level of 25% by 2019.

With regard to water leakages, it has been reported that 35% of water leakages are due to faulty taps, overflows at storage and leakages on service connections. Contributing factors to illegal connections, on the other hand, are unmetered connections, connections not on the City's billing system or not monitored, inadequate capacity in terms of both human and financial resources and vandalism of infrastructure. Domestic and commercial consumers who have illegally connected to the eThekwini water line will be prosecuted. This will assist with reducing water loss and debt. According to the Unit, since 2012, 178 consumers have been convicted of this offence in the Municipal Court, with 19 661 consumers investigated.

The Unit has been innovative in its approach to challenges by implementing a number of interventions under its NRW programme.

These are depicted below:

Table 15: Breakdown of NRW for the 2014/15 Financial Year

INTERVENTION	DESCRIPTION	NUMBERS ACHIEVED 2014/2015
Housing Project Meters	Install Meters to all Metro Housing Projects	4 520
Continued Meter Replacement (Large ICI Meters)	Non-domestic Meters >= 50mm diam	604
Continued Meter Replacement (Small Meters)	Meters 15-40mm diam	4 815
Pressure Reduction (Rezoning)	Number of New PRV Sites Designed	227
Leak Detection	Length of Mains Surveyed (km)	6 097
Active Leak Detection: Repair	Number of Visible and Non-Visible Leaks Repaired	11 738
Reactive Leak Repairs	Number of Repairs and Faults Repaired	157 343 (= 431/day)

Source: EThekwini Water and Sanitation Unit

With regard to the Pressure Reduction intervention, this reduces burst frequency and extends the lifespan of assets, whilst the Meter Replacement intervention ensures that all connections are metered and meters are accurate.

Another innovative approach by the Unit was to roll-out educational and awareness programmes which will increase awareness on the proper use and management of water and sanitation systems, reduce misuse and wastage of water, decrease the levels of non-payment and promote water conservation. The Unit provides bulk infrastructure (trunk mains, reservoirs, treatment works and pump stations), as well as water and sewer reticulation to service the citizens of eThekwini. This must not only be planned and constructed, but also maintained in perpetuity.

Furthermore, there is a substantial SCADA platform monitoring and controlling the infrastructure. The Unit will increase monitoring and reporting on the infrastructure and will also combine this data with other information available, while

making use of dashboards to report on the same. This is currently in the conceptual phase and further details will be shared in due course.

The programme, Raise the Citizen's Voice, has enforced policies to empower communities in the decision-making process. Since this programme and other initiatives of the Municipality, there has been a radical positive change that has been noted in that there has been a decrease in illegal connections, a reduction in water use, a decrease of water and land pollution and revenue increases as a result of previously non-paying consumers now abiding by the rules.

Smart Water Systems

Due to population growth and climate change, many cities, including eThekwini, face severe water challenges. Smart water systems can make dramatic improvements to the cost, safety and reliability of urban water supplies. A number of the projects and research efforts being undertaken within the city are regarded as 'smart' projects.

So, what is a smart water system? Most people refer to an ICT-enabled water system as a 'smart water system' or a 'smart water network.' In Smart Cities, ICT is used to achieve a sustainable, efficient and clean water supply.

Smart water is driven by three elements, the first being the scarcity of water, secondly, the fact that water is at risk and, thirdly, water is often under-priced and current prices do not adequately reflect its scarcity. It is important for cities to use smart technology in order to preserve and enhance its water supply, while keeping the cost of water as low as possible.

According to the Smart Cities Council, there are seven ways in which ICT can play a role in making water systems smart.
These are:

1. Mapping and monitoring the physical infrastructure - knowing where pipes and valves are located and the condition thereof;

2. Accurately measuring water consumption - smart water meters play a role in this regard;

3. Monitoring drinking water quality - smart water systems can have sensors that detect contaminants;

4. Present, perfect and predict conditions - a smart water system can present current conditions to give operators full situational awareness, perfect the system by optimising it and predict leaks, floods and equipment failures;

5. Make better use of diffuse and distributed non-traditional water resources - through recapture, recycling and re-use and through better planning;

6. Prepare better for storms; and

7. Harness the energy and nutrient resources in water and waste-water - ICT helps to capture the full potential of water.

