



energy

Department:
Energy
REPUBLIC OF SOUTH AFRICA

PROJECT RESEARCH PHASE REPORT

MARKET ASSESSMENT OF RESIDENTIAL AND SMALL COMMERCIAL AIR CONDITIONERS IN SOUTH AFRICA

Final Draft – 8 February 2019



INTEGRATED
ENERGY
SOLUTIONS

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Abbreviations

Consultants – Refers to the contracted consulting company Integrated Energy Solutions and their partners Eighty20

DoE – South African Department of Energy

EER – Energy Efficiency Rating

GEF – Global Environment Facility

LCC – Life Cycle Costing

MEPS – Minimum efficiency performance standards

NRCS – National Regulator for Compulsory Specifications

RFP – Request for Proposal

UNDP – United Nations Development Programme

LOA – Letter Of Authority

BTU – British Thermal Unit

BTU/hr – British Thermal Unit per hour

COP – Coefficient of Performance

1. Introduction

Report purpose and objective

This air conditioner market research report has been prepared as an interim step in the overall project entitled “A Market Assessment of Residential and Small Commercial Air Conditioners in South Africa”. The market research phase has included quantitative research undertaken at a retailer and supplier level, plus qualitative interviews with the main industry players. Next air conditioner user usage trends were investigated, and the overriding legislative and regulatory regime was assessed.

General project background

Given the significant use of electricity in South African households (17% of GWh’s generated), Department of Energy (DoE) policy has targeted the adoption of energy efficient appliances to reduce both electrical demand (MW) and electrical usage (GWh) with associated amelioration of the countries carbon footprint. To this end the Department of Energy (DoE) in collaboration with the Department of Trade and Industry and donor partners GEF, UNDP have introduced appliance minimum efficiency performance standards (MEPS) and an associated appliance labelling scheme covering 12 appliances. This programme was launched in May 2016.

The broad programme objective is to remove inefficient appliances from the South African market and encourage adoption of efficient technologies. Setting minimum standards and associated educational labelling is being augmented by market interventions to accelerate the take up of more efficient electrical appliances.

With the air conditioning suppliers having implemented the new standards for two years, a market assessment of residential and small commercial air conditioners in South Africa is needed. This assessment will provide an insight into how much the industry has moved and will be the basis upon which the initial air conditioners MEPS and labelling activities can be assessed, refined and augmented to further increase their impact.

Original project objective

Overall the project can be summarised from the Request for Proposal as:

Air conditioners (ACs) are among the most energy intensive products available in the market and are typically used in residential homes, commercial buildings such as offices and shopping malls as well as manufacturing premises in industrial buildings. Understanding AC’s market penetration, characteristics and energy usage is therefore necessary in determining the appropriateness of measures /interventions for market transformation. The purpose of this study is to uncover the current market trends of ACs in South Africa and identify the main market barriers that limit the penetration of more efficient ACs as well as suitable measures/interventions. The study will compare the results of the study with international best practices and recommend regulatory and non-regulatory measures/interventions to advance market transformation of ACs sold in South Africa.

Market research phase

From the inception report the following market research outputs were agreed.

Market information on the current air conditioning supply industry, through both desk research and direct consultations;

- a. General industry communication that the study is underway
 - A letter from DoE will be obtained that states that the project is underway and requests industry support.
 - Communicate with the air conditioning industry, via South African Air-conditioning Suppliers Association, briefing them on the project purpose, type of information that will be gathered etc.
- b. Quantitative research – an industry snap shot producing representative numerical values
 - Utilise existing databases for information; general AC listing, plus NRCS registered units.
 - Information to be gathered; Model/make, type (split/window/free standing), branding, rating (cooling, electrical), EER (heating/cooling), Refrigerant, Inverter Y/N, NRCS registered, Eff Label yes/no, country of origin, Unit price (with installation costs), LCC calculated, and then the # number sold per year.
 - Overall units imported per year as a reference check.
 - Store Audit to determine product lines, prices and market sales trends.
- c. Qualitative research – obtaining the trends behind the facts
 - Market arrangements from manufacturers, importers through to sellers and installers
 - Profile of purchase decision-makers, what they look at, what is important, level of understanding etc.
 - General reaction to the MEPS & Labelling programme; experiences, concerns, compliance issues/experiences, how do we improve/increase eff levels etc. Of course, additional questions will emerge during the interviews.
 - Store/installer interviews with staff to obtain information
 - Actual interviews will be limited to 12 detailed interviews and 10 outlet visits
- d. Additional notes on market interactions:
 - Stakeholder consultations with supply chain representatives and industry associations detailing the project purpose and scope as well as informing them of research that will be taking place.
 - Much of the information will need to be obtained through direct engagement with the air conditioner supply industry. To this end official introduction by the Department of Energy in the form of an introductory letter is critical for the research to establish credibility.
 - Detailed retail level survey of wholesalers, retail outlets, shops, and other point-of-purchase-markets: what product lines are being offered, prices, and market & sales trends? Noting product ranges product information, any efficiency labelling and interviews of staff to determine the nature of the customers purchasing, purchasing trends and insights. Obtaining listings of recent purchases and sales records will be beneficial for feedback interviews.

- Structured interviews with locally based manufacturers and importers on the nature of the industry, mark ups, trends, and their views on energy efficiency appliances, ideas and key drivers to create a shift to sales of these appliances.
 - Write up of the data in a suitable framework and extraction of the first level market intelligence.
- e. *Usage information*, on how end users operate the appliance:
- Engage with Eskom and other institutions who have undertaken research on the use of air conditioners in terms of load profiles, annual usage etc. Needs to be in the past few years, covering both summer and winter usage.
 - Validate the levels of usage by limited “dip stick” samples of 5 telephonic interviews for 5 market segments.
 - Write up of the data and extraction of the first level usage intelligence.
- f. *Regulatory understanding*, through:
- Obtain copies of the all regulation related to the sale and installation of air conditioners for the residential and commercial market.
 - Write up of an interpretation of their impact on the sale of appliances.
- g. Data analysis
- Quantitative research – an industry snap shot producing representative numbers
 - All variables such as type, rating, refrigerant ... by market volume
 - Customer usage trends
 - Relationship between EER and price, plus LCC
 - Comments on all the above trends
 - Qualitative research findings – observations
 - Write up of current industry structure
 - Current opinions and thoughts on the Efficient Appliance programme by industry
 - Purchase patterns and consumer realities
- h. Preparation of an *Interim Report* for circulation to the Project Manager and Project Management Team.

2. Research methodology and application

2.1. Quantitative research

Research process

The quantitative research process began with desk research to identify the best available data of air conditioning models in South Africa. The NRCS database was leveraged as it was indicated to be the best available source of data on current air conditioning models sold in South Africa. The NRCS mandate is to provide an Letter Of Authority (LOA) to an importer for each model imported into the country, this is to ensure that the model meets all regulatory frameworks and can be sold legally in the Republic. The initial NRCS data shared indicated that there were 141 air conditioner models that were recorded as energy efficient.

As a next step, the research team went into the field to identify key outlets for air conditioner sales in South Africa. The initial plan was to conduct ten store audits; five of these would be among consumer retailers and the remaining five would be among supplier-installers. However, after the fieldwork exercise begun, it was observed that the initial 10 outlets were not sufficient to capture more of the market, as each store did not have a large selection of models. As a result, additional locations needed to be audited. In the end, 25 stores were audited and within these stores a total of 199 models were found. The initial 141 models observed in the NRCS database were supplemented with 58 models from fieldwork.

With this discrepancy noted, Eighty20 set out to verify the existence of these additional models with the NRCS. A full database of air conditioners (large commercial, small commercial and residential) was found on the NRCS website. This database contained some 793 air conditioners, but only 238 were identified as being small commercial or residential models. Within these 238 models 149 were found in the stores during the audit, leaving 50 models existing in field but not represented in the NRCS database. It is uncertain how these models have made it into the country without an LOA document attached.

The next step was to determine the total market size using the South African Revenue Service Trade Database. This database was leveraged as no local manufacturers of small commercial or residential air conditioners were observed in the market. This database refers to all legal imports into South Africa. The RFP speaks to 7.1kW models, but as there is no definitive data for 7.1 kW models, the best assumption was to use 8.8 kW units.

The Harmonized Commodity Description and Coding System (HS code) of the tariff nomenclature is an international standardised system of names and numbers for the classification of commodities.

Below are the HS codes used during this project, pertaining to Air Conditioners with a cooling capacity of less than 8.8kW (8415.10 - *Of a kind designed to be fixed to a window, wall, ceiling or floor, self-contained or " split-system "*)

HS Code	Definition
8415.10.10	Of a kind used for buildings, compressor operated, having a rated cooling capacity not exceeding 8,8 kW
8415.10.20	Of a kind used for buildings, not compressor operated, having a rated cooling capacity not exceeding 8,8 kW
8415.10.50	Other, compressor operated, having a rated cooling capacity not exceeding 8,8 kW
8415.10.90	Other

These HS Codes were verified with both the industry and the NRCS to determine that the full market was captured. In order to determine splits between different types, instore staff, supplier-installers, and importers were engaged.

In the previous report commissioned it was noted that “during engagements with the industry it was revealed that the window, console and portable air conditioners are exempted from the MEPS and labelling regulations. Only the wall mounted split type air conditioners with a cooling capacity of 7.1kW (24000 BTU/hr) or lower are being subjected to the energy efficiency regulations. Because of the wording used in the regulation, it is even understood that ceiling mounted split-type air conditioners within the set cooling capacity threshold are also exempted” In the final report this issue will be clarified by the DOE.

Data collected

During the research process the following data points were collected, and included in a datafile.

- | | |
|--|--|
| <ol style="list-style-type: none"> 1. Whether the model was represented in the LOA. 2. The LOA Certificate # 3. Store where it was observed. 4. Brand 5. Supplier Type 6. Supplier 7. Manufacturer 8. Country of Origin 9. Model # 10. Type (Split, Window, Freestanding, Cassette) 11. Purpose (Reverse Cycle/Cooling) | <ol style="list-style-type: none"> 12. Technology (Inverter/Non-Inverter) 13. Size (BTU) 14. Refrigerant Type 15. Heating Output¹ 16. Cooling Output 17. Energy Efficiency Ratio¹ 18. Coefficient Of Performance¹ 19. Annual Energy Consumption¹ 20. LCC² 21. Price¹ 22. Installation Costs¹ |
|--|--|

Research notes

The quantitative research experienced delays owing to limited data and the need to constantly verify data. There currently does not exist any definite database of models that exist in the country. Furthermore, based on the nature of the product sold, it is difficult for the average consumer to determine whether they are indeed receiving an energy efficient air conditioner, as the consumer rarely sees the box the unit comes in.

