

## FOREWORD

Since 2002, when exchange rate depreciation resulted in rising prices for most agricultural commodities and inputs, as well as retail food prices, there has been increasing interest in the behaviour of agricultural prices. This led, for example, to the establishment of a Food Price Monitoring Initiative by the National Agricultural Marketing Council (NAMC), and the publication of quarterly reports on changes in food prices. It was also realised, however, that it was important to monitor and disseminate information on changes in agricultural input costs. In August 2006, a workshop was convened with stakeholders in the agricultural sector, at which it emerged that input cost monitoring would be a welcome addition to ongoing research on changes in agricultural-related prices. At this workshop, the NAMC was mandated to coordinate input cost monitoring on behalf of the agricultural industry. The NAMC has since taken up this activity in collaboration with various branches of the agricultural industry. Input cost monitoring, together with food price monitoring, now forms part of two of the NAMC's key research themes, namely, **agro-food chain analysis** and **market information systems**.

By monitoring input costs, the NAMC aims to be able to publish information on trends in farm input costs on a regular basis. This report provides broad trends in input costs for grains, more specifically in the maize and wheat industries (note that the trends of most input cost items are also applicable to other grains).

In this report, the following issues are considered: (i) broad trends in input cost movements for the grain industry; (ii) the contribution of different variable input costs to the total variable input cost of maize and wheat; and (iii) trends in individual input cost items.

## A comparison of price indices for maize and wheat (price movements of outputs and inputs)

Figure 1 shows trends for different input and output price indices from 1990 to 2011. It is noticeable that since 2001 the producer price indices for maize (PPI-Maize), wheat (PPI-Wheat), all field crops (PPI-Field crops) and all agricultural products (PPI-Total) have shown much more variability than the all farming requisites index (FRPI-Total). Such variability brings about uncertainty and risk, which affects farmers' decisions to plant and invest, and, hence, it also affects supply. The PPI-Maize and PPI-Wheat increased by 307.3 % and 339.9 %, respectively, from 1990 to 2011, whilst the PPI-Field crops and PPI-Total increased by 379.4 % and 397.6 %, respectively.

During the same period, the FRPI-Total increased by 603.7%.

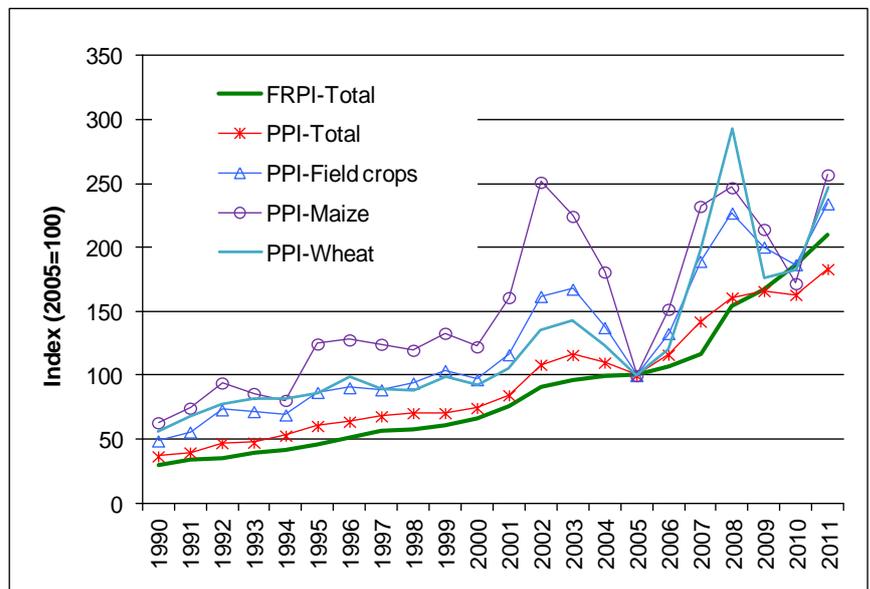


Figure 1: Comparison of various price indices, 1990 to 2011<sup>1</sup>  
Source: DAFF, 2012

It is noteworthy that most of the inputs included in the FRPI-Total increased substantially in late 2007 and early 2008. This is highlighted later in the report.

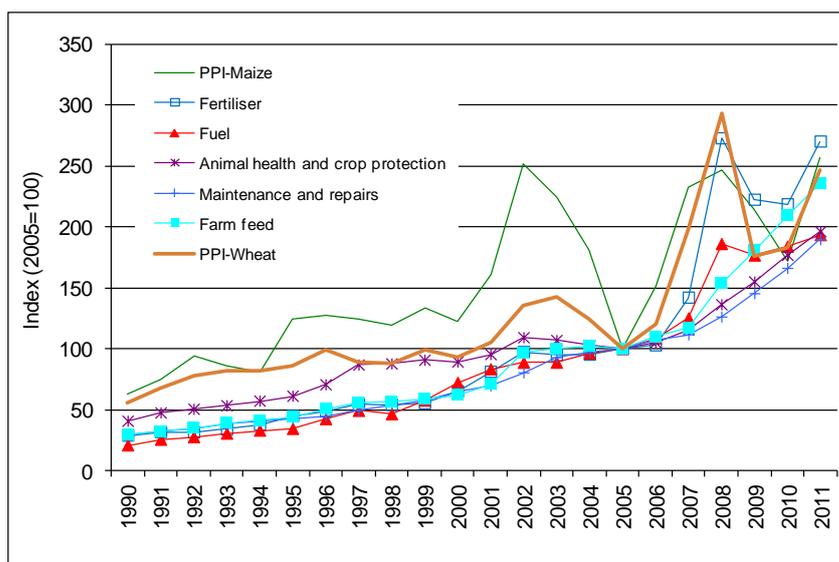
Figure 2 shows trends in the PPI-Maize, PPI-Wheat and selected intermediate inputs between 1990 and 2011 (note that intermediate inputs are part of the overall FRPI-Total). The intermediate inputs included are fertiliser, fuel, animal health and crop protection, maintenance, repairs and farm feed.

<sup>1</sup> See Appendix A for definitions of different price indices.

All of the indices show an increasing trend over the depicted period. During 2011, most of the prices depicted, except for wheat and fertiliser, reached or surpassed the levels seen during the 2008 peak.

During 2011, world production of grains decreased by 2.6 % and world demand increased by 0.9 % leading to lower closing stocks and increased commodity prices.

Global financial concerns continued to make for uncertain trading conditions. The world demand for oil exceeds the world supply of oil and the crude oil price also increased significantly, leading to an increase in the fertiliser prices.



