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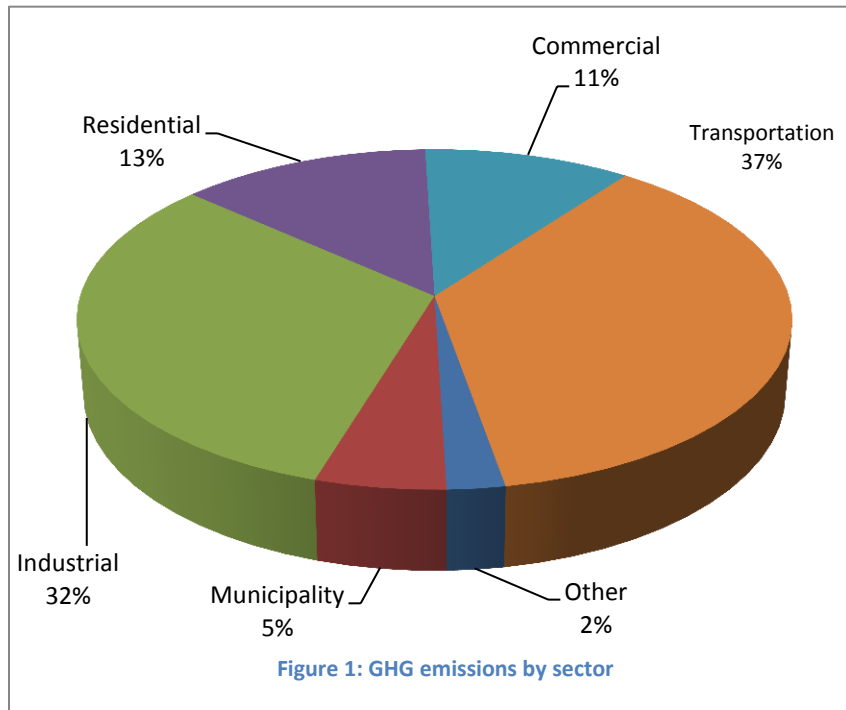
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# Final Summary Document: eThekweni Greenhouse Gas Emissions Inventory 2012

## 1 Synopsis

A Greenhouse Gas Emissions Inventory (GHGEI) for the eThekweni Municipality has been compiled for the 2012 calendar year. The inventory identifies the sources of GHG emissions from both the government and community sectors within the eThekweni Municipal Area. The eThekweni Municipality has compiled the emissions Inventory to help plan climate change mitigation strategies within the Municipality.

The GHG Emissions Inventory (GHGEI) is divided into two sub-inventories, one for the broader eThekweni community and one for municipality or local government emissions. The local government “sub-inventory” includes GHG emissions from activities under the control of the eThekweni Municipality entity, whilst the community inventory includes GHG emissions from various sectors within the boundary of the eThekweni Municipal Area.



The total greenhouse emissions recorded for entire eThekweni Municipal Area was 29,360,395tCO<sub>2</sub>e<sup>1</sup> for the 2012 year. As with previous GHEIs, the largest contribution to this footprint was transportation sector (37% of the total GHGs) followed closely by Industry emissions (32%). A graph showing the inventory by sector is shown above (Figure 1).

The 2010 Baseline GHGEI was developed as an easy to use EXCEL sheet and that allows for reporting of GHG emissions on an annual basis. That tool has been updated in order to calculate 2012 emissions. The process of developing the 2012 GHGEI highlighted a number of data inadequacies that have partly been addressed in the current version; however other

<sup>1</sup> Includes scope 1, 2 and selected scope 3 emissions (see below)

concerns still need to be systematically addressed in future GHGEIs. These concerns are briefly discussed in the Conclusion of the Greenhouse Gas Emissions Inventory 2012 Technical Report.

## 2 Background

In 2010 eThekwini Municipality, together with a number of cities across the globe, became a signatory of The Global Cities Covenant on Climate (the “Mexico City Pact”). Through this covenant, the Municipality committed to record its annual GHG emissions, climate change commitments, climate mitigation and adaptation measures, and actions. The 2011 eThekwini GHG Inventory, in addition to assisting in meeting the Municipality’s commitments to The Global Cities Covenant on Climate, is meant to aid the Municipality in forecasting emission trends, identifying the point and mobile sources of emissions generated, and setting goals for future reductions and mitigation.

The reporting of a municipal inventory also aligns eThekwini Municipality with the intentions of the National Climate Change Response White Paper (Department of Environmental Affairs, 2011) and the broader national government policy on climate change.

## 3 Methodology Used

The following Local Government GHG Emissions Analysis Protocols, developed by ICLEI – Local Governments for Sustainability, were used to guide the development of the eThekwini GHG Inventory:

- International Local Government GHG Emissions Analysis Protocol Version 1.0<sup>2</sup>; and
- Local Government Operations Protocol for the Quantification and Reporting of Greenhouse Gas Emissions Inventories Version 1.1<sup>3</sup>.

These protocols provide a standardized set of guidelines to assist local governments in quantifying and reporting GHG emissions associated with their government and community operations. Both protocols are based upon the Corporate GHG Protocol<sup>4</sup> developed by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD) as well as technical guidance provided by the United Nations Intergovernmental Panel on Climate Change (IPCC). Activities that cause emissions are recorded in different emission scopes:

- Scope 1 are any direct emissions produced by the organisation or area, such as combustion of fuel.
- Scope 2 activities are indirect emissions produced by electricity that is purchased by the organisation or area.
- Scope 3 emissions are those that occur from the organisation or area’s activities but the sources of the emissions are owned or controlled by another entity, such as emissions from flights where planes are not owned by the organisation/area in question.

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<sup>2</sup>Available at <http://www.icleiusa.org/tools/ghg-protocol>

<sup>3</sup>Available at <http://www.icleiusa.org/tools/ghg-protocol>

<sup>4</sup>Available at <http://www.ghgprotocol.org/standards/corporate-standard>

The figure below is a summary of the different types of scopes for GHG emissions.