The major limitation of the quantitative research was the fragmented and incomplete NRCS database, doesn't provide clarity on what is available on the market. Another limitation was the unrealistic assumption of number of store audits needed to size the market. This did not

¹ Where available

² Derived

take into consideration the distribution of air conditioner models and the actual market structure.

The main research lessons learned, and that can be reapplied for future research, would be to increase the number of store audits and potentially leverage the Industry Associations earlier. Once the industry understood the objectives of the project as well as the opportunity it presented to contribute to future discussions on the category, they were enthusiastic about getting involved and contributing to the overall analysis with specific data-examples. Additionally, to engage with the South African Revenue Service earlier in the process in order to determine the market size.

2.2. Qualitative research

As a next step Manufacturer/Importer Interviews were conducted within the industry to refine key hypotheses. The research sought to define the market structure discovered in the quantitative research phase. There were 10 interviews in total and these detailed interviews were used to understand the nature of the industry, mark ups, trends and views on energy rating.

As there are no local manufacturers, the questionnaire focused on organisations involved in the importation of Air Conditioners. The following organisations were interviewed.

	Name	Organisation	Email	Contact #
1	Desmond	FB Air Conditioning	bleuler@iafrica.com	021 982 8951
2	Mfundo Ciko	Fourways Air Conditioning	mfundo@fourwaysaircon.co.za	082 789 1259
3	Marco Ferdinardi	Mitsubishi Electric	marco@msaircon.com	083 700 1171
4	Richard Vermaak	Metra Clark	richard.vermaak@metraclark.co.za	073 801 3143
5	Tommy Gounden	Defy	tommy.gounden@defy.co.za	081 317 7037
6	Clarissa Pillay	Defy	clarissa.pillay@defy.co.za	082 876 2058
7	Neil Moriarty	Imperial	neil@imperialaircon.co.za	083 326 5711
8	Gerhard van Niekerk	Eco Aire	gerhard@ecoaire.com	083 291 3005
9	Naas Massyn	AHI Carrier	naas.massyn@ahi-carrier.co.za	082 809 0198
10	Phillip Theunissen	Metra Clark & Eurocool		082 783 4747

Based on the inception report and project proposal, the focus of the qualitative research would be:

1. Market arrangements from manufacturers, importers through to sellers and installers
2. Profile of purchase decision-makers, what they look at, what is important, level of understanding etc.
3. General reaction to the MEPS & Labelling programme; experiences, concerns, compliance issues/experiences, how do we improve/increase eff levels etc.

The questions which will obtain this information and based on the existing market knowledge will be focused on differing parts of the supply chain where:

- *Importer* – companies that import air conditioners into South Africa. Some are large brands (LG), small single line importers or even retailers who import their own range.
- *Distributor* – companies that warehouse air conditioners and then supply to multiple end suppliers such as installers and retailers.

- *Supplier* – companies and organisations that install AND sell air conditioners.
- *Retailer* – shops that sell air conditioners along with many other products (Makro etc.), separate installation arrangements are made

The final qualitative questionnaire was aligned with the client, based on observations in the quantitative research. The questionnaire follows:

1. Could you give an estimate of how many units are sold for commercial use and how many are sold for residential use
2. Can you confirm our understanding of the market arrangements; importers, distributors and retailers and installer-based selling, how does the market operate?
Importer | Supplier | Distributor
3. What are the typical distribution channels for the products imported? i.e. big retail stores, to a distributor, or directly to end-use clients. – *Importer*
4. For the average air conditioner buyer; technology is difficult to understand. In your experience, is this a fair assessment?
 - i. How does your company address this?
 - ii. Could more be done by an independent body (perhaps an industry association or government) to provide impartial advice and guidance? – *Importer | Supplier | Distributor | Retailers*
5. On average what are the three most important decision-making criteria for the average customer? – *Retailers*
6. Do you, as the supplier, importer or distributor, consider the energy efficiency performance of the Air Conditioner in your purchasing decision?
 - i. If yes, how do you check if the products meet the performance specified by suppliers?
 - ii. Do you ask for test reports? - *Importer | Supplier| Distributor*
7. How do you, as the supplier, importer or distributor, make your purchasing/sourcing decision?
 - i. Is it based on the retailer demand, on suggestions from manufacturers/suppliers or is it based on your own assessment of the market? – *Importer | Supplier| Distributor*
8. What is your experience of the Department of Energy MEPS and energy efficiency labelling programme?
 - i. Does it assist with sales, in addition to any criticisms please state how these could be addressed or improved? - *Importer | Supplier| Distributor*
9. How can government improve compliance and make the programme more effective? – *Importer | Distributor*
10. Have you been invited to workshops on the implementation on the new MEPS regulation?
 - i. How well has the Industry Association informed you?
 - ii. Do you feel that you need more information about the policy regulation process?
 - iii. Would you like to be more engaged in the process? – *Importer | Distributor*
11. All AC are imported and building a local test laboratory is expensive. Do you think it is necessary? Would your company use it? If so for what and how often?
Importer | Supplier| Distributor
12. Do you import used products?

- i. If yes, from where and what type?
- ii. If no, do you know if any used cooling products are imported in South Africa? – *Importer*

2.3. Air conditioner Usage research

Firstly, the research focused on identifying what other institutions in South Africa have done research on air conditioners, such as Eskom, and energy research companies like Enerweb or the universities.

Personal contacts and second party references were used to identify the sources. Then a direct approach was used to determine if they had done research, who to approach to obtain a copy and recommendations.

Next, this data was augmented through a limited “dipstick” sample of 5 telephonic interviews for 5 market segments.

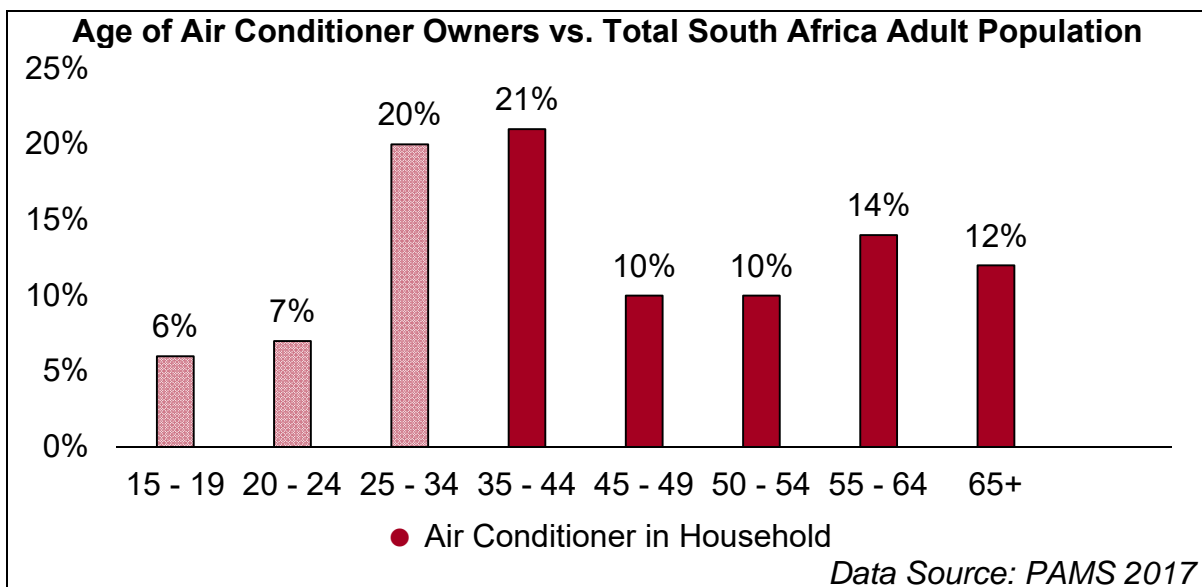
2.3.1. Purchase decision maker selection

The qualitative research phase of this exercise overlaid the quantitative consumer profile with psychographic elements. These market segments were aligned with the client in order to prioritise efficiently.

During the quantitative research phase, a basic consumer profile was developed to understand current household dynamics of households that own an air conditioner. These profiles were further developed with the dipstick qualitative interviews.

Age Distribution

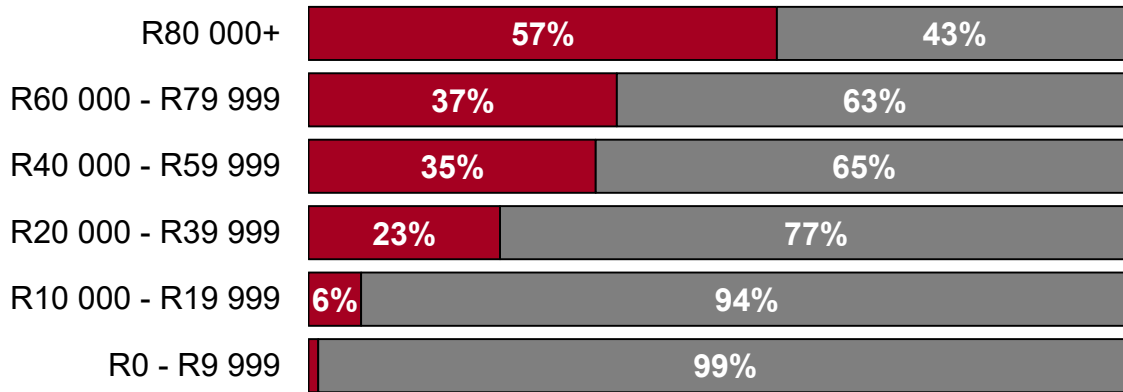
Households with Air Conditioners tend to be older, with 67% of adults in these households being older than 35 years, while within the South African Adult population the same age group makes up only 49%.



Income Distribution

Air Conditioner ownership remains a luxury, only available to the more affluent households in the country.

Monthly Household Income Distribution of Households with Air Conditioners vs without Air Conditioners



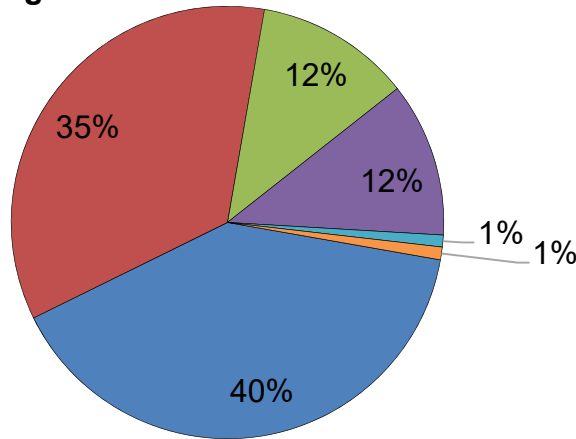
● Air Conditioner in Household

Data Source: PAMS 2017

Home Language

Households where there is an Air Conditioner predominately speak either English or Afrikaans as their Home Language.