**Figure 2: Trends in the PPI-Maize and PPI-Wheat versus selected intermediate inputs**

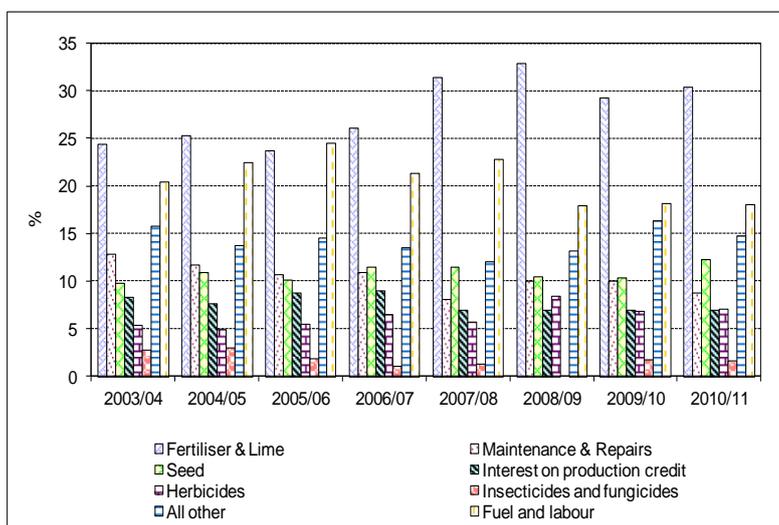
Source: DAFF, 2012

### Contribution of different variable input cost items to the total variable input cost of maize

The main focus of this section is on the variable costs to produce maize<sup>2</sup> and, specifically, to express different variable input cost items as a percentage of the total variable input costs (see Appendix B for the different input cost components included in a typical input cost budget for maize). Due to the many different input cost items included, their relative contribution to the total variable cost and the format in which this information is generally available, it was necessary to aggregate certain variable inputs into an “All other” category (see Appendix C for existing “Other cost” and “All other” cost items).

Figure 3 shows the average percentage contribution of selected variable input costs to the total variable input cost in the maize production regions mentioned in footnote 3. For the period under consideration, fertiliser and lime contributed almost 28% to the total variable input cost (between 24% and 33%).

Maintenance and repairs contributed 10% and showed a declining trend in terms of its relative contribution to the total variable input cost. Seed cost showed an increase in its relative contribution to the total variable input cost, while the cost for herbicides remained more or less 6% of the total variable input cost. Fuel and labour contributed, on average, 21% to the total variable input cost.



**Figure 3: Average percentage contribution of individual variable cost items to the total variable input cost<sup>3</sup>**

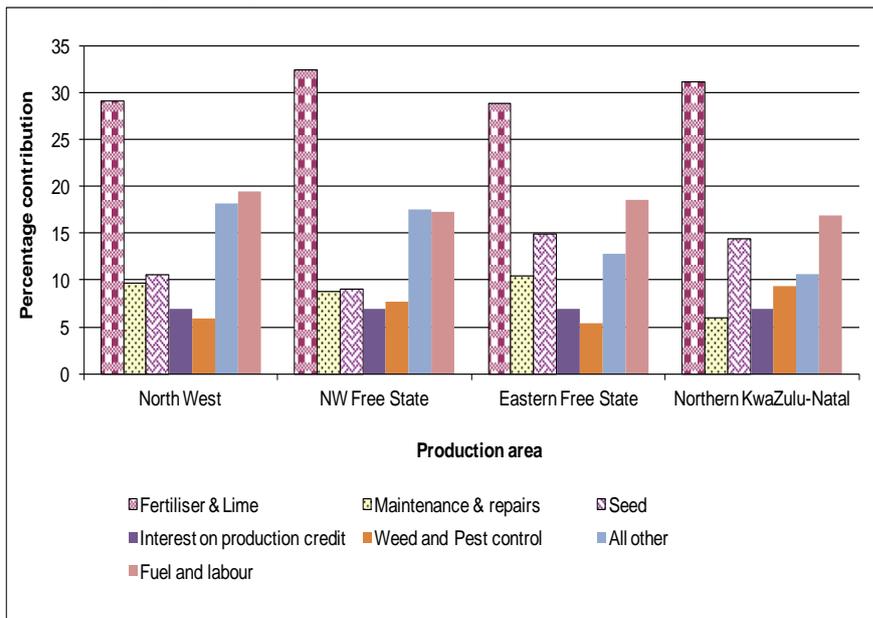
Source: Grain SA, 2012 and own calculations

**Note that the insecticides and fungicides were included with herbicides for 2008/09.**

<sup>2</sup> For maize, the variable input cost information was available for six summer production areas. These are the North West Province, North-Western and Eastern Free State, Northern KwaZulu-Natal, and Middelburg and Ermelo in Mpumalanga.

<sup>3</sup> From 2009/10 for four areas, from 2003/04 to 2008/09 for six areas; in 2002/03 for five areas; in 2001/02 for four areas; and in 1999/00 for three areas. Information for 2011/12 was not available during the preparation of this report.

Comparing the variable input cost items per production region for the 2010/11 production season, producers in the NW Free State region had the largest expenditure on fertilisers, i.e. fertilisers contributed 32.5 % to the total variable input cost, followed by those of Northern KwaZulu-Natal (see Figure 4). In the Eastern Free State region, expenditure on fertilisers was the lowest, contributing 29 % to the total variable input cost. In Northern KwaZulu-Natal, the seed cost, as a percentage of the total variable input cost, was the highest, while it was lowest in the NW Free State. The maintenance and repair cost, as a percentage of the total variable input cost, was highest in the Eastern Free State and the North West regions, while it varied between 5.9 % and 8.9 % contribution to the total variable input cost in the other production areas.