Smart water systems contribute to economic development in that they can differentiate a city in the competition for business and investment. Smart water is financially attractive to industrial consumers in particular, since they are often the largest users of the City's water supply.

Financing of Infrastructure

Author: Dr Clive Coetzee, General Manager, KwaZulu-Natal Provincial Treasury

Efficient public infrastructure plays a key role in a competitive and productive economy. Therefore, the on-going funding and financing of infrastructure delivery is of critical importance. The central issue is that infrastructure needs have grown beyond the capacity of Governments and, especially, Local Government.

Bailey (2011) states that public infrastructure delivery can be funded from either or both public finance or private finance. Traditionally, the majority of public finance has come from Government borrowing. Revenues from taxes are used to repay the ensuing debt over the expected lifetime of these physical assets provided by the public sector.

This traditional infrastructure funding model secures inter-generational equity by smoothing-out the one-off costs of infrastructure investments so that future users of infrastructure pay for it rather than placing the whole financial burden on the current generation of taxpayers.

The current trends in Local Government infrastructure funding in South Africa clearly indicate that traditional mechanisms of funding infrastructure delivery are

inadequate to meet most needs. It is, especially, social infrastructure in growth corridors that is lacking.

Alternative funding mechanisms can provide part of the answer to infrastructure needs, but it must be made very clear that alternative funding mechanisms are not a panacea.

Some mechanisms can better allocate costs to those benefiting from the service, thus, increasing equity in the provision of services. Some can increase accountability by the clear allocation of funds, while others can increase flexibility or service levels through contractual arrangements or partnerships. There are several potential benefits associated with alternative funding mechanisms:

- Revenue to support continued provision of safe and efficient infrastructure;
- Supplementing the property tax base;
- Incorporating life-cycle costs of infrastructure (i.e. depreciation of infrastructure, operation and maintenance costs resulting from new capital investments);
- Reliable, predictable and dedicated funding to support multi-year infrastructure investment strategies;
- Providing additional options to generate infrastructure funds; and
- Demand management techniques being developed.

There has been a long-term trend in the UK and a number of other countries away from the public provision of infrastructure financed from general taxation to private sector provision (through charges and fees) of both infrastructure and related services.

This trend seems to have been driven by a combination of the rising costs of infrastructure and the unwillingness of national and local electorates to pay higher taxes. Many of the studies state that, in essence, the funds to pay for public infrastructure ultimately have to come from those who benefit from it or from the wider community through their Governments.

The literature makes reference to the below alternative mechanisms. It must be stated that some of them have been or are being used in some way or form, but only by a limited number of Municipalities.

They are not the norm, but rather the exception and it's not because they cannot work, but rather because of a limited understanding and appetite to employ them. Some of them are also politically not very desirable.

- Sponsorships/Donations and Grants - An ideal source of funding, since there are no costs involved. i.e. it does not increase the total cost of the investment/project. Unfortunately scarcity of funds persists;
- Commercial Finance through Loans and Bonds/Capital Markets - This source of funding has huge potential and is, in general, very seldom used. However, the source is only available for the few big Municipalities, can potentially be expensive and is politically sensitive. Some Municipalities are over-borrowed, so they have little room to increase their borrowings. On the other hand, there is no reason why the private sector cannot make the loan or issue the bond within an agreement with the public;
- Equity Investment/Infrastructure Markets - This refers to the Public Private Partnership mechanism, which - theoretically - is attractive, but, practically, there seems to be very little appetite from both the private sector and public sector to enter into PPPs. However, there is potential, if the cost and risk associated with the PPP process can be lowered;
- Economic/Financial Incentives/ Developer Abatement - This relates to the use of the municipal tariff and taxes policy for infrastructure delivery. It uses the tax and charges instruments of the Municipality as incentives.