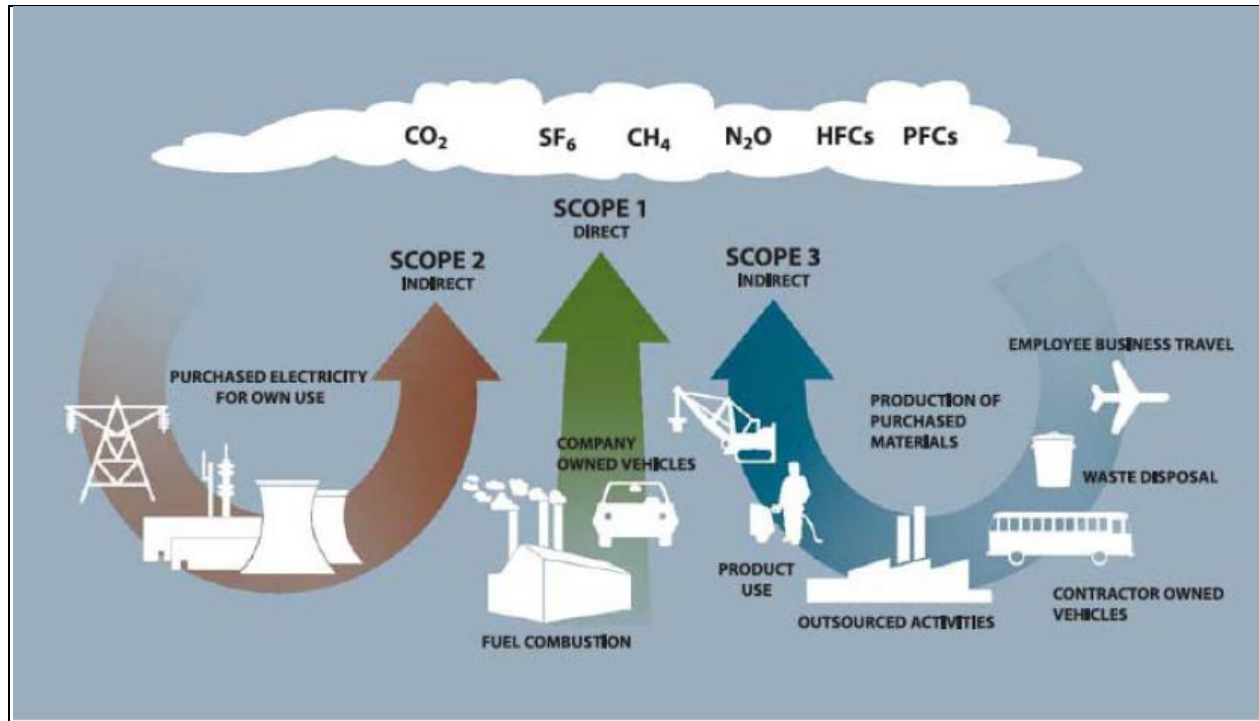


Figure 2: Total Government Emissions by Sector (Image Source: [www.ghgprotocol.org](http://www.ghgprotocol.org))

It is important that emission scopes are differentiated as this helps to avoid the possibility of double counting emissions and misrepresenting emissions when reporting. Scope 1 and 2 emission reporting is compulsory under the WRI’s GHG Protocol.

The eThekweni 2012 GHG Emissions Inventory comprises 2 sub-inventories, includes emissions from the government sector and a separate sub-inventory documenting emissions from the broader community. The government inventory includes GHG emissions from direct and indirect activities under the control of the eThekweni Municipality. The community inventory includes GHG emissions from industry, commercial and residential sectors as well as transport, waste and agriculture within the boundary of the eThekweni Municipal Area. The tables below show the emissions sources for government and community that are included in the Inventory.

Table 1: Government Emission Sources collected according to Scope

| Scope 1                     | Scope 2  | Scope 3   |
|-----------------------------|--|---|
| Stationary Fuel Combustion  | Electricity Consumption  | Employee Air Travel                                 |
| Mobile Fuel Combustion      | Electricity Transmission & Distribution (Technical and Non-technical losses) | Transit vehicles operated by contractor             |
| Wastewater Treatment        |  | Electricity consumption by Eskom owned streetlights |
| Solid Waste Disposal        |  |   |
| Power Generation Facilities |  |   |

Table 2: Community Emission Sources collected according to Scope

| Scope 1                              | Scope 2                 | Scope 3                  |
|--------------------------------------|-------------------------|--------------------------|
| Stationary Fuel Combustion           | Electricity Consumption | Air Transport Systems    |
| Mobile Fuel Combustion               |                         | Marine Transport Systems |
| Solid Waste Disposal                 |                         |                          |
| Enteric Fermentation                 |                         |                          |
| Pre-harvest Cane Burning             |                         |                          |
| Industrial Processes and Product Use |                         |                          |

In order to standardise reporting, activity data (such as fuel consumption) is multiplied by an emissions factor to convert all data to tonnes carbon dioxide equivalent (tCO<sub>2</sub>e). Emission factors are generally internationally accepted values, but are published by a range of different entities. South Africa has not published a list of emission factors for use in South Africa, with the one exception being an emission factor for electricity provided by Eskom<sup>5</sup>. Therefore the United Kingdom Government Department of Environment, Food and Rural Affairs (DEFRA) and the International Panel for the Climate Change (IPCC) published emission factors have been used.

## 4 Results

For 2012 the total carbon emissions recorded for the entire eThekweni Municipal Area was 29,360,395tCO<sub>2</sub>e. The following section provides more detail on this figure but is divided into emissions from the Municipality and emissions from the broader community. The division into government and community emissions is standard practice as data for local government emissions is generally more readily available.

### 4.1 Local Government Emissions

Total local government emissions for the 2012 period were 1,526,431tCO<sub>2</sub>e. The government emissions sub-inventory included operations that are directly under the eThekweni Municipality's control and emissions arising from the use of all significant assets and services during 2012. The table below summarises the municipal emissions by GHG scope.

Table 3: Municipal Emissions by Scope

| Emissions Scope | GHG Sources   | Municipal Emissions (tCO <sub>2</sub> e) |
|-----------------|---|--|
| Scope 1         | Stationary Fuel Combustion, Mobile Fuel Combustion, Wastewater Treatment, Solid Waste Disposal                    | 391,810 (26%)                            |
| Scope 2         | Electricity Consumption, Electricity Transmission & Distribution (Technical and Non-technical losses)             | 1,101,398 (72%)                          |
| Scope 3         | Employee Air Travel, Transit vehicles operated by contractor, Electricity consumption by Eskom owned streetlights | 33,222 (2%)                              |

The graph below (Figure 3) shows the distribution of emissions by sector for the government emissions for 2012. A breakdown of the sectors by emission source is provided in Table 4. The highest municipal emission source, contributing 47 % to the Municipality's total 2012 emission inventory, was electrical transmission and distribution losses (scope 2). This figure includes technical and non-technical losses from electricity purchased from Eskom, which amount to 5.93% of the total electricity purchased from Eskom.

<sup>5</sup> 1KWh = 1.03kg CO<sub>2</sub>e

The estimated losses are assumed to be 5.85% over the financial reporting period in the 12 months from June 2011 to July 2012. However the data presented here in the GHGEI is for January 2012 to December 2012 with an estimated loss of 5.93%. This difference exists because of the following:

- 1) Estimated readings in the residential sector which are read once every 3 months
- 2) Prepaid metering which is bought in advance and possibly not used in advance
- 3) The calculation of unmetered supply (for example street light on time variation)
- 4) Account adjustments for technical and administration errors

The second highest municipal emission source was from the sale of Certified Emission Reductions (carbon credits), contributing 14% to the total Municipal emissions. The sale of CERs are from the municipal landfill gas to electricity project and are recorded as a separate category of emissions as the CO<sub>2</sub>e reduction is claimed by the purchaser (see below for more details). CERs are followed by Municipal Building and Facilities (12%) and Streetlights and Traffic Signals (7%).