**Figure 4: Comparison of the contribution of different variable input cost items to the total variable input cost in different maize production regions (2010/11)**

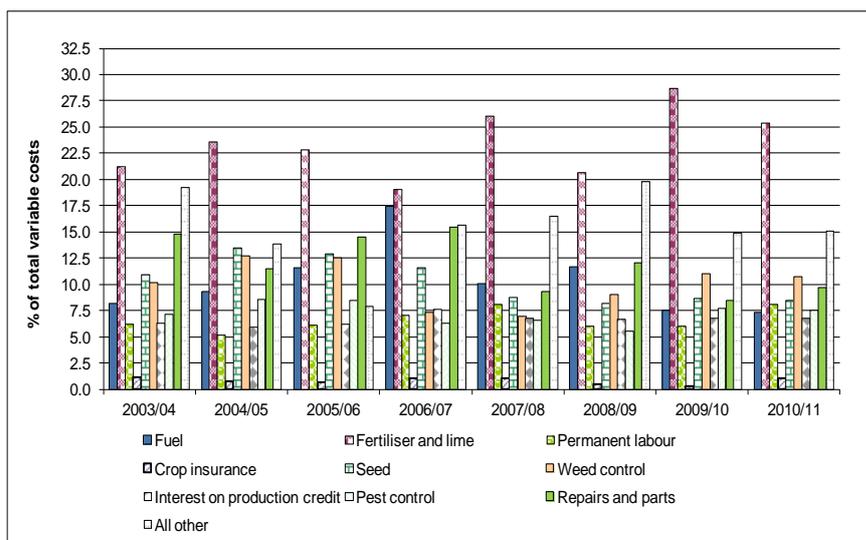
Source: Grain SA, 2012 and own calculations

#### Contribution of different variable input cost items to the total variable input cost of wheat<sup>4</sup>

Figures 5a, 5b and 5c show the average percentage contribution of selected variable input costs to the total variable input cost in each of the following wheat production regions, respectively: the Southern Cape, the Swartland (the western part of the Western Cape) and the North West Free State.

For the period under consideration, fertiliser and lime contributed between 20 % and 29 % to the total variable input cost. Repairs and parts contributed between 9 % and 13 % to the total variable input cost. The seed cost contributed about 9 % to the total variable input cost, while the cost for herbicides was between 4 % and 7 % of the total variable input cost. Fuel contributed between 11 % and 16 % and labour between 6 % and 8 % to the total variable input cost.

From Figure 5a, it is evident that fertiliser and lime contributed most to the total variable input cost, with 25.4 % during 2010/11 in the Southern Cape production region. The contribution of permanent labour to the total variable input cost increased the most from 2003/04 to 2010/11, by 29.3 %, followed by the cost of fertiliser and lime, which increased by 19.4 %.

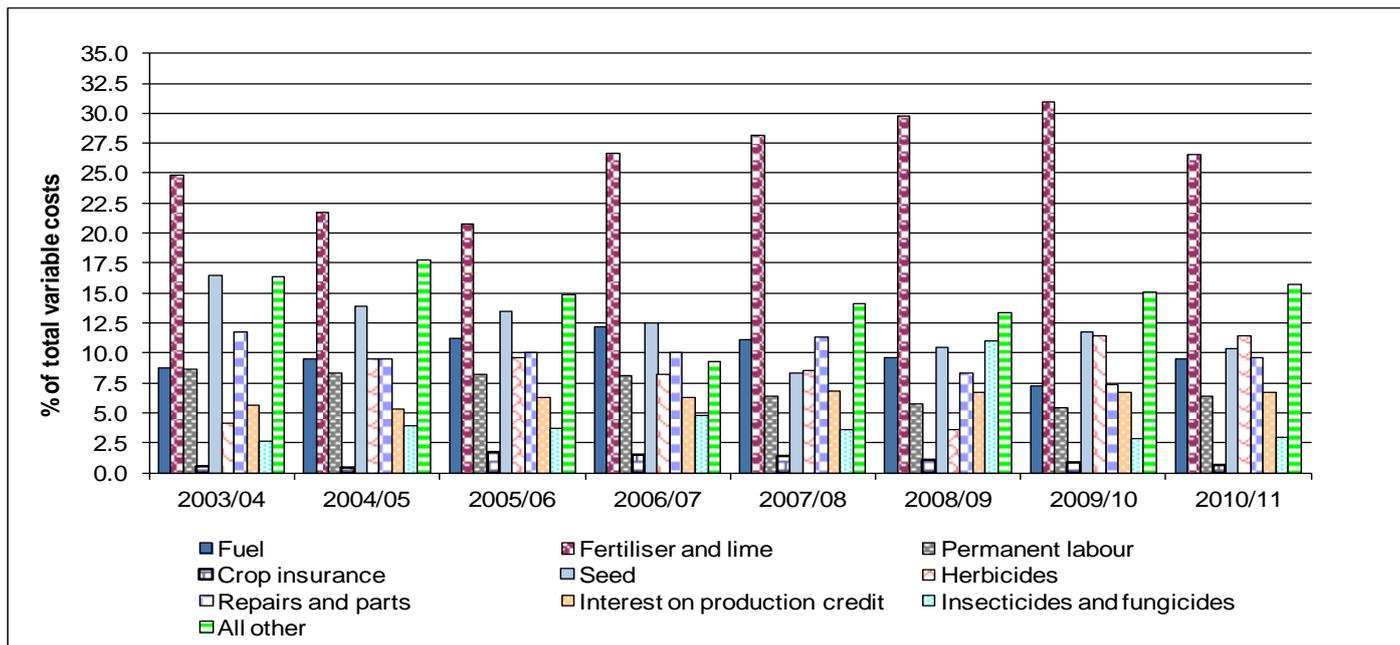


**Figure 5a: Percentage contribution of individual variable cost items to the total variable input cost (Southern Cape)**

Source: Grain SA, 2012 and own calculations

<sup>4</sup> The methodology for wheat is the same as for maize; please refer to Appendix B.2 and C for detail on the budgets.

