Department of Minerals and Energy Pretoria

Capacity Building in Energy Efficiency and Renewable Energy

Report No. 2.3.4-05 – FINAL

Title : Appliance Labelling Study

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Month/Year : February 2003

Department of Minerals and Energy Pretoria

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Checked	Frank Hansen - COWI
Approved	

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Abbreviations and Acronyms

BEE	Black Economic Empowerment
CaBEERE	Capacity Building in Energy Efficiency and Renewable Energy
CB	Capacity Building
CEF	Central Energy Fund
CSIR	Council for Scientific and Industrial Research
CTA	Chief Technical Adviser
DANCED	Danish Cooperation for Environment and Development
DG	Director-General
DDG	Deputy Director-General
DEAT	Department of Environmental Affairs and Tourism
DK	Kingdom of Denmark
DKK	Danish Kroner
DME	Department of Minerals and Energy
DoF	Department of Finance
DSM	Demand Side Management
DTI	Department of Trade and Industry
DUE	Domestic Use of Energy Conference / Proceedings
DWAF	Department of Water Affairs and Forestry
EE	Energy Efficiency
EES	Energy Efficiency Services –a Section of Technology Services International - a division of Eskom Enterprises (Pty) Ltd.
EIA	Environmental Impact Assessment
ESETA	Energy Sector Education Training Authority
FIDIC	International Federation of Consulting Engineers
IDC	Industrial Development Corporation of South Africa
LFA	Logical Framework Approach
LT	Long Term Adviser
NER	National Electricity Regulator
NGO	Non-Governmental Organisation
PDI	Previously Disadvantaged Individual

PM	Project Manager
PMG	Project Management Group
PQ	Pre-qualification
PS	Project Secretary
PSC	Project Steering Committee
PWG	Project Working Group
QA	Quality Assurance
RE	Renewable Energy
RDSM	Residential Demand Side Management
RSA	Republic of South Africa
SA	South Africa/South African
SABS	South African Bureau of Standards
SANAS	South African National Accreditation System
SALGA	South African Local Government Association
SANGOCO	South African Non-Governmental Organisations' Committee
SARS	South African Revenue Services
SMME	Small, Medium and Micro Enterprises
SP	Service Provider
ST	Short Term Adviser
TA	Technical Assistance
TOR	Terms of Reference
TSI	Technology Services International – Eskom Enterprises (Pty) Ltd
VAT	Value Added Tax
ZAR	South African Rand

1 INTRODUCTION

1.1 Background

The Department of Mineral and Energy (DME) South Africa is responsible for formulating strategies and drafting legislation for the South African Energy Sector have initiated this study in Appliance labelling for South Africa.

The DME is being assisted by the Danish Government - DANCED with the capacity building in the Energy Efficiency (EE) and Renewable Energy (RE) sector.

Energy labelling is an internationally well known and tested tool to reduce the national energy consumption through making customers aware of the energy consumption of items like household appliances, cars and buildings. Also in the Republic of South Africa, energy labelling is expected to be a feasible way forward in improving energy efficiency and thereby reducing overall energy consumption. Therefore, a energy labelling study was implemented to ascertain the state of affairs related to energy labelling, review existing laws and the requirements / desirability for new legislation / regulation.

1.2 General

The study was carried out by Energy Efficiency Services Section of Technology Services International a division of Eskom Enterprises (Pty) Ltd. on behalf of the Department of Mineral and Energy (DME) work group. Acknowledgement is given to these members and thanks for their support.

The stakeholders were drawn from government and industry

- Local manufacturers and importers,
- The National Electricity Regulator (NER),
- Eskom,
- Department of Trade and Industry (DTI),
- Department of Mineral and Energy (DME) – Energy Efficiency Environment and Energy - Project Working Group,
- SABS electrical and mechanical standards divisions
- Defy
- Miele
- TRAC Laboratories

The work group members are under the initial perception that the energy label is a good idea, it will save energy and hence lower energy bills, increase market share locally and internationally. However, as for all new ideas, they need to be motivated into the market and information on the energy label must be given to the users to obtain there acceptance and use.