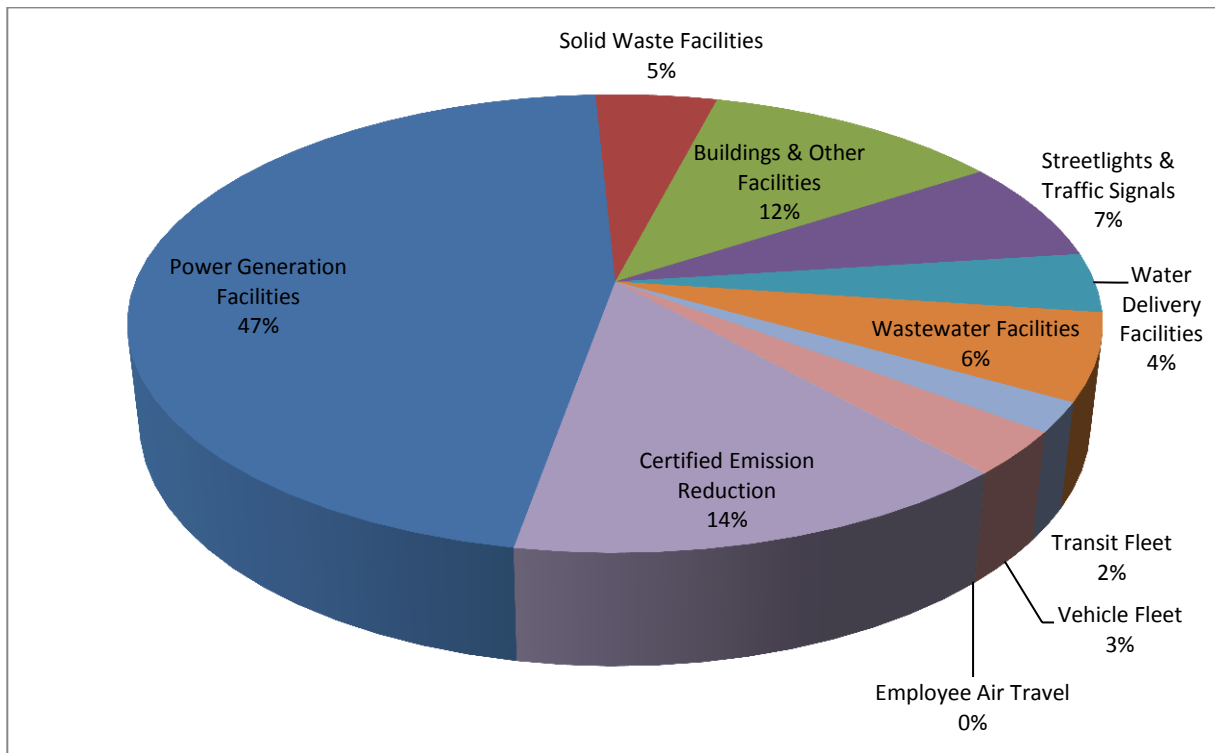


Figure 3: Total Government Emissions by Sector

Table 4: Municipal Operation Emissions by Sector and Source

| Sector                         | Scope | Emission Sources  | Emissions (tonnes CO <sub>2</sub> e) |
|--------------------------------|-------|---|--------------------------------------|
| Buildings & Other Facilities   | 1     | Stationary Fuel Combustion  | 15,082                               |
|                                | 2     | Purchased Electricity   | 164,935                              |
| Streetlights & Traffic Signals | 2     | Electricity consumption by municipal owned streetlights & traffic signals | 108,101                              |
|                                | 3     | Electricity consumption by Eskom owned streetlights                       | 1,079                                |
| Water Delivery Facilities      | 2     | Purchased electricity   | 64,048                               |

| Sector                            | Scope | Emission Sources                 | Emissions (tonnes CO <sub>2</sub> e) |
|-----------------------------------|-------|----------------------------------|--------------------------------------|
| Wastewater Facilities             | 1     | Stationary and process emissions | 35,979                               |
|                                   | 2     | Purchased electricity            | 57,100                               |
| Vehicle Fleet                     | 1     | Mobile fuel combustion           | 46,654                               |
| Transit Fleet                     | 3     | Mobile fuel combustion           | 31,951                               |
| Power Generation Facilities       | 1     | Fugitive Emissions               | 3 552                                |
| Power Generation Facilities       | 2     | Electrical distribution losses   | 705,364                              |
| Solid Waste Facilities            | 1     | Fugitive emissions               | 71,370                               |
|                                   | 1     | Purchased electricity            | 1,850                                |
|                                   | 2     |                                  |                                      |
| Employee Air Travel               | 3     | Mobile fuel combustion           | 191                                  |
| Certified Emission Reduction      | 1     | Certified Emission Reduction     | 219,173                              |
| <b>Total Government Emissions</b> |       |                                  | <b>1,526,431</b>                     |

## 4.2 Process Emissions

The 2012 GHGEI was also the first year that process emissions were calculated. Fugitive Emissions (SF<sub>6</sub>) of 3 552.0 t CO<sub>2</sub>e were included from electricity switch gear equipment. SF<sub>6</sub> is an extremely potent greenhouse gas that is used amongst other things as an insulant gas in switch gear. SF<sub>6</sub> is used in magnesium processing and semiconductor manufacturing, as well as a tracer gas for leak detection.

## 4.3 Certified Emission Reduction

As with the 2011 GHGEI, the 2012 GHGEI included Certified Emission Reduction (CERs). CERs are tradable commodities developed through the Clean Development Mechanism (CDM) Executive Board of the United Nations Framework Convention on Climate Change (UNFCCC). In essence the CDM allows project developers who are able to quantify emission reduction, to package and sell these reductions as CERs.

The eThekweni Municipality had two CDM projects registered with the UNFCCC for the 2012 GHGEI reporting period, namely the *Durban Landfill-Gas-To-Electricity Project – Marian Hill and La Mercy Landfills*<sup>6</sup> and *Durban Landfill-Gas Bisasar Road*<sup>7</sup>. For the 2012 period, the eThekweni Municipality registered 234,506 CERs for these 2 projects (see table below).

Table 5: Municipal Intensity Figures

| Source                | Units               | Total            |
|-----------------------|---------------------|------------------|
| Bisasar Road Landfill | t CO <sub>2</sub> e | 192,351.3        |
| Marian Hill Report 1  | t CO <sub>2</sub> e | 20,685           |
| Marian-hill Report 2  | t CO <sub>2</sub> e | 6,137            |
|                       |                     | <b>219,173.3</b> |

As with the 2011 GHGEI CERs are included under Scope 1 emissions for Sanitation and Solid Waste Facilities.

<sup>6</sup><https://cdm.unfccc.int/Projects/DB/TUEV-SUED1154520464.04>

<sup>7</sup><http://cdm.unfccc.int/Projects/DB/TUEV-SUED1214927681.45>

### 4.4 Community Emissions

Total community (excluding local government) emissions equated to 27,833,965tCO<sub>2</sub>e. The community emissions inventory includes GHG emissions associated with activities occurring within the eThekweni Municipality’s geopolitical boundary generated during 2012. The table below shows community emissions by scope.

Table 6: Community Emissions by Scope

| Emissions Scope | GHG Sources  | Community Emissions (tCO <sub>2</sub> e) |
|-----------------|--|--|
| Scope 1         | Stationary Fuel Combustion, Mobile Fuel Combustion, Solid Waste Disposal, Enteric Fermentation, Pre-harvest Cane Burning | 11,580,783 (42%)                         |
| Scope 2         | Electricity Consumption  | 12,573,397 (42%)                         |
| Scope 3         | Air Transport Systems, Marine Transport Systems  | 4,679,785 (17%)                          |

The sector contributing 32% to the total community GHG emissions is the industrial sector through purchased electricity and stationary fuel combustion. The second major contributor was the on-road and off-road (ground) transport sector contributing 21% to overall community emissions. The third highest contributor to community emissions was the air and water transport systems sector deriving its emissions from fuel consumption at 16%. Collectively (ground, air and water), transport sector emissions contribute the most significant proportion of the community emissions, at 37%. The residential sector is also significant, at 13% or 3,801,546tCO<sub>2</sub>e. Figure 4 below illustrates the total community emissions produced in eThekweni by sectors. A more in-depth breakdown of the sectors according to emission source can be found in Table 6.