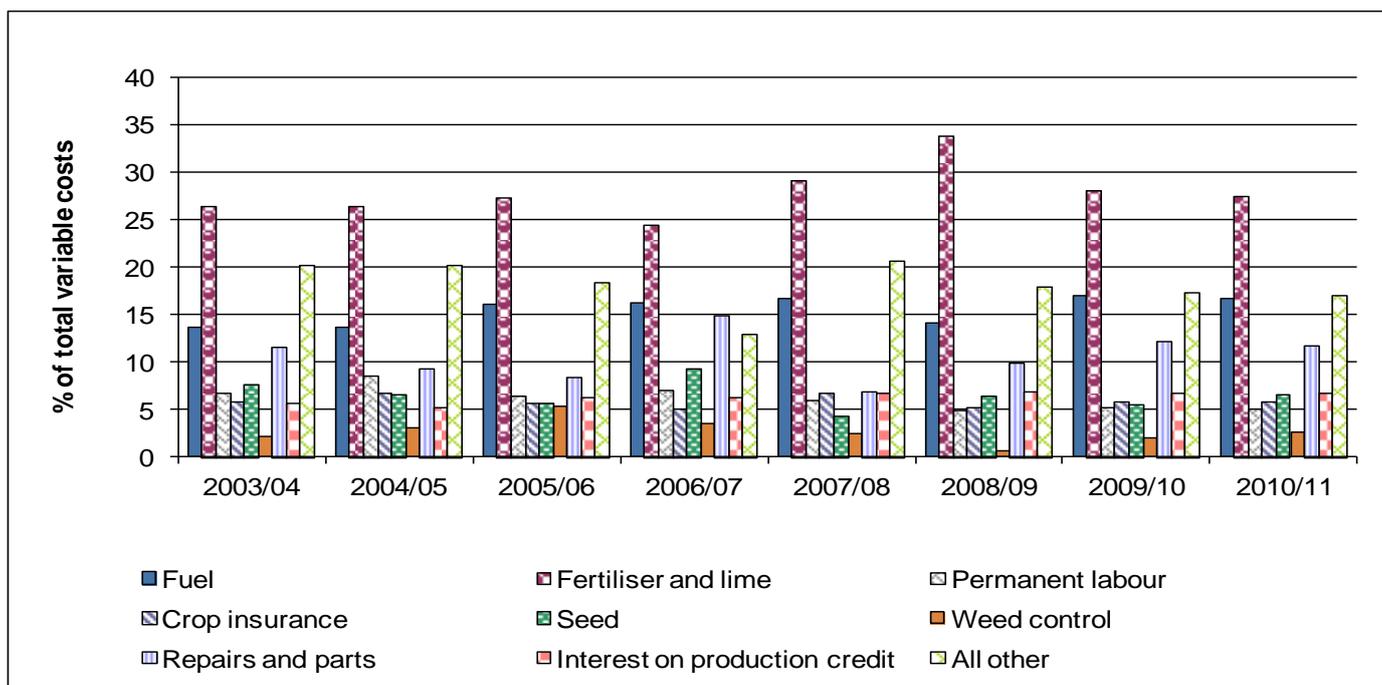
Figure 5b shows the contribution of individual variable input cost items to the total variable input cost in the Swartland production area. The cost of fertiliser and lime contributed the most to the total variable cost during the depicted period and varied between 24.8 % in 2003/04 and 26.6 % during 2010/11. The contribution of the cost of herbicides to the total variable cost increased by 171.2 % from 2003/04 to 2010/11.



**Figure 5b: Percentage contribution of individual variable cost items to the total variable input cost (Swartland)**

Source: Grain SA, 2012 and own calculations

Figure 5c shows the contribution of individual variable input cost items to the total variable input cost in the North West Free State production region. The cost of fertiliser and lime contributed the most to the total variable input cost during the depicted period and varied between 26.5 % in 2003/04 and 27.5 % during 2010/11. The contribution of the fuel cost to the total variable cost increased from 20.4 % to 21.8 %. The relative contribution of permanent labour changed from 6.8 % to 5 % over the depicted period.



**Figure 5c: Percentage contribution of individual variable cost items to the total variable input cost (North West Free State)**

Source: Grain SA, 2012 and own calculations

## Changes in fertiliser prices<sup>5</sup>

The South African fertiliser industry is fully exposed to world market forces in a totally deregulated environment, with no import tariffs or government sponsored measures. The local demand for fertiliser is in the region of 2 million physical tons; this amounts to approximately 750 000 tons of plant nutrient (N + P<sub>2</sub>O<sub>5</sub> + K<sub>2</sub>O). Table 1 shows the South African fertiliser demand, domestic production and import situation.

**Table 1: The South African fertiliser demand, domestic production and imports**

Nutrient	Demand ('000 t)	Domestic production ('000 t)	Imports ('000 t)	Products
Nitrogen (N)	400	250	150	Mostly Urea
Phosphate (P <sub>2</sub> O <sub>5</sub> )	200	Over 75 % of demand	<25 % of demand	Mostly DAP
Potassium (K <sub>2</sub> O)	160	None	All	Mostly MOP

Source: FSSA, 2010

South Africa is a net importer of potassium and imports approximately 40 % of its nitrogen requirements. Thus, the domestic prices are severely impacted by international prices of raw materials and fertilisers as well as shipping costs and the Rand/\$ exchange rate.

Figures 7 to 9 compare domestic and international price trends (expressed as indices: 2005 = 100) for fertilisers over the period of 1997 to 2011. All of the local prices are listed prices, excluding VAT and transport to the farm. It should be noted that the international prices were expressed in R/ton before they were converted into an index. In addition, the product is not at South African harbours, thus the international prices depicted exclude the cost, insurance and freight needed to land the product in South Africa. Furthermore, international FOB prices used differ from the usual port of origin for imports, but trends and general price levels are similar.

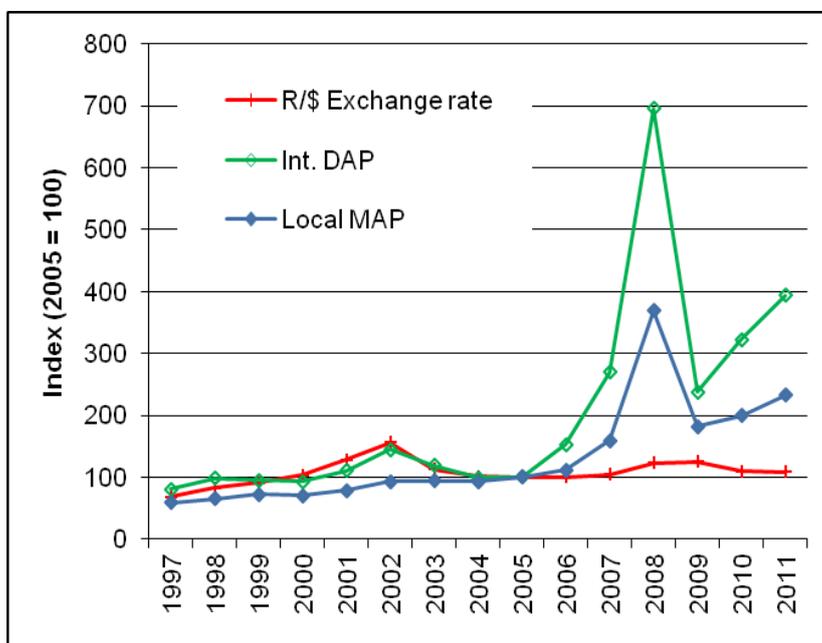
In Figure 6, the price movement of the local MAP price is compared with the price movement of the international DAP price<sup>6</sup>.

Price increases for the items depicted were as follows between **1997** and **2011**:

- Local MAP: 290.2 % increase
- International DAP: 385.8 % increase

From **2010** to **2011**, the following changes in prices occurred:

- Local MAP: 16.6 % increase
- International DAP: 21.9 % increase
- White maize (SAFEX): 58.2 % increase
- Wheat (SAFEX): 24.7 % increase
- R/\$ exchange rate: 1.3 % appreciation



**Figure 6: Local MAP compared with international DAP**

Source: Grain SA, 2012 and own calculations from listed prices

<sup>5</sup> For comprehensive information on fertiliser, please refer to Value chain study of the South African fertiliser industry on [www.namc.co.za](http://www.namc.co.za)

<sup>6</sup> The international DAP price is FOB, US Gulf in bulk. This comparison is made because both are a source of phosphate, although of different composition.