Home Language of Households with Air Conditioners

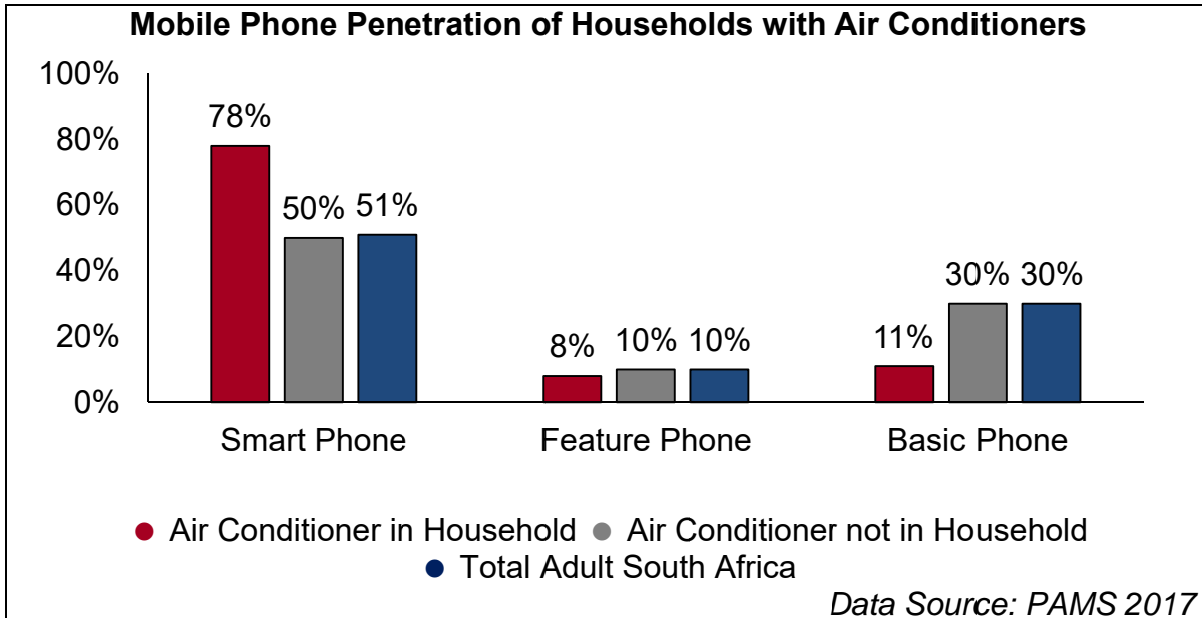


● Afrikaans ● English ● Nguni Languages
 ● Sotho-Tswana Languages ● Venda ● Tsonga

Data Source: PAMS 2017

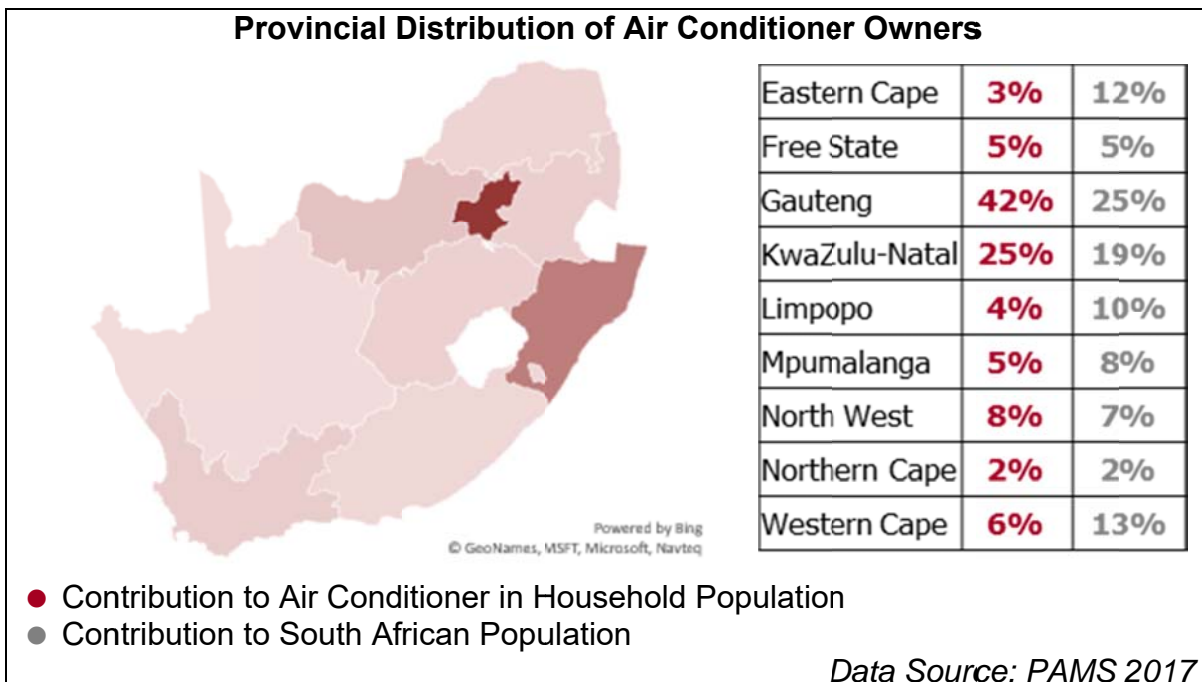
Smartphone Penetration

South Africa has a rising smartphone penetration, following trends observed on the continent. Ownership of an Air Conditioner increases the likelihood of owning a smartphone; and with the rise of internet enabled air conditioners, it is expected that smartphone penetration among air conditioner owners will grow even faster and more customers will use the new technology.



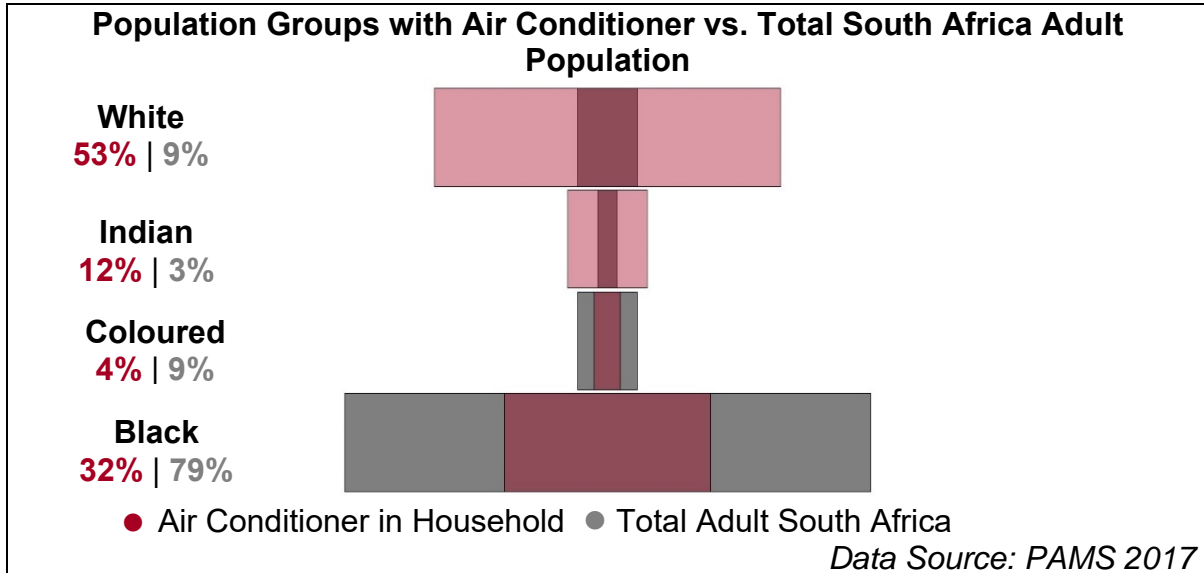
Provincial Distribution

Households with Air Conditioners are concentrated in Gauteng and KwaZulu Natal. A possible explanation for this may be that KwaZulu Natal is characterised by a subtropical climate, with many households purchasing Air Conditioners out of necessity. While Gauteng is the most affluent province, enabling more Air Conditioner purchases.