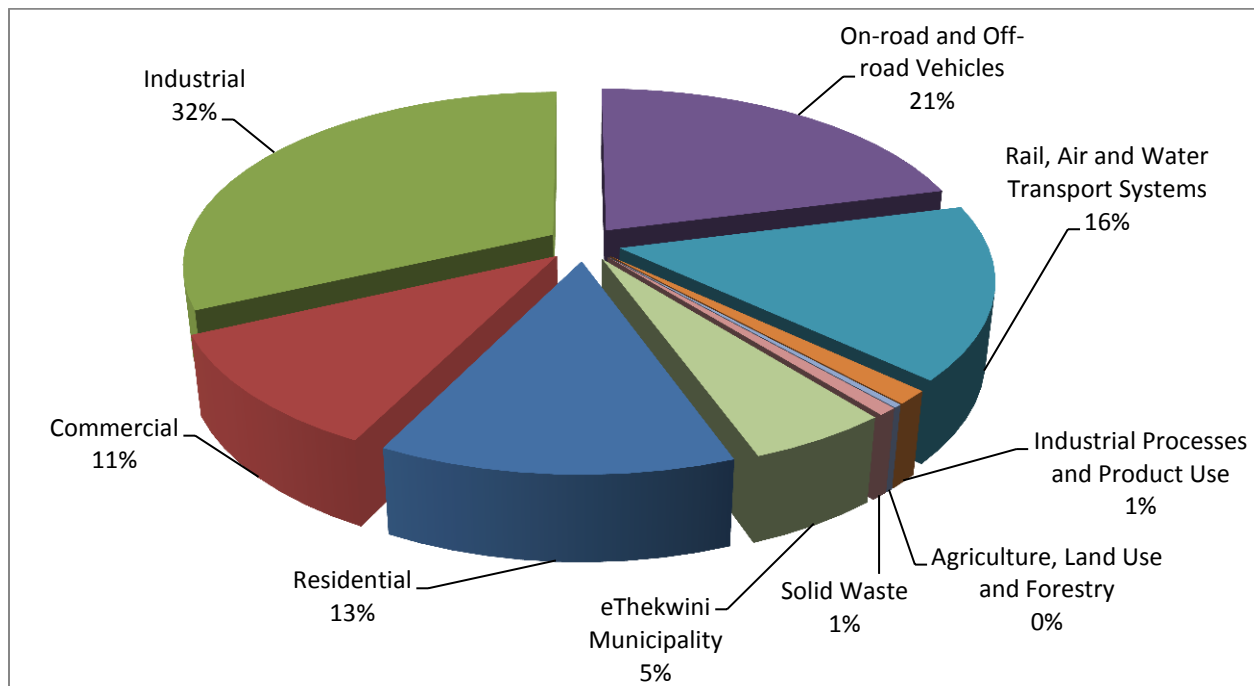


Figure 4: Total Community Emissions by Sector

Table 7: Community Operation Emissions by Sector and Source

| Sector                                | Scope | Emission Sources                   | Emissions (tonnes CO <sub>2</sub> e) |
|---------------------------------------|-------|------------------------------------|--------------------------------------|
| Residential                           | 1     | Stationary Fuel Combustion         | 214,097                              |
|                                       | 2     | Electricity Consumption            | 3,587,450                            |
| Commercial                            | 2     | Electricity Consumption            | 3,142,391                            |
| Industrial                            | 1     | Stationary Fuel Combustion         | 4,505,089                            |
|                                       | 2     | Electricity Consumption            | 4,843,557                            |
| On-road and Off-road Vehicles         | 1     | Mobile Fuel Combustion             | 6,183,253                            |
| Rail, Air and Water Transport Systems | 3     | Air Travel                         | 4,679,785                            |
| Industrial Process and Product Use    | 1     | Industrial Processes & Product Use | 375 851                              |
| Solid Waste                           | 1     | Fugitive Emissions                 | 212,230                              |
| Agriculture, Land Use and Forestry    | 1     | Enteric Fermentation               | 90,264                               |
| <b>Total Community Emissions</b>      |       |                                    | <b>27,833,965</b>                    |

#### 4.5 Data Gaps Analysis

The eThekweni Municipality contracted WardKarlson Consulting CC to address data gaps identified in the 2011 GHGEI. This scope of work included:

1. Review of existing data sources for the use of coal, coke and refinery gas in the Municipality.
2. Develop a system for collection of data for coal, coke and refinery gas in the Municipality.
3. Collect coal, coke and refinery gas data for 2012 period and submit to the Energy Office for inclusion in the GHGEI

A full report outlining the results from this research is on the municipal website<sup>8</sup>. The section below is a summary from these findings.

Industrial process emissions were included in the GHGEI in 2012 for the first time. Uncertainty regarding the Industrial Process Related CO<sub>2</sub> emissions led to a thorough investigation into the type of industries registered within the Municipality. After review of the Schedule Trade Permits (STPs), several companies were shortlisted and a detailed analysis of the production process was performed. As an outcome the cement industry was eliminated from the list as only grinding and blending occurs at the facility within the eThekweni boundary.

Based on research and after consultation with the key pulp and paper manufacturers within the Municipality it was established that process-related CO<sub>2</sub> emissions were generated from the pulp and paper industry. The data was supplied by the relevant companies and upon a data request will be updated on an annual basis.

A detailed process description was requested from the Non-Ferrous Metals (NFM) industry in order to establish whether an aluminium smelting process is operational. At this stage no information regarding the exact character of the manufacturing process is available and further follow up will be required.

<sup>8</sup> [http://www.durban.gov.za/Resource\\_Centre/Current%20Projects%20and%20Programmes/energyoffice/Pages/GHG-Inventory.aspx](http://www.durban.gov.za/Resource_Centre/Current%20Projects%20and%20Programmes/energyoffice/Pages/GHG-Inventory.aspx)



It was established that the Hydrofluorocarbons (HFCs) and Perfluorocarbons (PFCs) are being imported into the country and this process is regulated by SARS. Data with regards to number of imports of HFCs and PFCs within 2012 were requested. In an effort to estimate the GHG emissions from usage of HFCs and PFCs the main challenge appeared related to obtaining the number of facilities that use air-conditioning and refrigeration units. Data with regards to the number of households as well as vehicles registered within the Municipality were requested from the Municipality.

However this research wasn't concluded and will need to be followed up and updated in the following GHGEI. Given that this research has not been fully concluded, emissions were consequently estimated based on the published proportion of these gases in tCO<sub>2</sub>e compared to the total GHG emissions, which accounts for approximately 2% of total GHG emissions in the inventories reviewed.

## 5 Analysis of the GHG Inventory

### 5.1 Total Emissions

For 2012 the total<sup>9</sup> carbon emissions recorded for eThekweni Municipality was 29,360,395 tCO<sub>2</sub>e. Local Government Emissions account for 5% of the total eThekweni emissions (Figure 5). Transportation (ground, air and water) and Industry contribute the highest to the total emissions (Figure 5). Emissions from the industry are also significant, which is representative of the influential manufacturing and processing component of the city's economy.