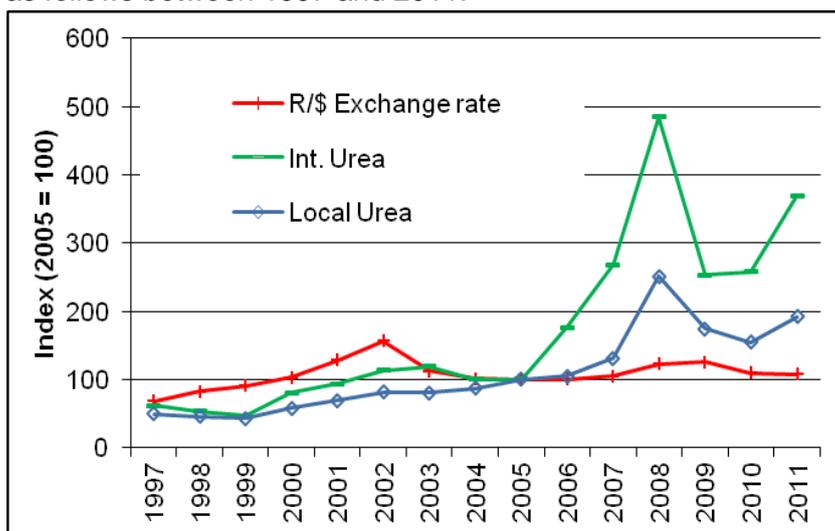
Figure 7 shows the price movements of local urea in comparison with the price movements of international urea<sup>7</sup>.

Price increases for the items depicted were as follows between 1997 and 2011:

- Local urea: 282.5 % increase
- International urea: 501.3 % increase

From **2010 to 2011**, the following changes in prices occurred:

- Local urea: 24.3 % increase
- International urea: 43.6 % increase
- White maize (SAFEX): 58.2 % increase
- Wheat (SAFEX): 24.7 % increase
- R/\$ exchange rate: 1.3 % appreciation



**Figure 7: Local urea compared with international urea**  
Source: Grain SA, 2012 and own calculations from listed prices

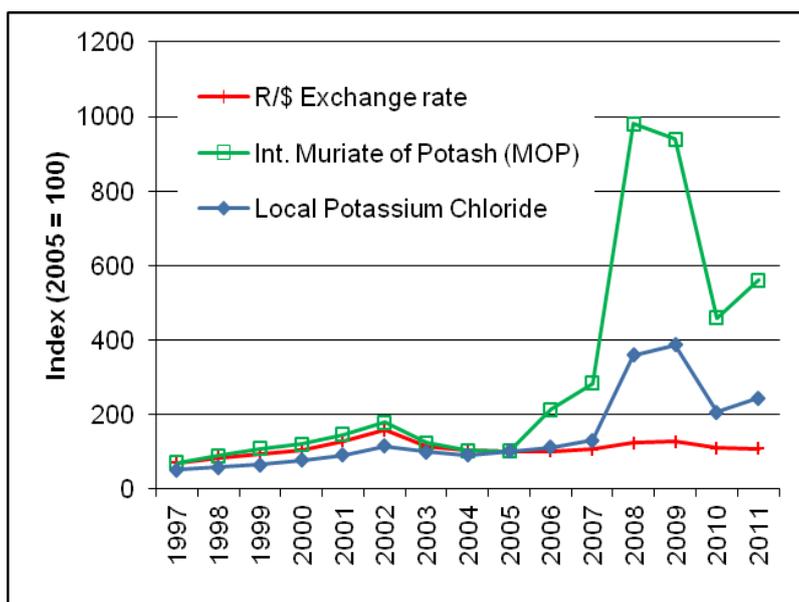
Figure 8 shows the price movements of local potassium chloride in comparison with price movements of international muriate of potash (MOP)<sup>8</sup>.

Price increases for the items depicted were as follows between 1997 and 2011:

- Local Potassium chloride: 382 % increase
- International MOP: 715.5 % increase

From **2010 to 2011**, the following changes in prices occurred:

- Local Potassium chloride: 18.6 % increase
- International MOP: 22.4 % decrease
- White maize (SAFEX): 58.2 % increase
- Wheat (SAFEX): 24.7 % increase
- R/\$ exchange rate: 1.3 % appreciation



**Figure 8: Local Potassium chloride compared with international Muriate of Potash (MOP)**  
Source: Grain SA, 2012 and own calculations from listed prices

<sup>7</sup> The international urea price is FOB, Eastern Europe in bulk. Although most urea is imported from the Arab Gulf, prices show the same movement but at slightly different levels.

<sup>8</sup> The international muriate of potash (MOP) price is FOB, CIS in bulk. Although most muriate of potash is imported from Vancouver and Israel, prices show the same movement but at slightly different levels.

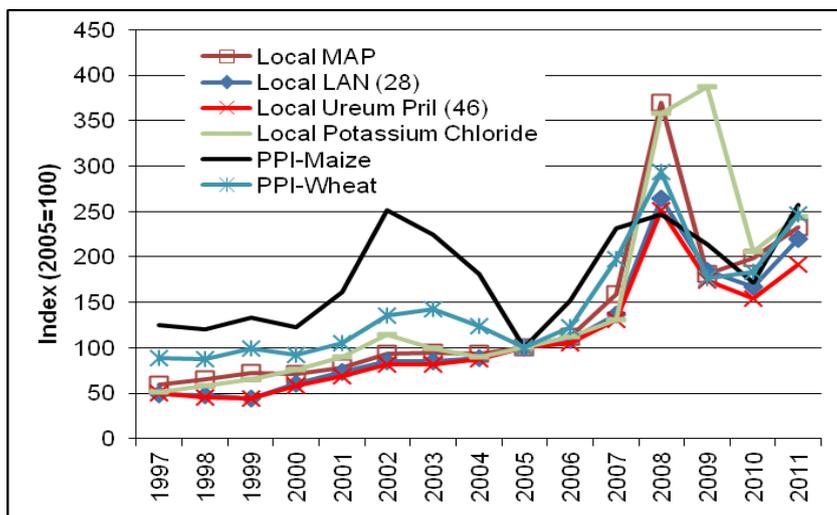
This section compares local fertiliser price changes for various selected fertilisers. To ensure easy interpretation of the data presented, price movements of only the local market of the identified fertilisers are presented in Figures 9 and 10. The PPI-Wheat and PPI-Maize are also included.