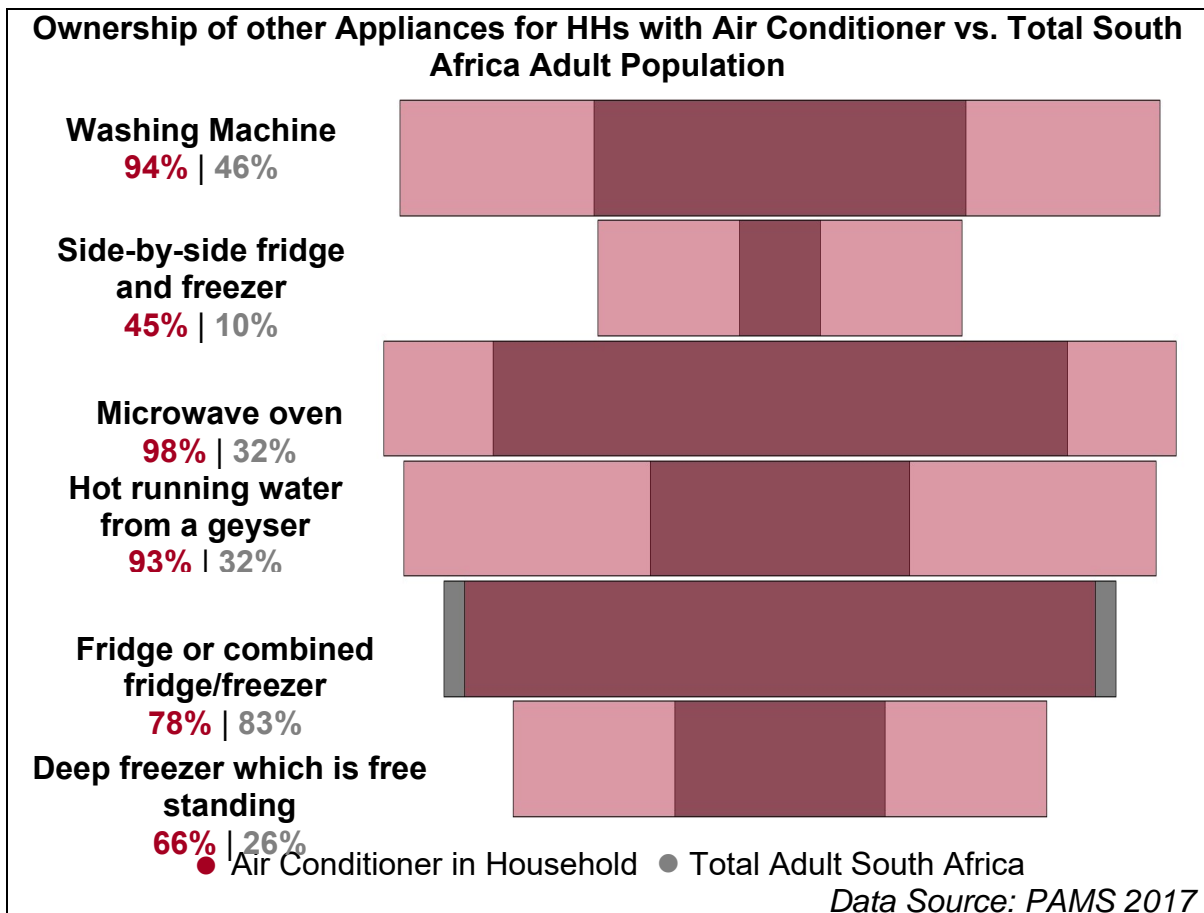
Population Group

The white population group which only accounts for 9% of the South African population and 53% of those with access to an air conditioner within their household. While the black population accounts for most of the country's population with 79%, but only accounts for 32% of people with access to an air conditioner in their household.



Ownership of Other Appliances

Households with Air Conditioners tend to have a higher ownership of other high energy appliances.



2.4. Confidence levels

For each area of research, a declaration is made on the confidence levels obtained.

Quantitative research

Overall there is complete confidence that the qualitative research reached at least 80% of the market, based on the NRCS LOA database, which we have noted hosts 238 small commercial and residential models. Additionally, by increasing the number of store audits, a larger subset of the market was reached; i.e. Retail, Supplier-Installer and eCommerce.

Qualitative research

The Manufacturer/Importer Interviews engaged with, what we believe to be, the main stakeholders involved in the importation of small commercial and residential air conditioners.

Usage research

The profiles used for the usage dip stick interviews were based on PAMS, a nationally representative dataset. We are therefore confident that the correct profiles were used to understand usage characteristics of customers.

3. Air conditioner quantitative research

3.1. General findings

Basic overview of the data



Overall 199 units were found during the audit, most of these being split units. The supplier-installer remains the dominant player in the industry, with most customers opting to visit the installation site, and provide a quotation onsite. The buyer rarely enters the place of business and is reliant on the supplier-installer to determine if the unit is energy efficient.



A database of supplier-installers and retail stores was developed; this database included the models that were found via the audits. The database was used to identify key stakeholders for qualitative interviews.

A list of energy efficient complaint models was initially shared by the NRCS, this list contained 141 units. However, during the fieldwork phase there were additional models identified and a desk research exercise of reviewing the full NRCS database of 793 units was undertaken. In order to begin a market sizing exercise, the South African Revenue Service Trade database was leveraged as well.

Air conditioner types

The following types of units were identified:

	<p>Window units are most commonly used for single rooms. In this air conditioner all the components, namely the compressor, condenser, expansion valve or coil, evaporator and cooling coil are enclosed in a single box. This unit is fitted in a slot made in the wall of the room, or more commonly a window sill.</p>
	<p>The split air conditioner unit comprises of two parts: the outdoor unit and the indoor unit. The outdoor unit, fitted outside the room, houses components like the compressor, condenser and expansion valve. The indoor unit comprises the evaporator or cooling coil and the cooling fan. For this unit you don't have to make a large hole in the wall of the room. Further, present day split units have aesthetic appeal and do not take up as much space as a window unit. A split air conditioner can be used to cool/heat one or two rooms.</p>

	<p>Cassette units work the same way as wall-hung split system units, with the difference being that cassettes are installed into the ceiling instead of on the wall. The indoor unit itself sits flush to your ceiling and distributes conditioned air through two, three or four sides of the unit. The outdoor unit of a cassette Air Conditioner is mounted outside, in much the same way as it would be for a conventional wall mounted split system unit.</p>
	<p>A portable/freestanding air conditioning unit (also known as a spot cooler) is designed to add additional cooling or for temporary cooling in a location where there is no existing air conditioning. As a portable air conditioning unit, the operation is similar to a window air conditioner; it pulls air into an evaporator, cools it, and circulates it back into the room. However, the unit is typically on wheels and in a self-contained cabinet making for ease of portability. Importantly, unless the unit is connected to a hose that rejects air outside, the overall effectiveness is lost.</p>

Once the audit was completed, 199 models were identified, and within those models, there were 50 models that were not represented with an LOA certificate.

Market size covered

The previous report indicated a market size of 294 100 units with a R1.3 Billion value in 2017. However based on a review of the South African Revenue Service (SARS) Trade Database this may have only captured one of the HS Code classifications (8415.10.10), which showed a market size of 281 100 Units that year.

This report calculated a market size based on the South African Revenue Service (SARS) Trade Database; it was established that there are no local manufacturers of residential & small commercial air conditioners. The total air conditioners imported into South Africa between October 2017 and September 2018 was 445 494 units and this accounted for R1 103 649 515 in customs value.

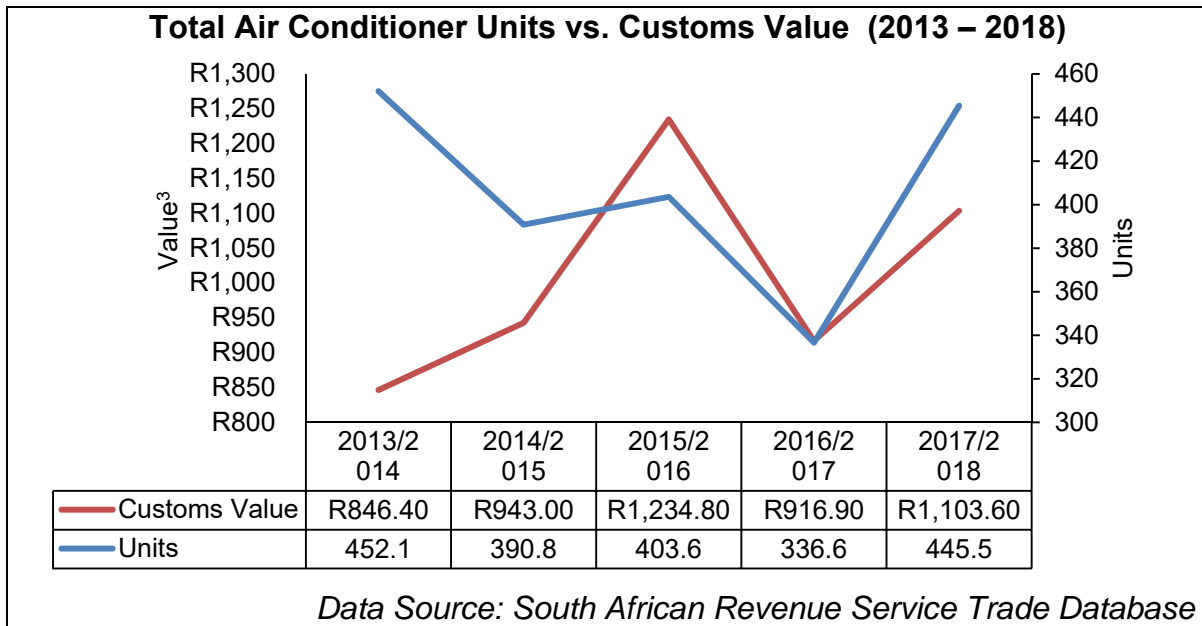
Air conditioners are defined under the HS Code 8415.10 - ***Of a kind designed to be fixed to a window, wall, ceiling or floor, self-contained or " split-system "*** with 4 classifications.

HS Code	Definition
8415.10.10	Of a kind used for buildings, compressor operated, having a rated cooling capacity not exceeding 8,8 kW
8415.10.20	Of a kind used for buildings, not compressor operated, having a rated cooling capacity not exceeding 8,8 kW
8415.10.50	Other, compressor operated, having a rated cooling capacity not exceeding 8,8 kW
8415.10.90	Other

The following table provides a breakdown of air conditioners by HS Code Classification by year (October – September)

	8415.10.10		8415.10.20		8415.10.50		8415.10.90	
	Units ('000)	Value ³ (R Million)	Units ('000)	Value ³ (R Million)	Units ('000)	Value ³ (R Million)	Units ('000)	Value ³ (R Million)
13/14	331.0	610.0	1.3	5.1	3.9	5.1	115.9	226.1
14/15	284.8	615.6	52.9	4.3	9.1	5.3	44.0	317.8
15/16	350.2	805.4	0.3	1.4	6.8	14.0	46.4	414.1
16/17	281.1	571.8	0.1	0.3	10.4	23.8	45.0	320.9
17/18	363.7	743.3	0.1	0.7	0.1	1.5	81.7	358.1