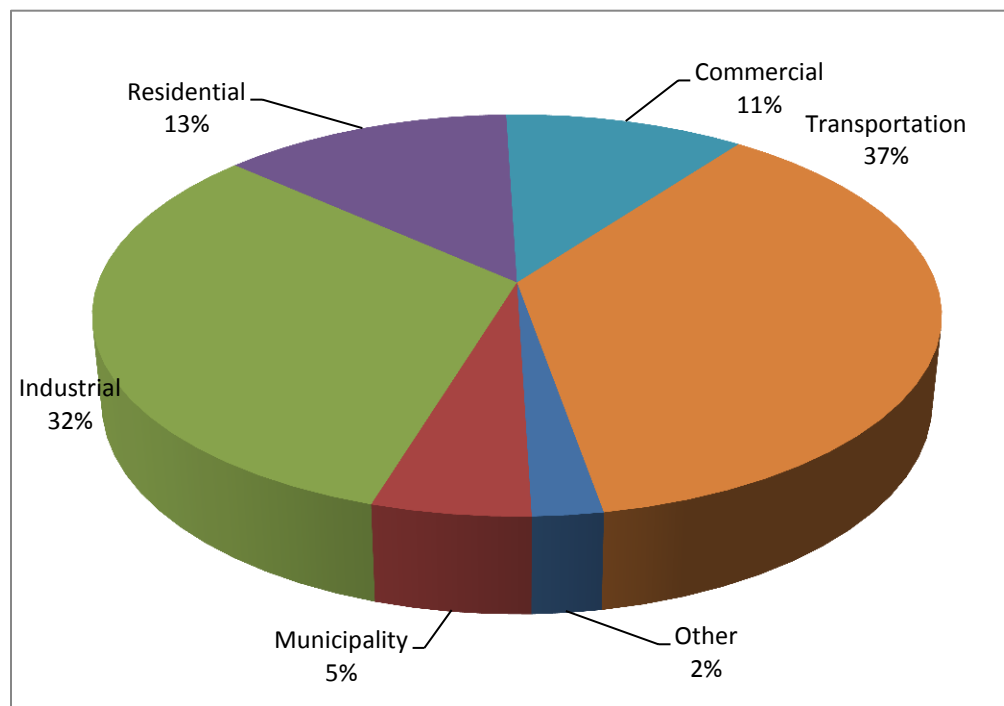


Figure 5: Carbon emissions by Sector

This "emission by sector" representation is largely an indication of the demand for energy in the city. The graph above illustrates that industry and transport have a large energy demand in comparison to residence and commercial activities.

<sup>9</sup> Municipal and community emissions

This sector comparison turn helps prioritize climate change mitigation interventions to sectors where there are large demands on energy.

Conversely, the total emission value of 29,360,395 tCO<sub>2</sub>e can also be assessed by “source” or *supply*. The graph below is an indication of where the greenhouse gasses in the city come from. As to be expected Transport Fuels<sup>10</sup> are responsible for 37% of total GHG footprint, which matches the 37% allocation in the transport sector (Graph 5 above). Electricity however is the largest source of Greenhouse Gasses, responsible for 43% of the total footprint. Stationary Combustion<sup>11</sup> also contributes to the overall GHG footprint with 16% of the total emissions. However there are serious data gaps in this particular category and research needs to be conducted to better understand the emissions from different stationary combustion sources. For the purposes of this Graph CERs are classified as a separate source of emissions.

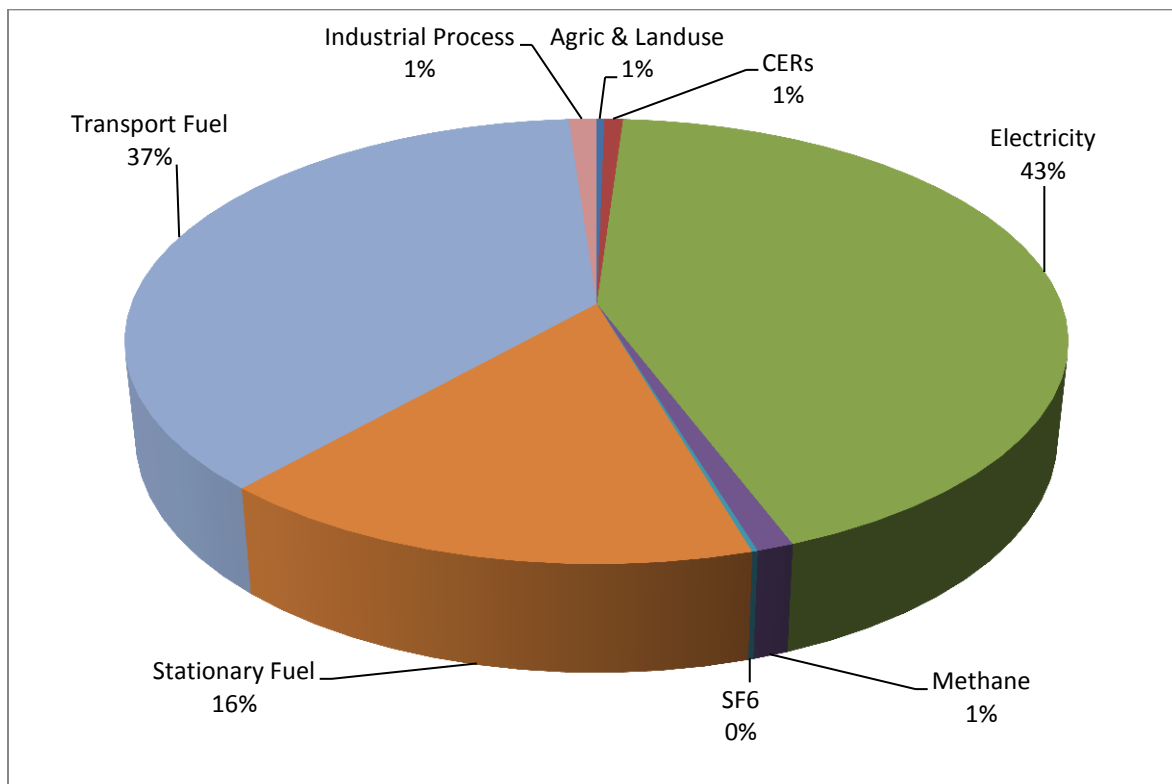


Figure 6: Carbon emissions by Source

The imported electricity supplied in the city was 12 087 GWh (99.6%) compared to local generators of electricity at 48 GWh (See figure 7 below). This local generation is predominantly from the Municipal Landfill Gas to Electricity Project<sup>12</sup> and 3.5 GWh of renewable energy embedded generators.

<sup>10</sup>Including: Petrol, Diesel, Jet Fuel, Marine Diesel and Fuel Oil

<sup>11</sup>Including: Heavy Furnace Oil; Bitumen; Natural Gas; LPG; Coal; Coke; Illuminating Paraffin; Paraffin Wax; Refinery Gas

<sup>12</sup><http://www.kznenergy.org.za/durban-landfill-gas-to-electricity-project/>