Figure 9 shows that the trends for the items represented are generally upward.

Price increases for the items depicted were as follows between **2010** and **2011**:

- Local MAP: 16.6 % increase
- Local LAN (28): 31.4 % increase
- Local Urea: 24.3 % increase
- Local Potassium chloride granular: 18.6 % increase
- PPI-Maize: 49.4 % increase
- PPI-Wheat: 35 % increase

The 2011 prices are still higher than the 1997 levels.



**Figure 9: Price indices for different fertiliser products compared to the PPI-Wheat and PPI-Maize**

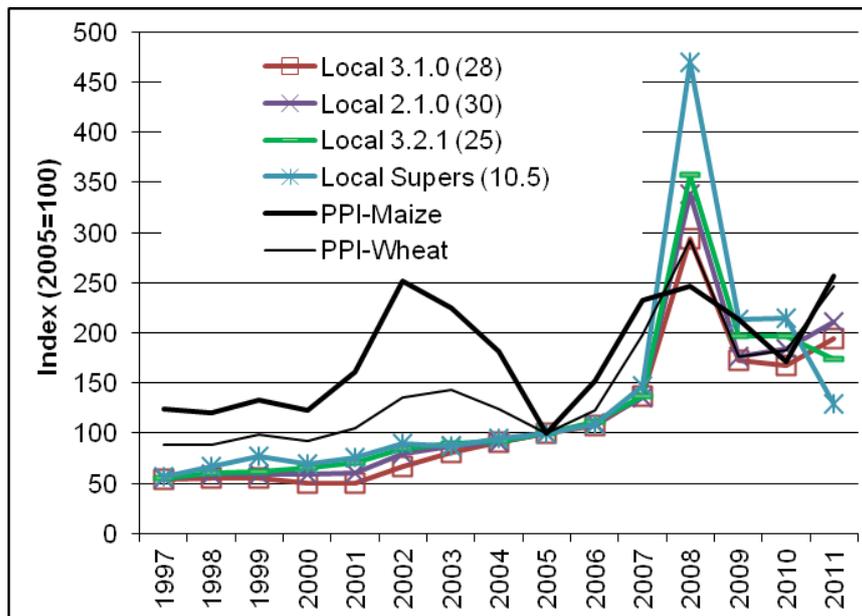
Source: DAFF, 2012 and own calculations from listed prices

Figure 10 shows that the trends for the items represented are also generally upward.

Price increases for the items depicted were as follows between **2010** and **2011**:

- Local 3.2.1 (25): 11.4 % decrease
- Local 2.1.0 (30): 14.9 % increase
- Local 3.1.0 (28): 15.9 % increase
- Local Supers (10.5): 40.1 % decrease
- PPI-Maize: 49.4 % increase
- PPI-Wheat: 35 % increase

The 2011 prices are still higher than the 1997 levels.



**Figure 10: Price indices for different fertiliser products compared to the PPI-Wheat and PPI-Maize**

Source: DAFF, 2012 and own calculations from listed prices

## Changes in maize and wheat seed prices<sup>9</sup>

The differences between cultivars of the various seed companies make it difficult to compare and construct a seed “basket”. Hence, the information depicted in Figure 12 provides only a general trend.

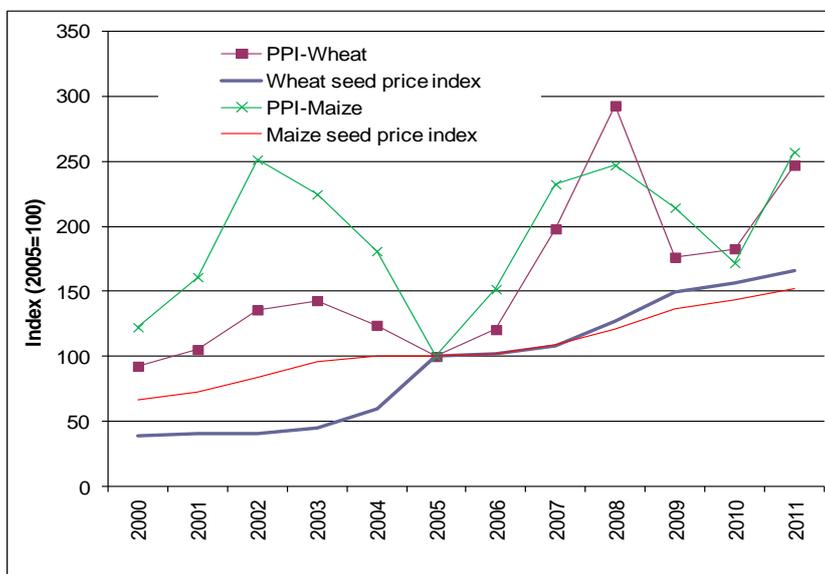
Figure 11 shows the PPI-Maize, PPI-Wheat and the maize and wheat seed price indices.

Price increases were as follows for the items depicted between **2000 and 2011**:

- Wheat seed price index: 326.5 % increase
- PPI-Wheat: 166.5 % increase
- Maize seed price index: 126.8 % increase
- PPI-Maize: 109.8 % increase

From **2010 to 2011**, the following changes in prices occurred:

- Wheat seed price index: 6.1 % increase
- PPI-Wheat: 35.1 % decrease
- Maize seed price index: 6 % increase
- PPI-Maize: 49.5 % decrease



**Figure 11: Average price movements for maize seed, wheat seed and maize and wheat PPI**

Source: PPI-Maize and PPI-Wheat (DAFF, 2012); Seed price indices (Grain SA) and own calculations, 2012

## Changes in tractor prices

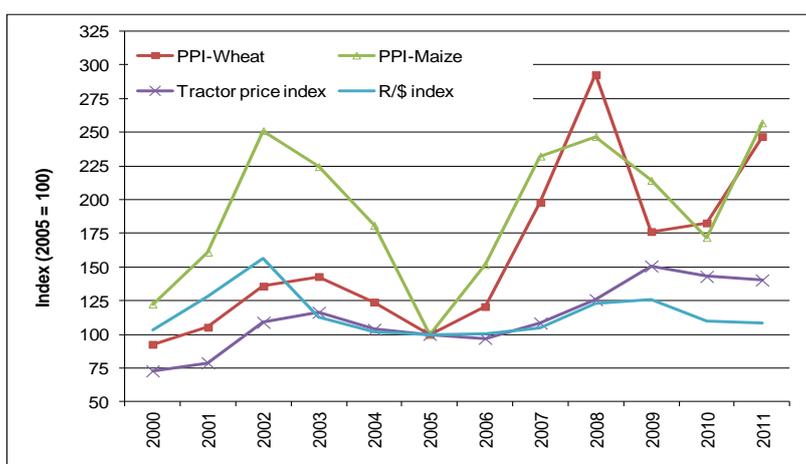
Figure 12 shows the price index for tractors<sup>10</sup>, PPI-Maize, PPI-Wheat and the R/\$ index.