FEEDBACK ON RECENT EVENTS

INNOVATION WEEK 2015 - INNOVATION SUMMIT

Innovation Week 2015 came to a climax at the Innovation Summit that was held on 16 and 17 July at the Moses Mabhida Stadium. The activities of Innovation Week 2015, which included the Youth Innovation Challenge - the Hackathon and enterPRIZE Challenge culminated in the Summit that was held over two days. The Summit was held in order to cultivate a culture of innovation among participants as one of the key objectives of the Innovate Durban programme.

The Summit was targeted at participants in the Youth Innovation Challenge, as well as businesses, academia and Government. Participants were involved in a summit programme that consisted of young, local innovators speaking about their successes in the South African and global markets. They were also provided valuable information on financing and funding, as well as intellectual property protection.

The Summit also included a 'Pitching Den' sponsored by Vodacom. Participants from the Hackathon were tasked to 'pitch' their application solutions to a panel of judges and the audience in an attempt to win smart phones from Vodacom. Throughout the process of Innovation Week, the youth learned and were equipped with some valuable skills, aside from the prizes that were won. They learned how to become problem-solvers, work in teams, collaborate, draft business concepts and market/pitch their ideas.

However, the process did not end with the Summit. Innovate Durban has conceptualised an aftercare programme together with its partners, the International Labour Organisation and IBM, that will assist interested participants to further develop their applications, train those who lack relevant skills, provide intellectual property assistance (in partnership with Adams & Adams) and provide mentorship and incubation support to those who meet certain criteria. Internship opportunities have also been offered to winning teams and remaining participants at various organisations, including the Municipality, IBM, Mine RP and Black IT Forum.

The aim of Innovation Week is to provide a sustainable platform for the youth to be innovative and take that innovation through to commercialisation that enables them to become productive in the economy and contribute to job creation and economic growth.

For more information on Innovate Durban, please contact:
innovate.durban@durban.gov.za

USE-IT - ACHIEVEMENTS

USE-IT is the eThekwini Waste Materials Recovery Industry Development Cluster and is mandated by eThekwini Municipality to maximise waste diversion from landfill through job creation in the waste sector. USE-IT has been a leading example of what can be achieved through a focus on Green Economic Development. USE-IT's efforts have facilitated the creation of 2 235 jobs since its inception.

- 95,3% of these jobs have been created through enterprise developments and community developments that USE-IT has facilitated, with the remaining percentage with internal projects;
- 97% of these jobs are Black and 3% White or Indian;
- 8% of the direct jobs are disabled Black individuals;
- No accurate statistics of gender, but we estimate 60% male and 40% female;
- No accurate statistics of youth with indirect jobs, but we estimate 70% youth (under 35 years old) in direct jobs.

USE-IT has shown that additional leveraged funding has given USE-IT a gearing ratio of 10,11 to one on investment from eThekwini Municipality. A 1 000% return on investment for the City proves that recycling and waste beneficiation is the best investment that any Municipality can make.

In addition to the leveraged funding, the diversion of waste from landfill also represents a considerable saving to the City. With last year's diversion alone of 18 254m^3 this equates to a saving to landfill of R5 476 200 - a saving of R2,74 for every Rand in operational funding received from the City. Combined with the leveraged funding, this gives the City a 1 285% return on investment, which adequately illustrates the success of the USE-IT initiative.