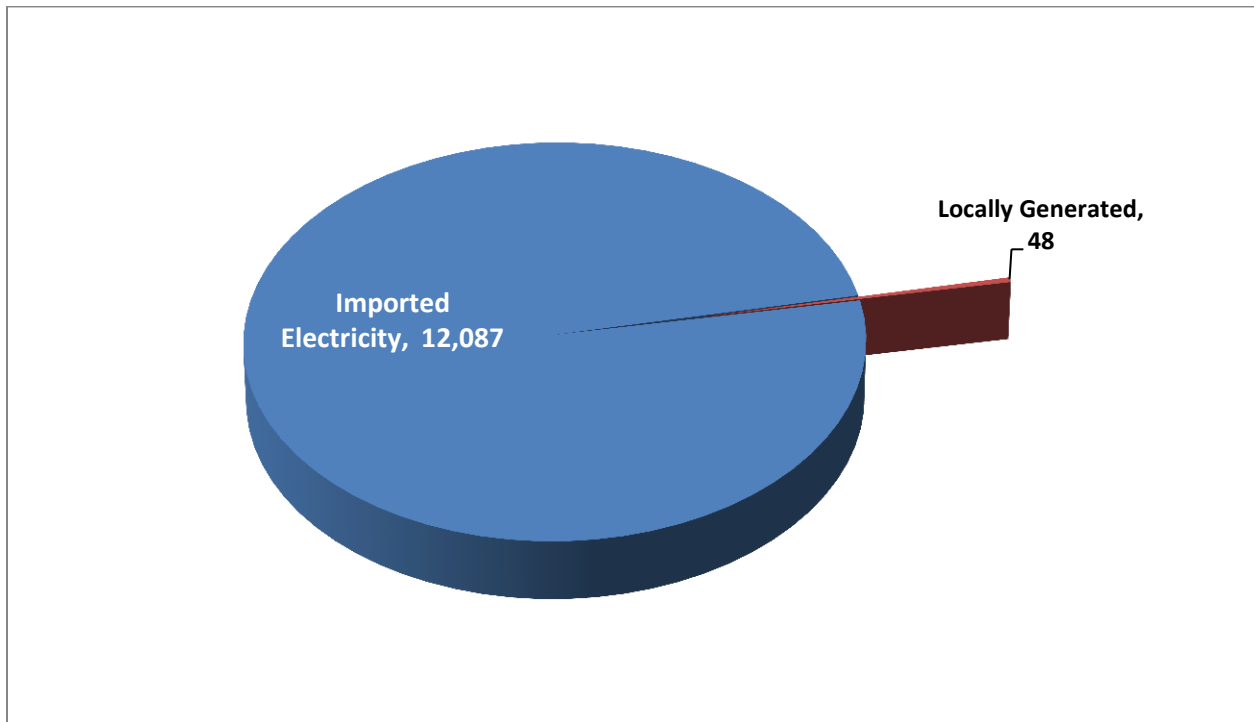


Figure 7: Electricity Supply by Source in the eThekweni Municipal Area (GWh)

## 5.2 Municipal Emissions

The spread of municipal emissions by infrastructure type is provided in the graph below. This graph excludes electricity transmission losses to more clearly identify area of operations within the municipality that have high carbon outputs. Certified Emission Reductions were responsible for the largest component of the municipal footprint (excluding transmission losses) followed by Water and Sanitation and Solid Waste Operations. The Solid Waste emissions are predominantly from methane while Water and Sanitation are from electricity usage (77%) and some methane (23%). The bulk of the remaining infrastructure emissions are from the use of electricity (Figure 9 below).

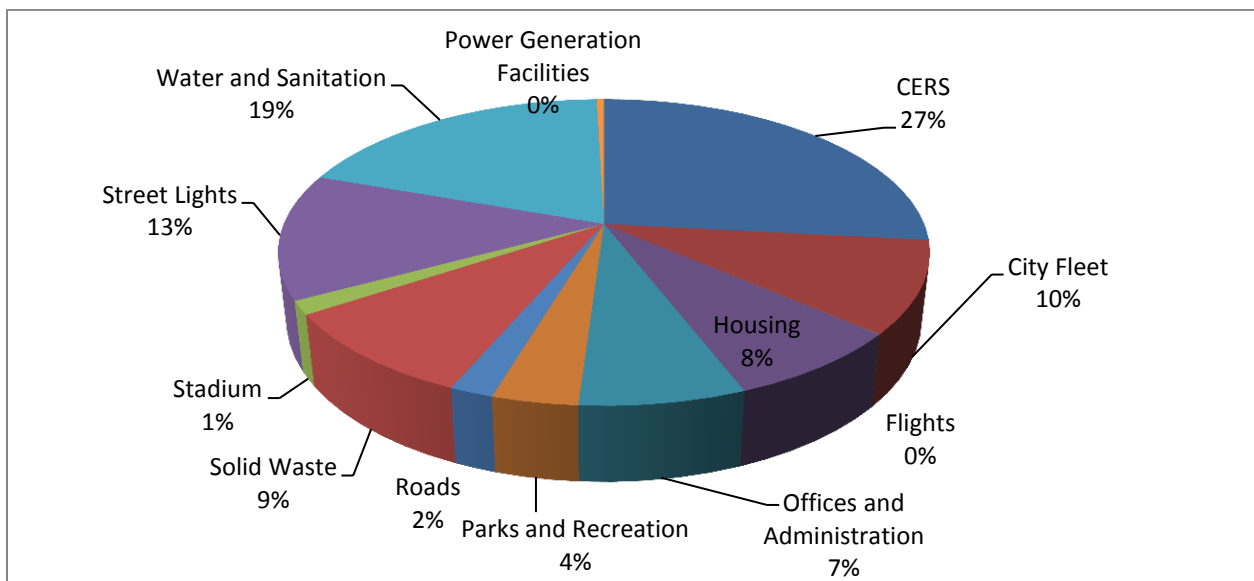


Figure 8: Municipal Emissions by Infrastructure Type tCO<sub>2</sub>e (excluding electricity transmission losses)

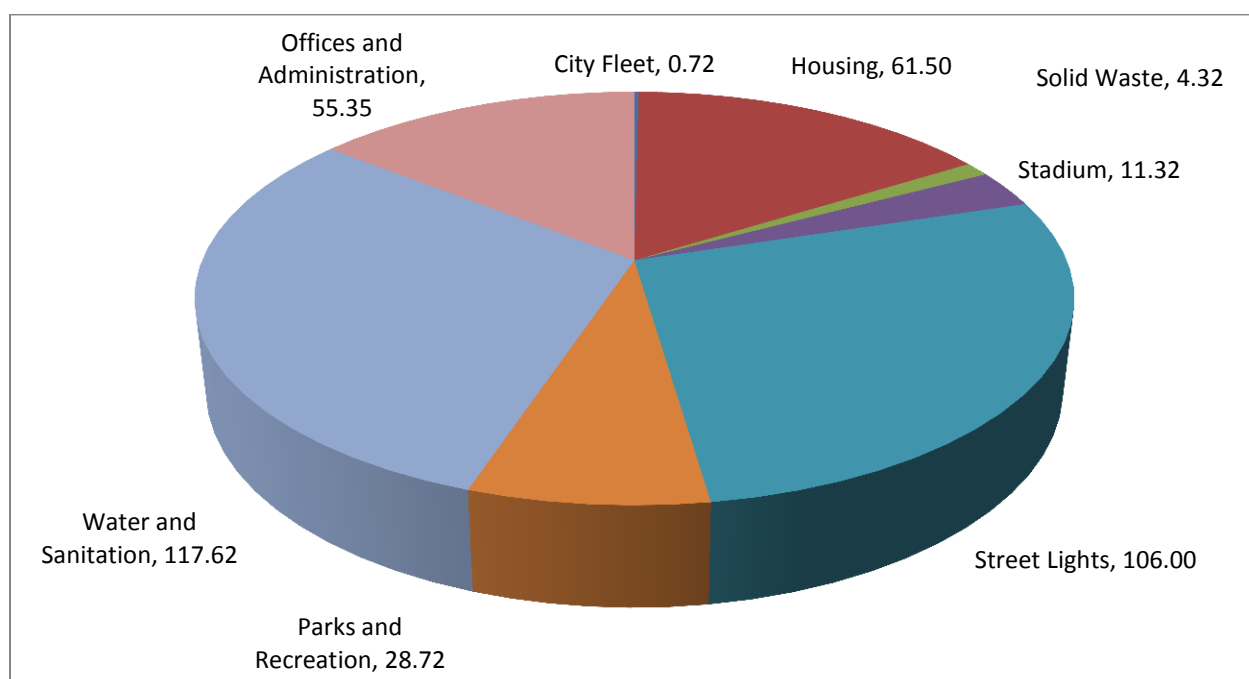


Figure 9: Municipal Electricity Consumption GWh (excluding electricity transmission losses)

## 5.3 Intensity of Emissions

### 5.3.1 Government Intensity Figures

Emission intensity figures for the Municipality are recorded below in Table 7. These figures were calculated by combining all municipal scope 1 and 2 emissions and dividing them by the relevant indicator.