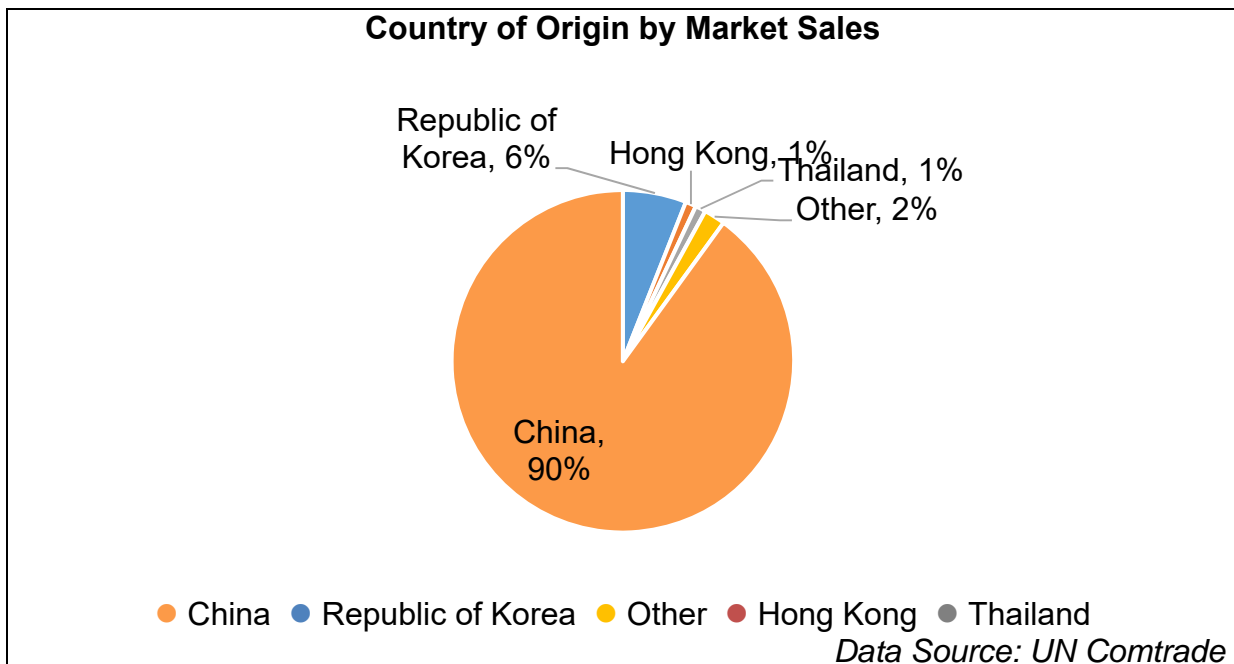
³ Customs Value



3.2. Major categories of understanding

Country of Origin

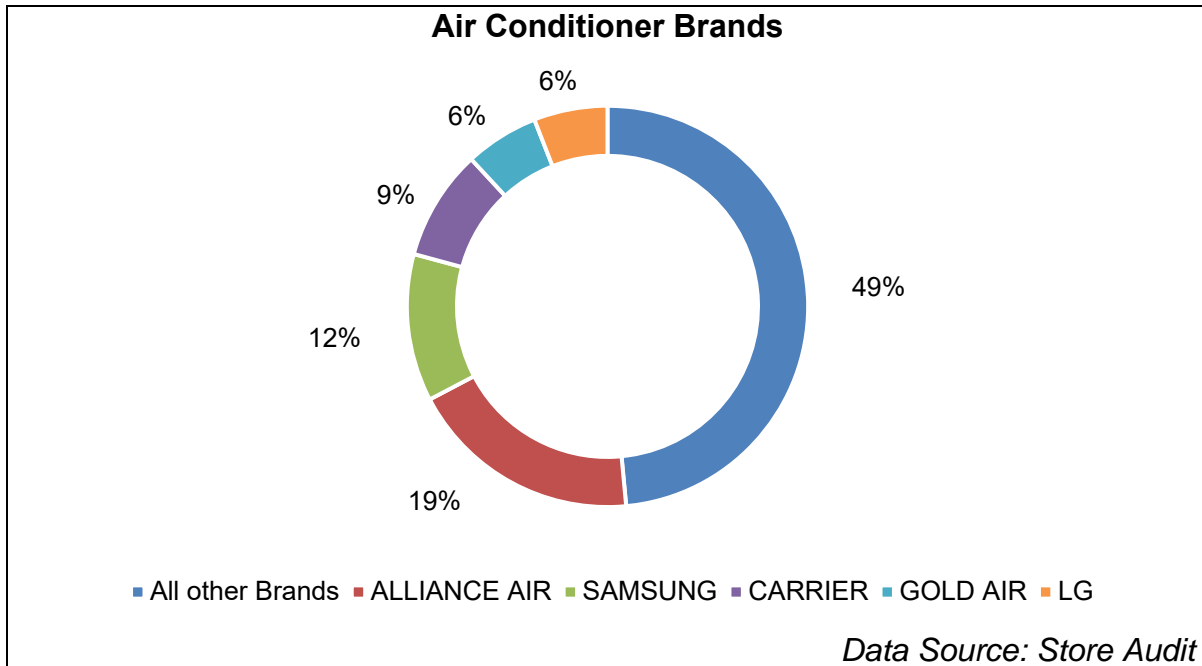
Most units are imported from Asia, with at least 90% coming in from China. Other locations include the Thailand, Japan and South Korea. The European Union, United Kingdom and United States are represented in the SARS trade database but contribute a negligible number of units.



Product brands

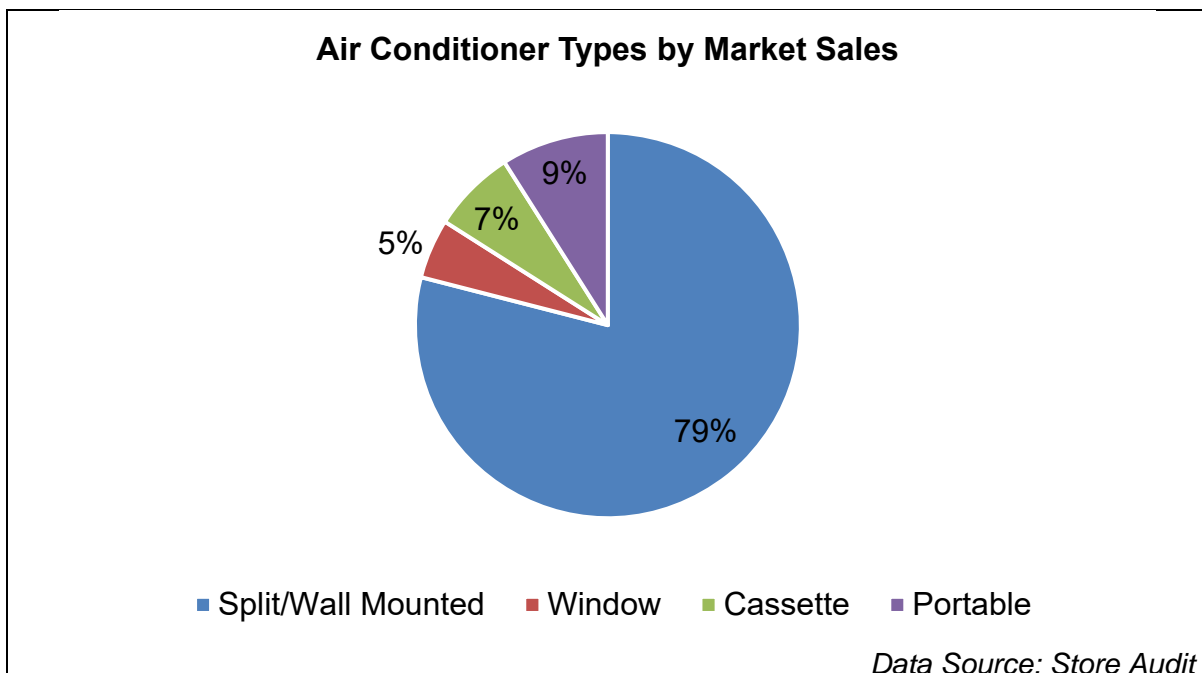
The Top five brands observed were Alliance Air, Samsung, Carrier, Gold Air and LG. The most observed brand was Alliance Air, which is imported by Imperial Air Conditioning and distributed by Fourways Air Conditioning. Samsung, the second most observed brand is also distributed by Fourways Air Conditioning. Fourways Air Conditioning has access to more than 30% of the models available in the country.

This slightly differed to findings in the previous report commissioned as they indicated that major brands were LG (31.5%), Samsung (19.5%), De’Longhi (14.2%) and Hisense (6.1%) the rest of the market being made up of other smaller brands.



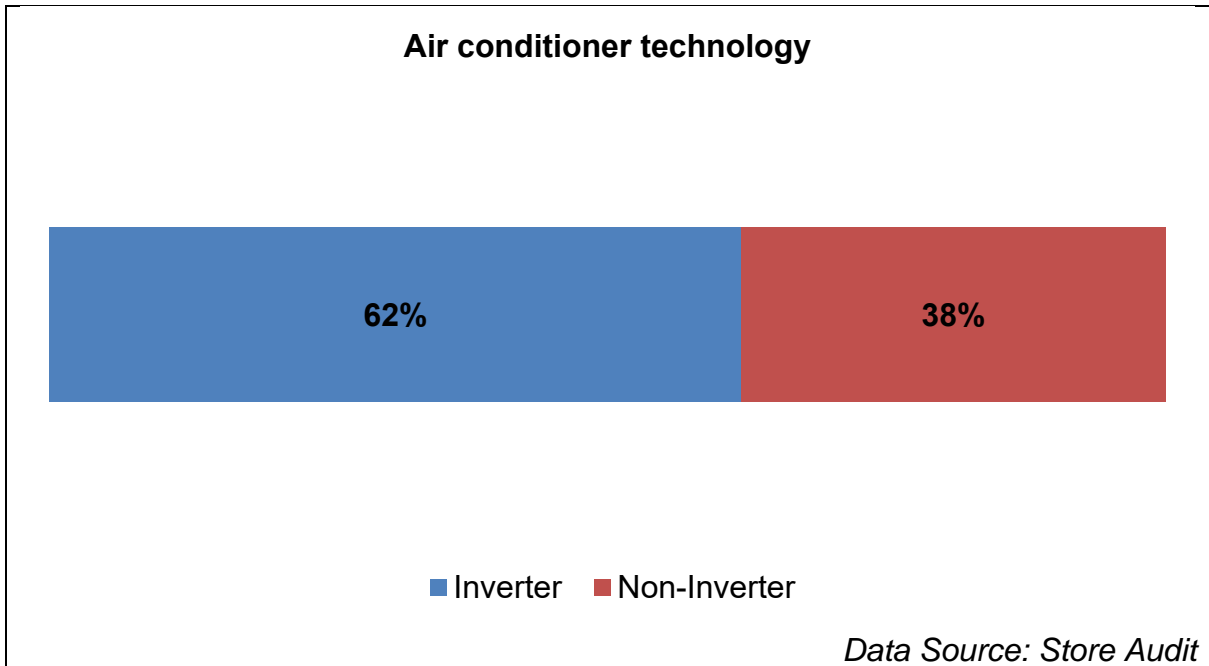
Air Conditioner Types

Wall Mounted/Split Units are the most popular Air Conditioning units available in South Africa and account for 79% of all models observed.