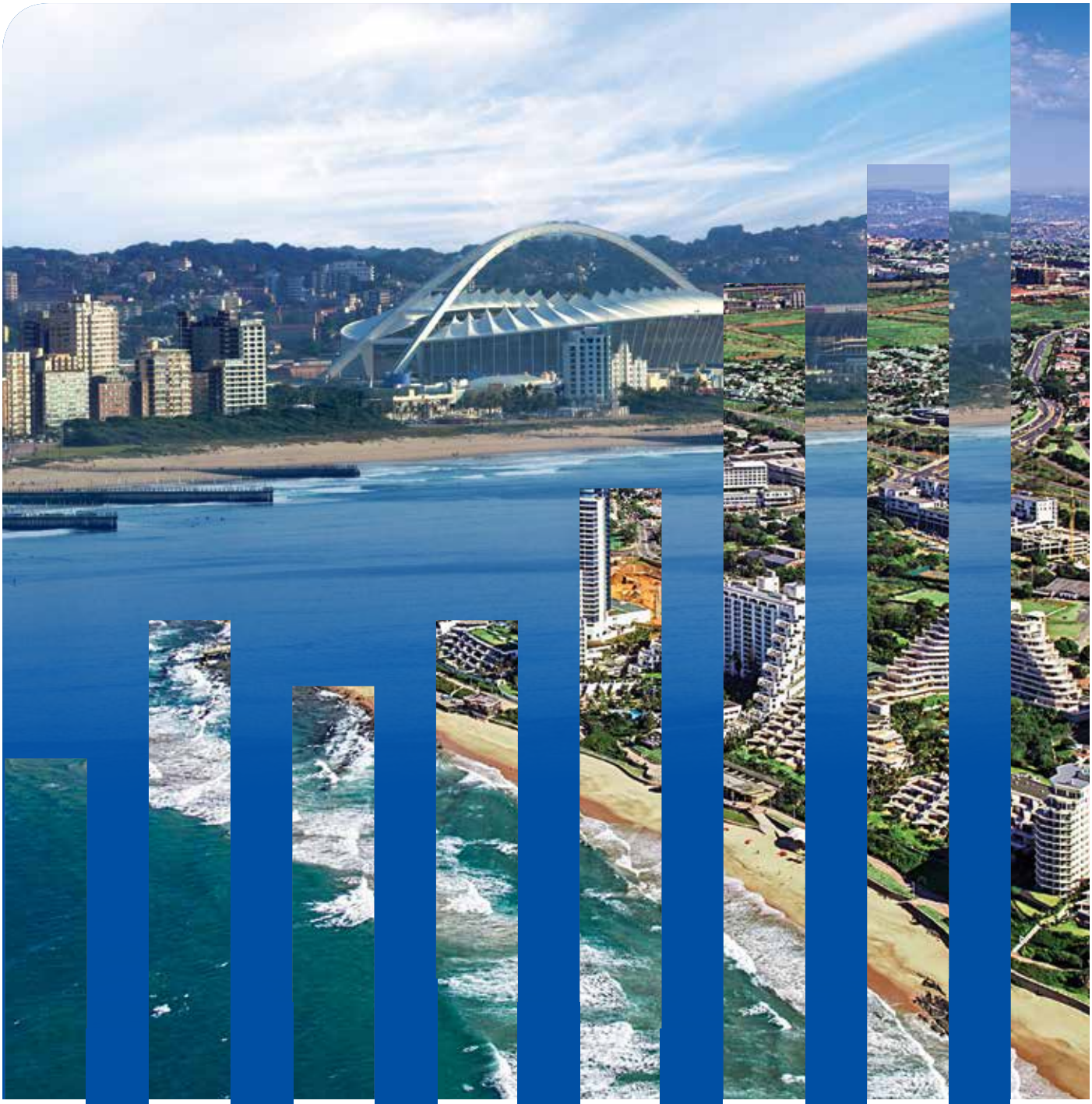
The success of the eThekwini USE-IT initiative is receiving local, national and international recognition with multiple awards bestowed on the initiative. This year USE-IT received the Innovation Trophy from the Institute of Waste Management (IWMSA) and more recently won the Mail & Guardian Greening the Future Award for Green Innovative Technologies. In addition, USE-IT won the Mail & Guardian Editor's Choice Award for South Africa's environmental project that stands out as a shining example of best practice in the field. The Editor picked this project for special mention because of its impact on the environment, the job creation opportunities that it creates and the potential that it holds for expansion into other parts of the country.

LOOKING AHEAD TO THE NEXT EDITION

The EDGE looks at topical and current issues that affect decision-makers in eThekwini. The theme of our next edition will focus on the Creative Industries Sector in eThekwini. The latest available data on key economic indicators will also be provided.

The EDGE is produced by the eThekwini Economic Development and Investment Promotion Unit's Policy, Strategy, Information and Research (PSIR) Department.

For feedback or queries, email Aurelia Albert on Aurelia.Albert@durban.gov.za or phone 031 311 4015.



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