Table 8: Municipal Intensity Figures

| Intensity Figure | Unit  | Metric Numerator | Unit   | Metric Denominator        | Unit                                       |
|------------------|---|------------------|--|---------------------------|--|
| <b>R 56.31</b>   | tCO <sub>2</sub> e / million Rand of operating budget | 1 493 209        | tCO <sub>2</sub> e ( Municipal Scope 1 & 2 ) | R 26 520.00 <sup>13</sup> | Million Rand Operating Budget (2012/ 2013) |
| <b>R 281.74</b>  | tCO <sub>2</sub> e / million Rand of Capital budget   | 1 493 209        | tCO <sub>2</sub> e ( Municipal Scope 1 & 2 ) | R 5 300.00 <sup>14</sup>  | Million Rand Capital Budget (2012/ 2013)   |
| <b>75.00</b>     | tCO <sub>2</sub> e / Permanent employee               | 1 493 209        | tCO <sub>2</sub> e ( Municipal Scope 1 & 2 ) | 19 910 <sup>15</sup>      | Permanent Employees                        |

<sup>13</sup>[http://www.durban.gov.za/media\\_publications/Press\\_Releases/Pages/201213BudgetAdopted.aspx](http://www.durban.gov.za/media_publications/Press_Releases/Pages/201213BudgetAdopted.aspx)

<sup>14</sup>[http://www.durban.gov.za/media\\_publications/Press\\_Releases/Pages/201213BudgetAdopted.aspx](http://www.durban.gov.za/media_publications/Press_Releases/Pages/201213BudgetAdopted.aspx)

<sup>15</sup>EThekweni Municipality, Human Resources

### 5.3.2 Community Intensity Figures

Community intensity figures are recorded below. These emissions were calculated by combining relevant sector scope emissions and dividing them by the relevant indicators.

Table 9: Community Emissions Figures

| Intensity Figure | Unit  | Metric Numerator | Unit  | Metric Denominator        | Unit                                |
|------------------|---|------------------|---|---------------------------|-------------------------------------|
| <b>3.98</b>      | tCO <sub>2</sub> e / household                      | 3,801,546        | tCO <sub>2</sub> e (Residential Scope 1 & 2 ) | 956 071 <sup>16</sup>     | Number of households within the EMA |
| <b>R 52.72</b>   | tCO <sub>2</sub> e / million Rand of Capital budget | 3,142,395        | tCO <sub>2</sub> e (Commercial Scope 1 & 2 )  | R 59 600.00 <sup>17</sup> | 2012 Annual retail trade sales      |

### 5.3.3 Total Emissions Intensity Figures

Total emission intensity figures (for the municipality and the community) are recorded below in Table 8. These emissions were calculated by combining relevant sector scope emissions and dividing them by the relevant indicators. A per capita figure has been calculated using total scope 1 and 2 emissions, and separately using emissions from all three scopes to account for different methodologies of calculating this figure.

Table 10: Total Emissions Intensity Figures

| Intensity Figure | Unit                        | Metric Numerator | Unit                                | Metric Denominator      | Unit                      |
|------------------|-----------------------------|------------------|-------------------------------------|-------------------------|---------------------------|
| <b>7.16</b>      | tCO <sub>2</sub> e / Capita | 24,647,329       | tCO <sub>2</sub> e (Scope 1 & 2)    | 3,442,361 <sup>18</sup> | Population within the EMA |
| <b>8.53</b>      | tCO <sub>2</sub> e / Capita | 29, 360,395      | tCO <sub>2</sub> e (Scope 1, 2 & 3) | 3,442,361               | Population within the EMA |

## 5.4 Comparison with previous GHGIE

The 2010 eThekweni GHG Inventory serves as the baseline inventory because the methodology for collecting and reporting data was clearly defined for this period. However data for Greenhouse Gas Emissions Inventories in the eThekweni Municipality dates back to 2002. This emerging emissions trend is summarised in the table and graph below. As is evident from these data sets, there is a continued and steady increase in greenhouse gas emissions over time in the city. This trend is primarily a result of improved data collection methodologies but also due to increased uses of energy and carbon intensive processes in the city.

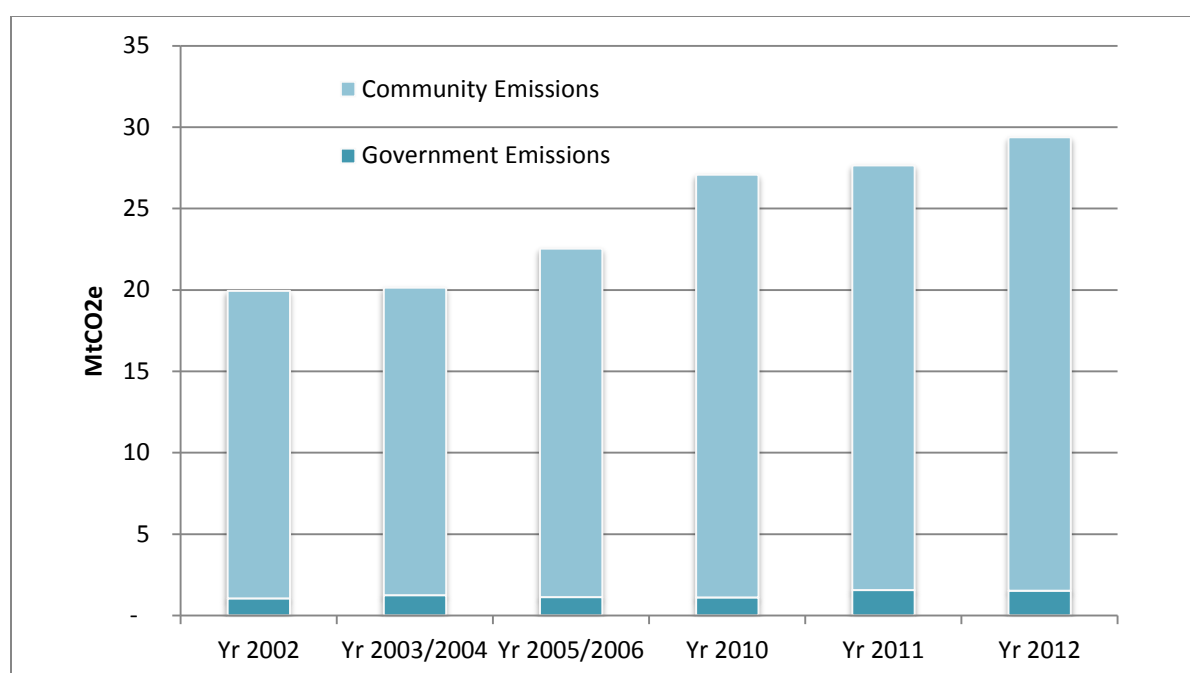
<sup>16</sup>EThekweni Municipality, Integrated Developed Plan 2012/2013