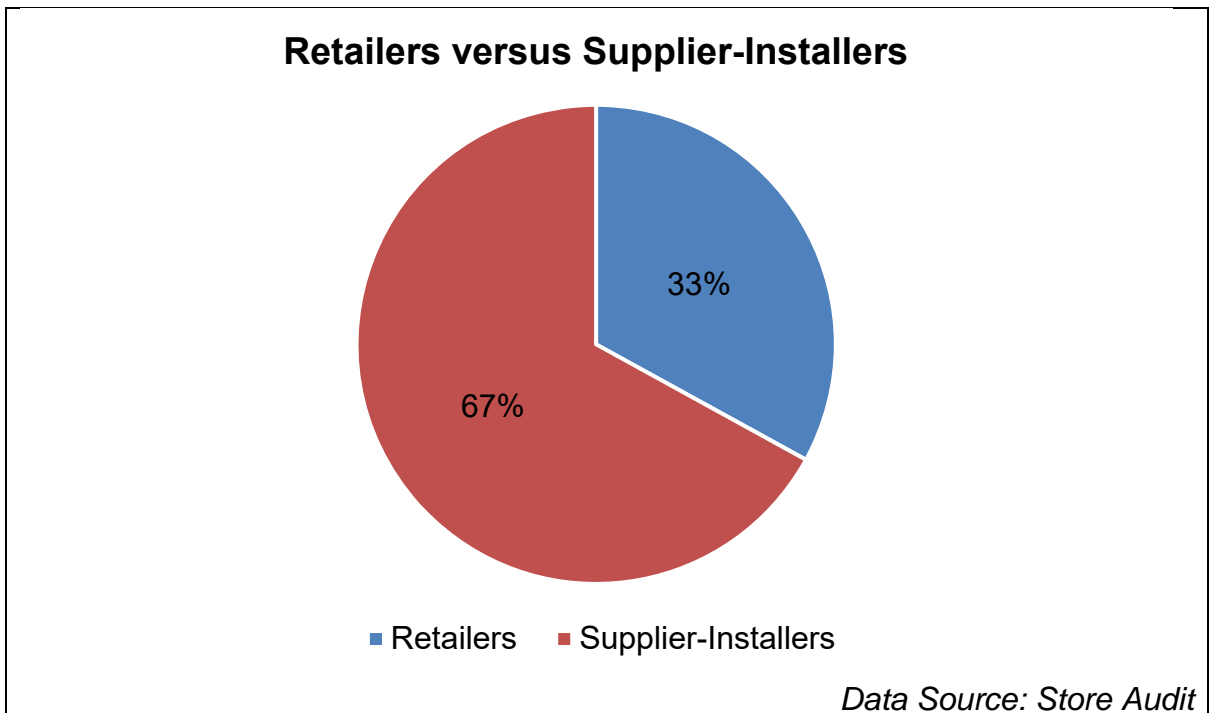
Air Conditioner Technology

Inverters are the main technology observed in the market, via the Store Audits



Retailers versus Supplier-Installers

Supplier-installers account for 67% of sales versus retailers that account for 33%.

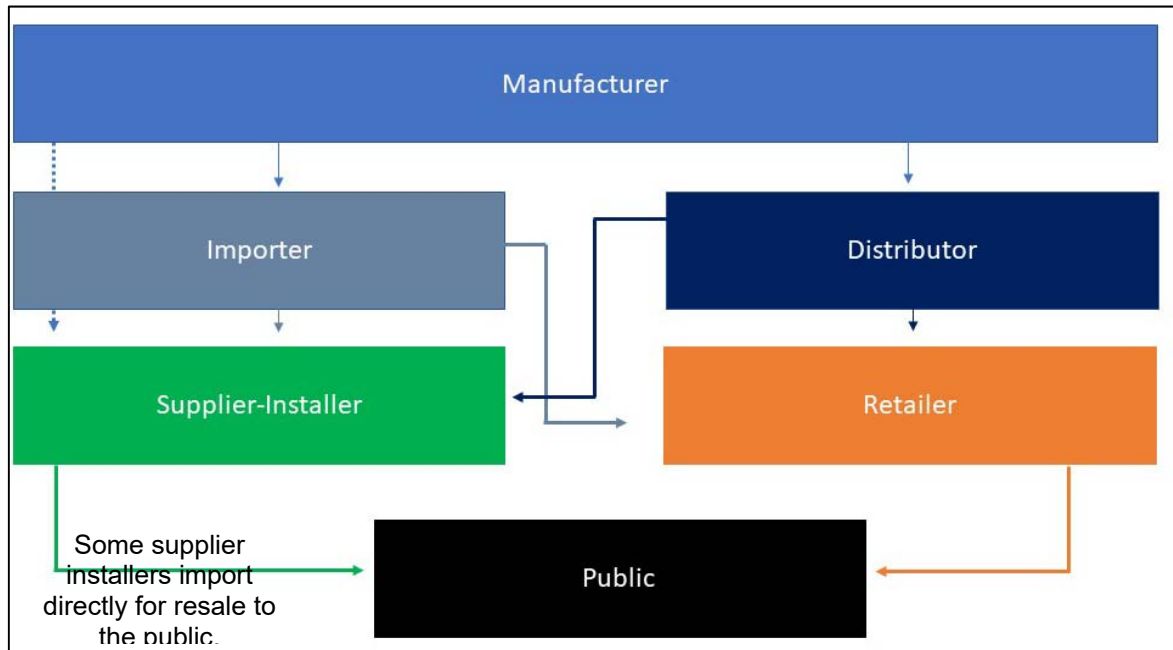


Industry structuring

There is no local manufacturing of air conditioners in South Africa, all air conditioners are imported based on orders from supplier-installers. While some retail stores also import from international manufacturers to sell directly to the public. Some international brands make use of local distribution agencies to manage their sales on the ground, these agencies act as exclusive suppliers to the market.

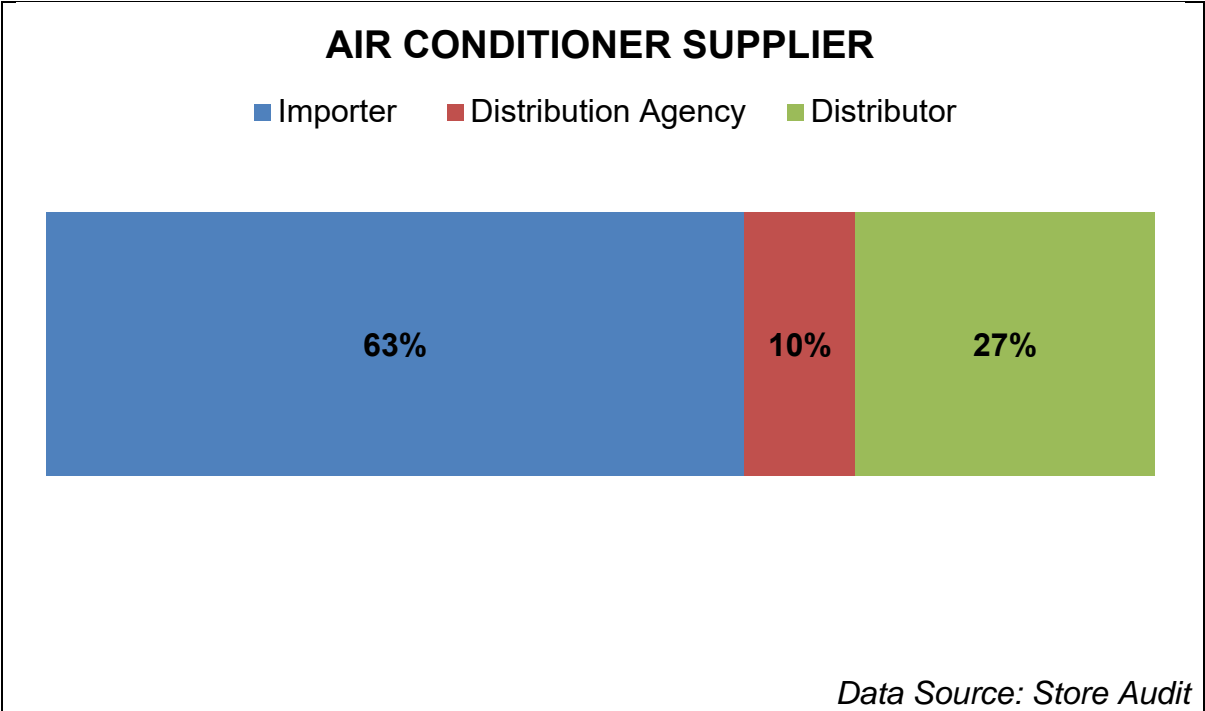
During trade interviews a draft market structure was created, and during the qualitative Manufacturer/Importer Interviews this market structure was refined.

The major entities in the supply structure are:



A breakdown of primary channel supplying Air Conditioners is provided below:

A **Distributor** refers to a company that has been nominated by the manufacturer to sell their products within a certain location or consumer segment. A **Distribution Agency** refers to a company that may distribute household electronics across various categories and not necessarily be an expert in any of them. An **Importer** can be either a subsidiary of the global company or a local business that imports directly from the manufacturer.



3.3. Purchasing patterns

Air conditioner types versus market share

During the store audit exercise, store personal were asked to estimate what percentage of their sales corresponded to different types of air conditioners. Most responded that their volume sales were indicative of the units that were available in their stores. These estimates were validated via the qualitative interviews with the industry.

	Volume Sales	Value Sales
Split	91.5%	±5%
Window	4%	±10%
Free Standing (Portable)	5%	±85%

Data Source: Stakeholder Interviews & Store Audit

Refrigerant versus market share

Although R22 has been banned globally via the Montreal Protocol, and a limit to importation has been implemented since 2015 with a move to a total ban by 2030, there were 4 units observed during the store audit.