Price increases for the items depicted were as follows between **2000 and 2011**:

- Tractor price index: 92.4 % increase
- PPI-Wheat: 166.5 % increase
- PPI-Maize: 109.8 % increase
- R/\$ index: 4.6 % appreciation

From **2010 to 2011** the following changes in prices occurred:

- Tractor price index: 1.9 % decrease
- PPI-Wheat: 35.1 % increase
- PPI-Maize: 49.5 % increase
- R/\$ index: 1.3 % appreciation



**Figure 12: Average price movements for tractors, wheat and maize**

Source: PPI-Maize and PPI-Wheat (DAFF, 2012); Tractor price index (Grain SA) and own calculations, 2012

<sup>9</sup> Refer to previous Input Cost Monitor: The Story of Maize and Wheat on [www.namc.co.za](http://www.namc.co.za) for more background information on seed.

<sup>10</sup> Recommended retail prices, excluding personal discounts.

## Changes in fuel prices

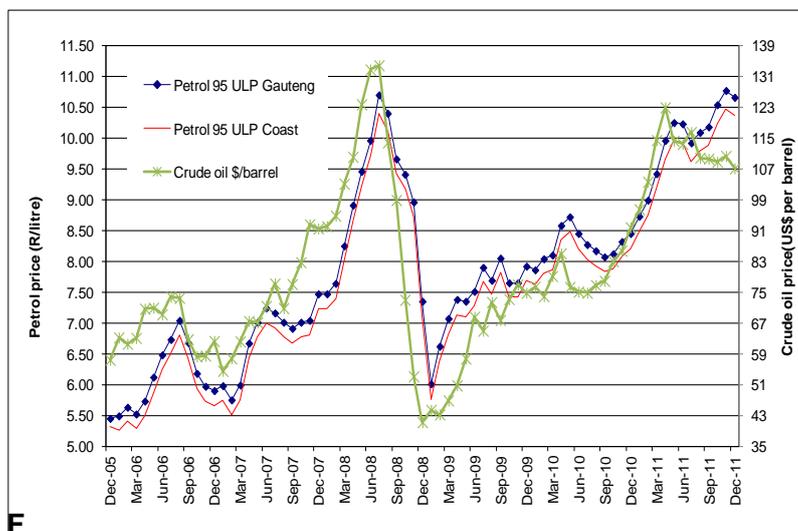
Figure 13 shows the prices of petrol 95 ULP Gauteng, petrol 95 ULP Coast and crude oil from December 2005 to December 2011.

Price increases for the items depicted were as follows between **December 2005 and December 2011**:

- Petrol 95 ULP Gauteng: 95.6 % increase
- Petrol 95 ULP Coast: 94.7 % increase
- Crude oil: 86.6 % increase

From **December 2010 to December 2011**, the following changes in prices occurred:

- Petrol 95 ULP Gauteng: 26.2 % increase
- Petrol 95 ULP Coast: 26.2 % increase
- Crude oil: 16.7 % increase



**Figure 13: Petrol and crude oil prices**

Source: South African Petroleum Industry Association (SAPIA), 2012

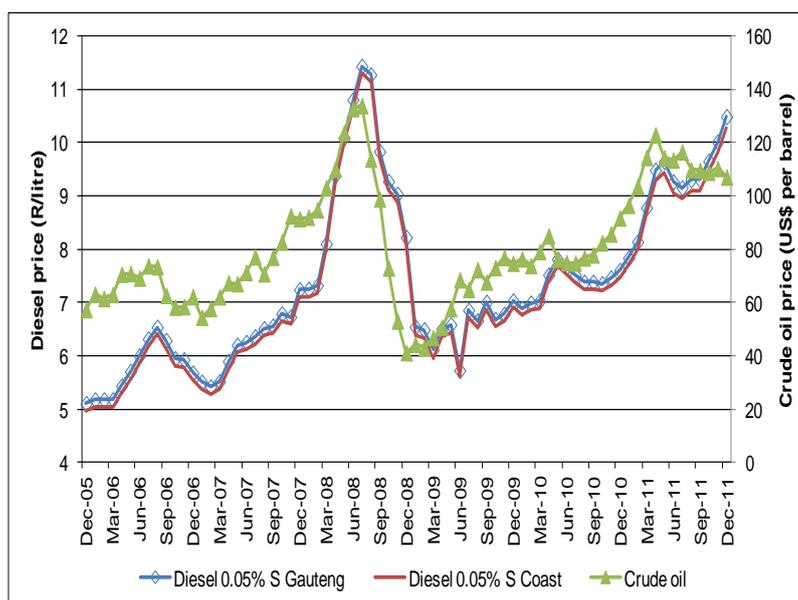
Figure 14 shows the prices of diesel 0.05% S. Gauteng, diesel 0.05% S. Coast and crude oil from December 2005 to December 2011.

Price increases for the items depicted were as follows between **December 2005 and December 2011**:

- Diesel 0.05% S. Gauteng: 105.3 % increase
- Diesel 0.05% S. Coast: 106.6 % increase
- Crude oil: 86.6 % increase

From **December 2010 to December 2011**, the following changes in prices occurred:

- Diesel 0.05% S. Gauteng: 37.9 % increase
- Diesel 0.05% S. Coast: 37.7 % increase
- Crude oil: 16.7 % increase