<sup>17</sup>[http://www.durban.gov.za/media\\_publications/edge/Documents/Edge%20Fast%20Facts%20Issue%204%202012.pdf](http://www.durban.gov.za/media_publications/edge/Documents/Edge%20Fast%20Facts%20Issue%204%202012.pdf)

<sup>18</sup>STATSSA: Census 2011: Municipal Fact sheet

Table 11: Historic Emissions Data for the eThekweni Municipality (tCO<sub>2</sub>e)

| Year                | Government Emissions | Community Emissions | Total Emissions | % Change | % Change from 2010 Baseline |
|---------------------|----------------------|---------------------|-----------------|----------|-----------------------------|
| <b>Yr 2002</b>      | 1 047 000            | 18 890 000          | 19 937 000      |          |                             |
| <b>Yr 2003/2004</b> | 1 247 000            | 18 890 000          | 20 137 000      | 1.0%     |                             |
| <b>Yr 2005/2006</b> | 1 118 061            | 21 413 906          | 22 531 967      | 11.9%    |                             |
| <b>Yr 2010</b>      | 1 104 212            | 25 962 074          | 27 066 285      | 20.1%    | Baseline Yr                 |
| <b>Yr 2011</b>      | 1 551 420            | 26 097 979          | 27 649 400      | 2.2%     | 2.2%                        |
| <b>Yr 2012</b>      | 1 526 431            | 27 833 965          | 29 360 395      | 6.2%     | 8.3%                        |

Figure 10: Historic Emissions Data for the eThekweni Municipality (tCO<sub>2</sub>e)

Total emissions show an increase of 6.2% from year 2011 to 2012, which is equivalent to an additional 1 710 996.0 tCO<sub>2</sub>e emitted. The municipal sector presents a decrease of 1.6% (-24 989.6 tCO<sub>2</sub>e), while the community sector changed by 6.65% (1 735 985.5 tCO<sub>2</sub>e). A detailed summary of the differences in 2012 and 2011 is provided in the accompanying technical report.

## 6 Conclusion and Way Forward

The compilation of the eThekweni GHG Emission Inventory is an important step in documenting the eThekweni Municipality's government and community emissions that are contributing to climate change. The current inventory is the third iteration using the Local Government GHG Emissions Analysis Protocols. There is an upward trend in the total GHG emissions in the eThekweni Municipality from 27 066 285 tCO<sub>2</sub>e in 2010 to 29 360 395 tCO<sub>2</sub>e in 2012. This trend is largely due to improved data collection systems where previously unrecorded emissions are now being calculated and included in the inventory.

Table 12: Data Comparison between 2010 and 2011 Reporting Periods

| Scope                | Type                              | Sub-Type                             | 2011 (tCO <sub>2</sub> e) | 2012 (tCO <sub>2</sub> e) |   | Comment  |
|----------------------|-----------------------------------|--------------------------------------|---------------------------|---------------------------|---|--|
| Municipal<br>Scope 1 | Fuel<br>Consumption               | Stationary Fuel Combustion           | 17 309.8                  | 15 082.2                  | -13%  | Decrease in the use of Bitumen   |
|                      |                                   | Vehicle Fleet                        | 18 508.8                  | 46 654.1                  | 151%  | Data collection gap in the previous inventories                            |
|                      | Solid Waste                       | Solid Waste (CH <sub>4</sub> )       | 150 483.1                 | 71 370.0                  | -53%  | Change in the factors used to calculate methane from solid waste.          |
|                      | Power<br>Generation<br>Facilities | Fugitive Emissions                   | -                         | 3 552.0                   |   | Previously not included  |
|                      | Wastewater<br>Treatment           | Wastewater (CH <sub>4</sub> )        | 29 675.2                  | 35 978.8                  | 21%   | Significant increase in population data (possible error in 2010 data)      |
|                      | CERs                              | Certified Emission Reduction         | 234 506.5                 | 219 173.3                 | -7%   | Change not significant   |
| Municipal<br>Scope 2 | Electricity<br>Consumption        | Buildings                            | 156 350.9                 | 164 935.4                 | 5%  | Change not significant   |
|                      |                                   | Streetlights & Traffic Signals       | 119 798.0                 | 108 100.8                 | -10%  |  |
|                      |                                   | Water Delivery Facilities            | 67 404.8                  | 64 048.2                  | -5%   |  |
|                      |                                   | Transmission and Distribution Losses | 690 311.4                 | 705 364.5                 | 2%  |  |
|                      |                                   | Solid Waste Facilities               | 1 747.0                   | 1 849.9                   | 6%  |  |
|                      | Wastewater Facilities             | 31 037.1                             | 57 099.7                  | 84%                       | Addition of 7 bulk accounts for the Wastewater data set |  |
| Municipal<br>Scope 3 | Transport<br>Systems              | Streetlights                         | 1 332.70                  | 1 079.1                   | -19%  | Improved data collection for the number and wattage of street lights       |
|                      |                                   | Transit Fleet                        | 31 951.4                  | 31 951.4                  | 0%  | No change  |
|                      |                                   | Flights                              | 931.7                     | 285.8                     | -69%  | Change in service providers who manage travel arrangements and travel data |

| Scope              | Type                               | Sub-Type                   | 2011 (tCO <sub>2</sub> e) | 2012 (tCO <sub>2</sub> e) |       | Comment                                       |
|--------------------|------------------------------------|----------------------------|---------------------------|---------------------------|-------|---|
| Subtotal Municipal |                                    |                            | 1 551 420.4               | 1 526 525.1               | -2%   |   |
| Community Scope 1  | Fuel Consumption                   | Stationary Fuel Combustion | 4 327 733.5               | 4 719 185.8               | 9%    | Improved data collection methodology          |
|                    |                                    | Mobile Fuel Combustion     | 5 668 963.5               | 6 183 253.3               | 9%    | Data from National DoE                        |
|                    | Solid Waste                        | Solid Waste                | 209 280.0                 | 212 230.0                 | 1%    | Change not significant                        |
|                    | Industrial Processes & Product Use | IPPU                       | -                         | 375 850.6                 |       | Previously not included                       |
|                    | Agric&Landuse                      | Agric&Landuse              | 65 322.4                  | 90 263.6                  | 38.2% | Data is now collected via the dip tank census |
| Community Scope 2  | Electricity Consumption            | Residential                | 3 417 110.1               | 3 587 449.7               | 5%    | Fair reflection of electricity sales          |
|                    |                                    | Commercial                 | 3 067 300.4               | 3 142 390.7               | 2%    | Fair reflection of electricity sales          |
|                    |                                    | Industrial                 | 4 742 415.1               | 4 843 556.5               | 2%    | Fair reflection of electricity sales          |
| Community Scope 3  | Transport Systems                  | Air Transport Systems      | 172 097.9                 | 251 933.9                 | 46%   | Data from National DoE                        |
|                    |                                    | Water Transport Systems    | 4 427 756.4               | 4 427 756.4               | 0%    | No data received for 2012                     |
| Subtotal Community |                                    |                            | 26 097 979.1              | 27 833 870.4              | 7%    |   |
| <b>Total</b>       |                                    |                            | <b>27 649 399.5</b>       | <b>29 360 395.5</b>       |       |   |