	Units	Percentage
R410	196	98%
R22	4	2%

Data Source: Store Audit

Cooling sizes versus market share (Btu)

Cooling Size in BTU	% Volume Share
9000	21.5%
10 000	1%
12 000	26%
14 000	1%
18 000	23.5%
18 600	0.5%
22 000	0.5%
24 000	21.5%
30 000 ⁴	1.5%
36 0000 ³	2.5%
48 0000 ³	0.5%

Data Source: Store Audit

Retail versus supplier versus market share

	Supplier-Installer	Retailer
Split	72%	28%
Window	100%	0%
Free Standing (Portable)	30%	70%

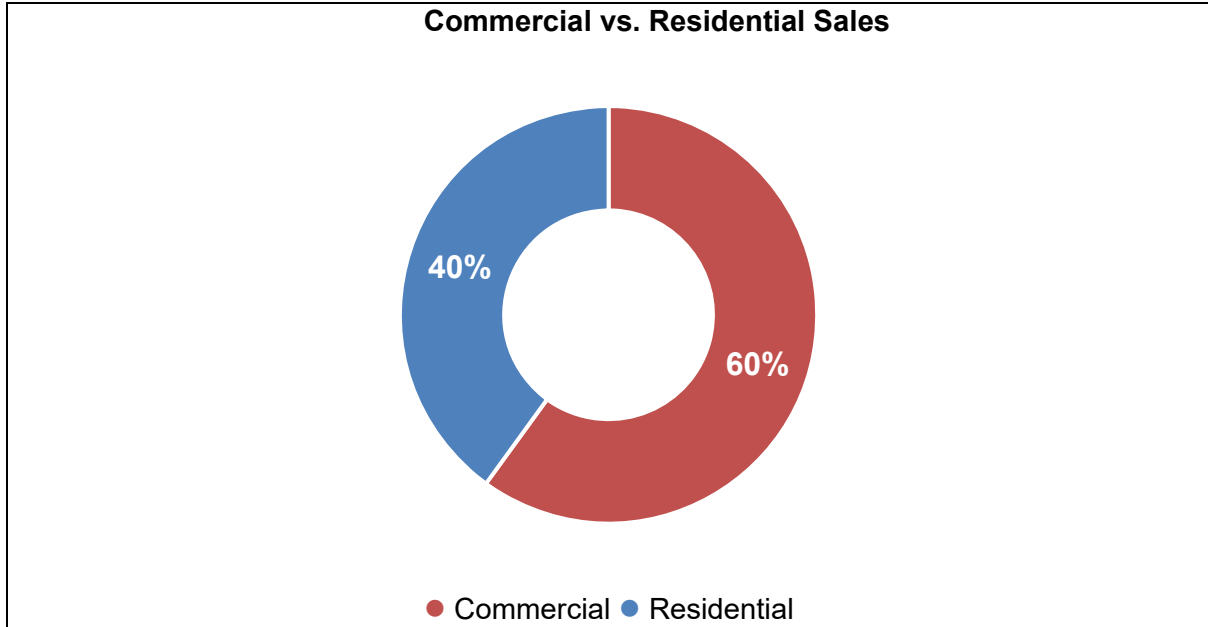
⁴ These units are currently being marketed as residential units, however fall outside of the scope of this research. They were included to highlight the fluid boundaries that exist within the air conditioner industry regarding residential & non-residential units.

4. Air conditioner industry information

4.1. Qualitative findings

Ten industry stakeholders were interviewed, with the following responses to the questions posed:

1. **Could you give an estimate of how many units are sold for commercial use and how many are sold for residential use**



2. **Can you confirm our understanding of the market arrangements; importers, distributors and retailers and installer-based selling, how does the market operate?**

The industry stakeholders confirmed the industry structure identified during the quantitative research phase.

3. **For the average air conditioner buyer; technology is difficult to understand. In your experience, is this a fair assessment?**
 - i. **How does your company address this?**
 - ii. **Could more be done by an independent body (perhaps an industry association or government) to provide impartial advice and guidance?**

The industry stakeholders agreed that the average customer was not knowledgeable about the air conditioner technology, however neither was the average sales person. There was no demand from customers for this knowledge as the most important factor in purchase decision making was price.

4. On average what are the three most important decision-making criteria for the average customer?

Price was the most important criteria followed by after-sales customer service and brand loyalty. Customers want to know that they are getting value for money and if something goes wrong they will have someone to contact.

5. Do you, as the supplier, importer or distributor, consider the energy efficiency performance of the Air Conditioner in your purchasing decision?

- i. **If yes, how do you check if the products meet the performance specified by suppliers?**
- ii. **Do you ask for test reports?**

Energy efficiency was not the main consideration in the importer's purchasing decision. Price and market demand were bigger considerations. Test reports were requested for no other reason than to be submitted for LOA purposes.

6. How do you, as the supplier, importer or distributor, make your purchasing/sourcing decision?

- i. **Is it based on the retailer demand, on suggestions from manufacturers/suppliers? or;**
- ii. **Is it based on your own assessment of the market?**

Purchasing/Sourcing decisions are dependent on company structure; Large global brands are dictated to by their HQ, while independent brands make their decisions mostly based on price and market demands.

7. How can government improve compliance and make the programme more effective?

The industry stakeholders communicated that there needed to be more emphasis on enforcement of regulation, particularly on the rogue elements of the industry.

8. Have you been invited to workshops on the implementation on the new MEPS regulation?

- i. **How well has the Industry Association informed you?**
- ii. **Do you feel that you need more information about the policy regulation process?**
- iii. **Would you like to be more engaged in the process?**

The industry stakeholders communicated that they had never had an engagement around the implementation of the regulation and it had been dictated to them. In the future they were very receptive to being included in discussions around the policy.

9. All AC are imported and building a local test laboratory is expensive. Do you think it is necessary? Would your company use it? If so for what and how often?

Industry stakeholders communicated that units were already being tested before being imported and were being issued with certification at the manufacturer. They agreed that this was a big expense and were not sure what benefit it would provide to the industry. They proposed that the regulator rather incorporated current global

test report measures into local regulation.

10. All AC are imported and building a local test laboratory is expensive. Do you think it is necessary? Would your company use it? If so for what and how often?

Industry stakeholders communicated that units were already being tested before being imported and were being issued with certification at the manufacturer. They agreed that this was a big expense and were not sure what benefit it would provide to the industry. They proposed that the regulator rather incorporated current global test report measures into local regulation.

11. Do you import used products?

- i. If yes, from where and what type?**
- ii. If no, do you know if any used cooling products are imported in South Africa?**

Industry stakeholders communicated that they did not import used air conditioners, however if a customer chose to return a unit. Some supplier installers would recondition the unit and resell it to another customer.

5. Air conditioner usage research

Based on the RFP plus the inputs obtained during the Introductory and Inception meetings the following work plan has been prepared.

5.1. Research through South African institutions

A Eskom senior staff member in the IDM (Integrated Demand Management) department was approached, Mr Herman Claassen who kindly engaged broader in the organisation to determine what air conditioner usage information they have available

Confirmation received that Eskom have not undertaken any air conditioner usage research in the past 10 years. This was further confirmed by Mr Rob Surtees of Enerweb, who completed this type of work for Eskom but more than 10 years ago.

Further various Universities were contacted and again the feedback was that no research has been undertaken during the past 10 years on air conditioning usage patterns.

Calculative estimates of usage levels will be undertaken during the project analysis phase.

5.2. Customer research

Five dipstick interviews were conducted with South African customers who have an air conditioner in their households. The following insights were gathered.

Q1. Are you aware of the Energy Efficiency Rating of your unit? Does it Matter?

White, Mature Couple only Household Western Cape	Not really, and it doesn't matter to us
White, Young Family Western Cape	Not aware of Energy Efficiency Rating, and it doesn't matter, as I only switch it on to cool or heat the room in peak winter and peak summer.
Indian, Mature Family KwaZulu Natal	We don't care about energy efficiency, just that the unit works well and is a good price.
Indian, Young Couple only Household Gauteng	We were told that our unit is energy efficient, but we are not sure if it is a gimmick.
White, Mature Couple only Household Gauteng	Not aware but would be interested to find out, especially if it changes our electricity expense.

Q2. When do you use your unit the most?

White, Mature Couple only Household Western Cape	At the night time, when we are asleep.
White, Young Family Western Cape	Every day during peak summer and peak winter, between 5-9pm.
Indian, Mature Family KwaZulu Natal	Mostly in the summer months, especially when there are heatwaves.
Indian, Young Couple only Household Gauteng	We use it in Summer, during the day on weekends when we are at home.
White, Mature Couple only Household Gauteng	In the December holidays mostly when it is really hot.

Q3. How does using your Air Conditioner affect your electricity bill?

White, Mature Couple only Household Western Cape	It is 20% more expensive, when we use our Air Conditioner.
White, Young Family Western Cape	I would guess it adds only a few hundred rand per month.
Indian, Mature Family KwaZulu Natal	It goes up, but we don't mind, our comfort is important.
Indian, Young Couple only Household Gauteng	We don't see too much change as we don't use it too often.
White, Mature Couple only Household Gauteng	We are lucky because we are off the grid and don't make use of Eskom

6. Legislation & Regulation

6.1. Background to the programme

National Government commitment and programmes

Following South African Governments Kyoto commitments the DoE prepared and released in 2005 a National Energy Efficiency Strategy (NEES). The strategy targeted the reduction in energy intensity of the South African economy by 12% by 2015. This target was more than surpassed in most sectors by 2012.

Currently the DoE is finalising a post 2015 National Energy Efficiency Strategy , which will build on these achievements, stimulating additional improvements through a combination of fiscal and financial incentives, robust legal and regulatory framework and enabling measures.

The Vision is to “promote energy efficiency as the ‘first fuel’ to drive a socially inclusive and environmentally sustainable economic growth, boosting job creation and leading technological innovation across the region”. Included in the framework are targets for a reduction in final energy consumption across a range of economic sectors, including the residential sector.

For the residential sector three savings opportunities have been identified as having significant potential, namely; appliances, lighting and buildings. The electricity savings (12.1 TWh) proposed within the cost effective scenario would contribute to roughly 20% of revised 2030 saving baselines. These savings would then translate to roughly 12.75 Mt of CO2 emissions. The proposed savings would mean a 6.8% decrease in household electricity intensity between 2010 and 2030.

Clearly the new soon to be released post 2015 National Energy Efficiency Strategy relies heavily on the savings potential within household appliances and thereby the S&L Programme.

Appliance Standards & Labelling Programme target market

Across South Africa the use of electricity by domestic households will be impacted by the purchase and use of more efficient appliances. To appreciate the size and nature of the domestic household market a range of market information is provided.

The Household Appliance Standards & Labelling Programme (S&L) has been designed to improve the level of energy efficiency of appliances purchased in South Africa. The programme has addressed the policy environment; ensured information is made available, plus overcome technology and financial barriers that have prevented the widespread introduction and uptake of efficient appliances.

Global Environmental Facility (GEF) funds are being used to provide assistance to the Government, national agencies and the private sector to introduce and implement a mandatory S&L programme successfully. At the same time, relevant capacity building activities are being implemented through training and technical assistance such as this manual and training.

The goal of the project is to reduce greenhouse gas emissions caused by household appliances' electricity consumption by facilitating a comprehensive market transformation of the South African market towards the use of energy efficient electrical appliances.

The project targets 12 electrical appliance groups which have been identified as providing the greatest return; including air conditioners the focus of this study.

The market transformation is being achieved though external regulation by introducing a combination of two regulatory tools; Minimum Energy Performance Standards (MEPS) and

Information Labels. The first MEPS will ensure only new appliances with a minimum level of energy efficiency are available for sale in South Africa, plus appliance buyers are educated and encouraged to purchase the highest efficiency and affordable appliances through effective energy efficiency labelling.