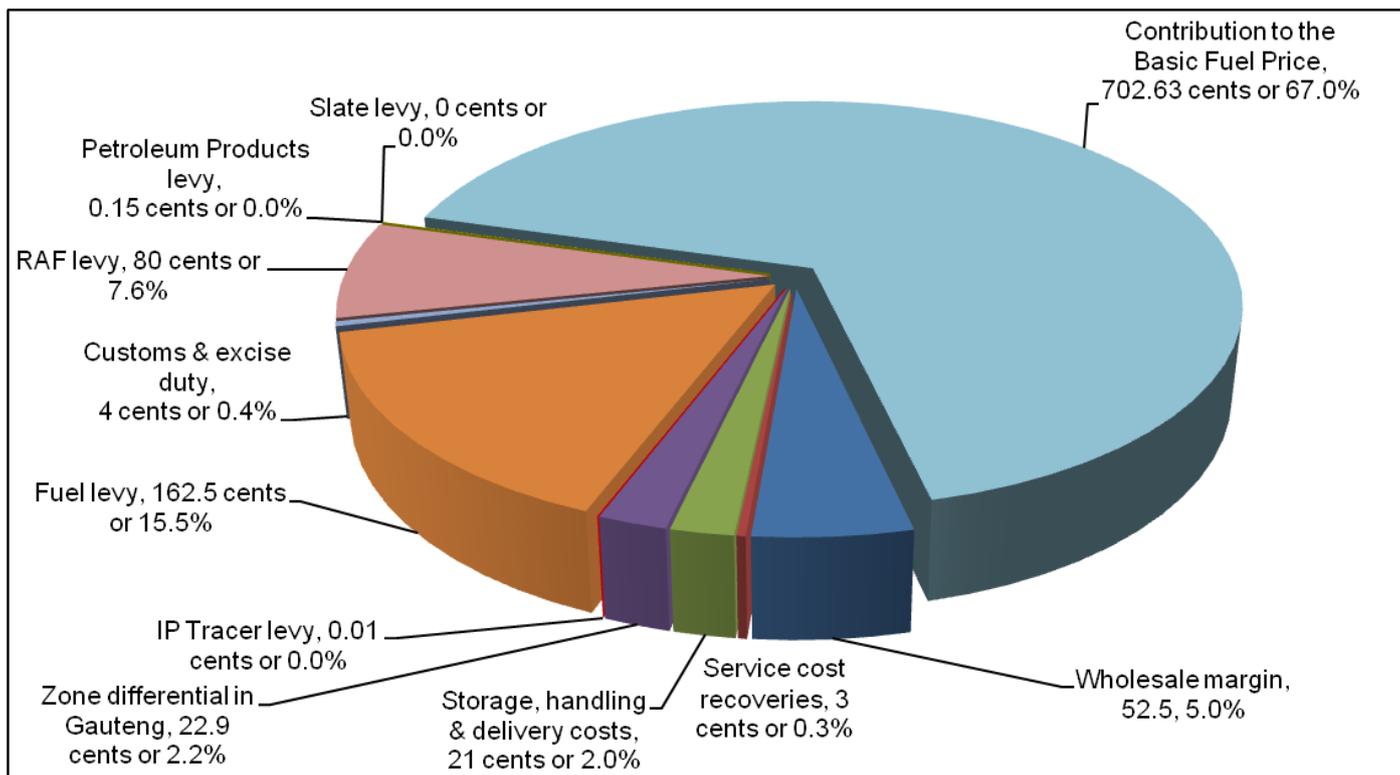
**Figure 14: Diesel and crude oil prices**

Source: South African Petroleum Industry Association (SAPIA), 2010

The fuel price in South Africa is linked to the international price of crude oil and is quoted in US dollars (US\$) per barrel. Crude oil prices and the Rand/Dollar exchange rate therefore have a major impact on fuel prices (Department of Minerals and Energy, 2008). The fuel pump price is made up of certain international and domestic price elements. The international element, or Basic Fuel Price (BFP), is based on the import parity principal (the cost incurred by a South African importer of fuel to buy the fuel from an international refinery, transport the product from that refinery, insure the product against losses at sea, and land the product on South African shores). To arrive at the final pump price in the different pricing zones (magisterial district zones), certain domestic transport costs, government imposts (or taxes and levies) and

retail and wholesale margins need to be added to the international price. The government regulates the petrol retail price. The Central Energy Fund (CEF) is responsible for the price calculation (on behalf of the Department of Minerals and Energy). Changes in margins and the transport element are based on actual costs incurred by the South African industry and are calculated according to a formula approved by the Minister of Minerals and Energy (iFleet, 2007).

During December 2011, the wholesale price for Diesel 0.005 % S was 1 048.69 cents per litre. The Basic Fuel Price amounted to 702.63 cents per litre. Figure 15 shows the breakdown of the other 346.06 cents per litre. The wholesale price of diesel is regulated, but the retail price is not. Farmers qualify for a fuel rebate of 142 cents per litre (April 2011) on 80 % of their consumption, which is calculated as follows: The RAF (Road Accident Fund) levy (80 cents per litre) plus 40 % of the fuel tax (62 cents per litre).



**Figure 15: Breakdown of (Gauteng) diesel wholesale price: 1 048.69 c/l in December 2011 (0.05 % sulphur content) – price (c/l); percentage (%) of total price**

Source: Department of Energy, 2012

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## Appendix A: Definitions of different price indices

FRPI-Total includes price indices for machinery and implements, materials for fixed improvements and intermediate goods. The latter includes fertiliser, fuel, farm feed, animal health and crop protection, packing material, and maintenance and repairs.

PPI-Total includes indices of producer prices of field crops, horticulture and animal production.

PPI-Field crops include indices of producer prices for summer grains, winter grains, oilseeds, sugarcane, hay, dry beans, cotton and tobacco.

PPI-Maize is the price index for producer prices for maize.

PPI-Wheat is the price index for producer prices for wheat.

## Appendix B: Composition typical of production costs

Table B.1 shows the different input cost components included in a typical input cost budget. The focus of this report is on the variable cost component only.

Table B.1: Input cost components

<b>Variable cost</b>	<b>Capital cost</b>
Seed	Machinery and equipment:
Fertiliser and lime	Depreciation
Herbicides	Interest
Insecticides and fungicides	Fixed improvements:
Fuel	Interest
Maintenance and repairs	Depreciation
Crop insurance	Repairs and maintenance
Casual labour	
Marketing cost	
Drying and cleaning cost	
License and insurance	
Permanent labour	
Interest on production credit	
Contract work	
Other cost	

Table B.2 shows the different input cost components included in a typical input cost budget for wheat. The focus of this report is on the variable cost component only.

Table B.2: Input cost components

<b>Variable cost</b>	<b>Capital cost</b>
Seed	Machinery and equipment:
Fertiliser and lime	Depreciation
Herbicides	Interest
Insecticides and fungicides	Fixed improvements:
Fuel	Interest
Maintenance and repairs	Depreciation
Crop insurance	Repairs and maintenance
Casual labour	
Marketing cost	
Drying and cleaning cost	
License and insurance	
Permanent labour	
Interest on production credit	
Contract work	
Other cost	

### **Appendix C: “Other cost” & “All other” cost items**

The “other cost” category includes banking fees, printing and stationary, donations, water and electricity, telephone and auditing costs.

The “All other” cost category includes the costs of crop insurance, marketing, drying and cleaning, license and insurance, and contract work.