It is estimated that the project will provide electricity savings of up to 388 GWh per year, which will lead to 4.6 Mt of direct CO₂ emissions reductions (over the lifetime of the appliances covered) and indirect CO₂ emissions reductions of 11.5 Mt CO₂.

6.2. Range of legislation and regulation

SANS standard reference

VC9008 COMPULSORY SPECIFICATION FOR ENERGY EFFICIENCY AND LABELING OF ELECTRICAL AND ELECTRONIC APPARATUS (VC 9008 Household appliances)

- Falls under the NATIONAL REGULATOR FOR COMPULSORY SPECIFICATIONS ACT (Act 5 of 2008)
- 28 Nov 2014 under Govt Gazette No. 38232
- Authorises NRCS to issue the Letter of Authority (LOA)
- Following extensions by the Minister, effective 28 November 2016. All new air conditioner products require a LOA before import clearing.

SOUTH AFRICAN NATIONAL STANDARD (SANS) 941:

- Is the national standard covering energy efficiency of electrical and electronic apparatus.
- Clause 4.2.1 specifies for all air conditioner combinations shall comply with requirements for energy consumption in *SANS 54511*. Plus display an energy efficiency label reflecting the measured values. *Minimum energy efficiency rating of Class B*.
- Scope covers air conditioners not exceeding 7.1 kW (24 000btu/h) cooling capacity, of the wall mounted split, window and portable types and heat pumps for space heating and cooling.
- Ceiling mounted split are not covered- a current loophole.

SANS 54511-3 Air conditioners, liquid chilling packages and heat pumps with electrically driven compressors for space heating and cooling.

- Specifies the methodology for testing energy consumption and the label content of Air conditioners
- Cooling Performance (EER value)
- Heating Performance (COP value)

Import duties

An extract of the customs and excise tariffs is provided below:

Jacobsens CUSTOMS AND EXCISE TARIFF BOOK		- 365 -		(16904) Supp 1081 03.01.2017		SEC.XVI 84.14			Reference
Heading / Subheading	CD	Article Description	Statistical Unit	Rates of Duty					Reference
				General	EU	EFTA	SADC	MERCOSUR	
8414.90.70	2	-- For ventilating fans (excluding that for fans identifiable for use with motor vehicle engines)	kg	5%	free	free	free	2,5%	A1/1/1549 w.e.f. 1/4/16
8414.90.90	7	-- Other	kg	free	free	free	free	free	
84.15		AIR CONDITIONING MACHINES, COMPRISING A MOTOR-DRIVEN FAN AND ELEMENTS FOR CHANGING THE TEMPERATURE AND HUMIDITY, INCLUDING THOSE MACHINES IN WHICH THE HUMIDITY CANNOT BE SEPARATELY REGULATED: + Refer to 124.05 • Refer to Letter of Authority (LOA) from NRCS • Refer to Prohibited Goods Index							
8415.10		-Of a kind designed to be fixed to a window, wall, ceiling or floor, self-contained or "split-system":							
8415.10.10	6	-- Of a kind used for buildings, compressor operated, having a rated cooling capacity not exceeding 8,8 kW	u	15%	free	15%	free	15%	
8415.10.20	3	-- Of a kind used for buildings, not compressor operated, having a rated cooling capacity not exceeding 8,8 kW	u	free	free	free	free	free	
8415.10.50	5	-- Other, compressor operated, having a rated cooling capacity not exceeding 8,8 kW	u	15%	free	15%	free	13,5%	
8415.10.90	4	-- Other	u	free	free	free	free	free	
8415.20	3	-Of a kind used for persons, in motor vehicles	u	15%	free	15%	free	15%	
8415.8		-Other:							
8415.81		-- Incorporating a refrigerating unit and a valve for reversal of the cooling/heat cycle (reversible heat pumps):							
8415.81.10	4	--- Of a kind used for buildings, having a rated cooling capacity not exceeding 8,8 kW	u	free	free	free	free	free	
8415.81.90	2	--- Other	u	free	free	free	free	free	
8415.82		-- Other, incorporating a refrigerating unit:							
8415.82.10	0	--- Of a kind used for buildings, having a rated cooling capacity not exceeding 8,8 kW	u	free	free	free	free	free	
8415.82.90	9	--- Other	u	free	free	free	free	free	
8415.83		-- Not incorporating a refrigerating unit:							
8415.83.10	7	--- Of a kind used for buildings, having a rated cooling capacity not exceeding 8,8 kW	u	free	free	free	free	free	
8415.83.90	5	--- Other	u	free	free	free	free	free	
8415.90		- Parts:							
8415.90.05	6	-- Indoor units and outdoor units for machines of subheadings 8415.10.10 and 8415.10.20	kg	15%	free	free	free	13,5%	
8415.90.20	5	-- Other parts identifiable for use solely or principally with compressor operated machines of subheading 8415.10 having a rated cooling capacity not exceeding 8,8 kW	kg	15%	free	free	free	15%	
8415.90.90	0	-- Other	kg	free	free	free	free	free	

Points of note:

- NRCS LOA required.
- Ad Valorem Duty of 9% is paid
- VAT is payable on importation.
- The 8.8kW cooling ceiling is evident on the application of these tariffs.

6.3. Testing/calculation methodology

Air conditioners are tested by operating a unit where the two heat exchangers receive controlled air conditions and the effectiveness is measured.

Measurements enable the test laboratory to calculate the cooling power and heating power in kW, whilst measuring the electrical power used by the unit. When cooling capacity, heating capacity, coefficient of performance (COP) and energy efficiency ratio (EER) of an air-conditioner is tested, the measured value shall not be lower than 95 % of the rated value

These ratios EER and COP can then be compared to the tables on page 62 of standard. For example:

1	2
Energy efficiency class	EER/COP
A	$EER/COP > 3,00$
B	$3,00 \geq EER/COP > 2,80$
C	$2,80 \geq EER/COP > 2,60$
D	$2,60 \geq EER/COP > 2,40$
E	$2,40 \geq EER/COP > 2,20$
F	$2,20 \geq EER/COP > 2,00$
G	$2,00 \geq EER/COP$

Sample from a report

Product description/name plate

General product information: Window type air conditioner for household use only, the refrigerant is R410A. The appliance incorporates both cooling and heating functions through reverse cycle means.		Basic product and test condition information
Air Conditioner Details:		
A/C Type	Cooling and heating	Manufacturers name plate information, including rated inputs and cooling/heating capacities
A/C Configuration 1 —Air distribution	Non-ducted	
A/C Configuration 2—Type	Window Type	
A/C Configuration 3—Heat transfer	Air	
Rated voltage(V)(of package unit or indoor unit if split system)	220-240 V	
Rated voltage(V)(of outdoor unit if split system)	220-240 V	
Rated frequency	50 Hz	
Rated total cooling capacity (condition T1).....	Model 1: 3550 W Model 2: 5350 W	
Rated effective power input, cooling	Model 1: 1179 W Model 2: 1772 W	
Rated heating capacity(condition H1)	Model 1: 3200 W Model 2: 4810 W	
Rated effective power input, heating.....	Model 1: 1049 W Model 2: 1598 W	
Does this air conditioner use a variable output compressor (e.g., speed drive or multi-speed compressor)	No	
Refrigerant.....	Model 1: R410A, 970 g Model 2: R410A, 1200 g	

Efficiency test results

Test results:																					
The determination of cooling capacity:																					
Cooling capacity	Total cooling capacity in kW	3.644																			
	Air conditioner power consumption in kW	1.171																			
Energy efficiency ratio(EER)		3.112	COP for cooling measured at 3.112																		
The minimum energy efficiency rating according to COMPULSORY SPECIFICATION FOR ENERGY EFFICIENCY AND LABELING OF ELECTRICAL AND ELECTRONIC APPARATUS (VC 9008)		B	Minimum rating required																		
Rated energy efficiency ratio(EER)		3.01																			
Energy efficiency class in cooling mode		A	Class as per Table AA.5 is A																		
The indicative annual energy consumption, kWh, in cooling mode		585.5 kWh																			
Indicate fan and any other settings for determination of rated capacity:	Fan speed: the highest speed. Grilles are in the position which result in the largest air quantity.																				
The energy efficiency class of air conditioners in cooling mode shall be determined in accordance with table AA.5, relevant to the type of air conditioner.																					
<p style="text-align: center;">Table AA.5 — Window type air conditioners</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;">1</th> <th style="text-align: center;">2</th> </tr> <tr> <th style="text-align: center;">Energy efficiency class</th> <th style="text-align: center;">EER/COP</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">A</td> <td style="text-align: center;">$EER/COP > 3,00$</td> </tr> <tr> <td style="text-align: center;">B</td> <td style="text-align: center;">$3,00 \geq EER/COP > 2,80$</td> </tr> <tr> <td style="text-align: center;">C</td> <td style="text-align: center;">$2,80 \geq EER/COP > 2,60$</td> </tr> <tr> <td style="text-align: center;">D</td> <td style="text-align: center;">$2,60 \geq EER/COP > 2,40$</td> </tr> <tr> <td style="text-align: center;">E</td> <td style="text-align: center;">$2,40 \geq EER/COP > 2,20$</td> </tr> <tr> <td style="text-align: center;">F</td> <td style="text-align: center;">$2,20 \geq EER/COP > 2,00$</td> </tr> <tr> <td style="text-align: center;">G</td> <td style="text-align: center;">$2,00 \geq EER/COP$</td> </tr> </tbody> </table>			1	2	Energy efficiency class	EER/COP	A	$EER/COP > 3,00$	B	$3,00 \geq EER/COP > 2,80$	C	$2,80 \geq EER/COP > 2,60$	D	$2,60 \geq EER/COP > 2,40$	E	$2,40 \geq EER/COP > 2,20$	F	$2,20 \geq EER/COP > 2,00$	G	$2,00 \geq EER/COP$	
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F	$2,20 \geq EER/COP > 2,00$																				
G	$2,00 \geq EER/COP$																				
The determination of heating capacity:																					
Heating capacity	Total heating capacity in kW	3.149																			
	Air conditioner power consumption in kW	1.016																			
Coefficient of performance (COP)		3.099	COP for heating measured at 3.099																		
The minimum energy efficiency rating according to COMPULSORY SPECIFICATION FOR ENERGY EFFICIENCY AND LABELING OF ELECTRICAL AND ELECTRONIC APPARATUS (VC 9008)		B																			
Rated coefficient of performance (COP)		3.05																			
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