The users must be informed of the energy label and what to look for on the label to make a decision. The suppliers and distributors must also be informed. This should be done by an awareness campaign.

2 METHODOLOGY

2.1 Methodology of Study

In the study, TSI in conjunction with the DME Project Work Group identified the possible appliances for this study. The appliances selected were:-

- Water Heaters – Electric, gas, paraffin, coal and solar
- Refrigerators and freezers
- Washing machines
- Tumble driers - electric
- Stoves – fixed electric
- Dish washers
- Space heating – thermostats in particular
- Lamps – Incandescent and fluorescent lamps

The approach for the selection of these appliances included the estimated / potential savings, the comparison to overseas and local standards / specifications and regulations. The proposed text for implementation was produced after a workshop.

The first group of appliances selected from the above list were those with major savings or where existing technical standards / specifications and or regulations were available and would be faster to implement an Energy Label System. The following appliances were included in this group:

- Water Heaters – Electric fixed,
- Stoves – fixed electric
- Refrigerators and freezers - electric
- Washing machines – domestic laundry treatment machines
- Lamps – Incandescent and fluorescent lamps

The recommendation for these appliances were taken to a workshop where the working group and commercial companies commented and were asked whether or not they would commit themselves to supporting the energy label system.

The study will take the balance of the appliances that could possibly be labelled into the next phase. The potential estimated savings and the relevant specifications were listed for some of the appliances but due to the short duration of this study, a complete study was not possible.

The programme identified possible energy labels and what information should be given to the consumers in such a label. (See Annex A)

The way forward was discussed and where possible, estimated budgets were included for the workshop and are included in this report. The high cost of the implementation stage, namely the advertising and promotion of the energy label, was not included in the costing nor budgets as this would be a major campaign with high costs. There are methods of lowering the promotional costs to an individual manufacturer or sponsor by sharing the costs and obtaining larger coverage.

The use of the new ECO label in Europe with the associated environmental aspects was also included in the study as this is part of the unification of the different country energy labels.

3 EXISTING NATIONAL LEGISLATION / REGULATION

3.1 Current State of Affairs in RSA

The South African history of appliance labelling started in 1991 in a report by Prof. Ernst Uken of the Cape Town Technikon.

The Department of Mineral and Energy in 1995 commissioned a project, as the first phase, to study the scope of appliance labelling and this resulted in the Canadian study by Marbek Resource Consultant (Ottawa Canada). The second and third phases were to be followed by the design and implementation of the labelling system. This was not done.

The ***White Paper on the Energy Policy of the Republic of South Africa 1998*****,** includes a section 8.3 on Energy Efficiency (page 75) where it states that *"energy efficiency is a measure of saving of energy,…… ", "Government will promote an energy efficiency awareness in households and will facilitate the establishment of relevant standards and codes of practice for the thermal performance of dwellings, ……... "* and *"The Government will promote the introduction of a domestic appliance labelling programme."* The DME have initiated a Baseline Study and Energy Audits of Buildings and this Appliance Labelling Study amongst its many programmes.

There have been other reports and papers presented at the Domestic Use of Energy Conference in Cape Town such as:

- "An Evaluation of Comprehension and Use of the U.S. Energy Guide Label: Lessons for Effective Program Design" by Jennifer Thorne American Council for an Energy-Efficient Economy (2000);
- "Minimum Energy Efficiency Standards for Room Air Conditioners in Malaysia: Estimating Electricity Savings Possibilities" by Masjuki HH, Mahlia T M I, Choudhury I A and Saidur R (2000);
- "Energy Efficiency Labels and Standards in the Developing World: The Collaborative Labelling and Appliance Standards Program (CLASP)" by Mika della Cava and Sachu Constantine Lawrence Berkeley National Laboratory and the Alliance to Save Energy (2001);
- "Energy and Water Savings from Household Clothes Washers in Malaysia by Masjuki H H, Choudhury I A and Maleque M A University of Malaya (2001).

In 1994, the topic of appliance labelling was raised in the Residential Demand Side Management (RDSM) section of Eskom and Electrotek (now EES) was contracted by Eskom Marketing to make some proposals and test selected appliances. Some of this work is included in the MARBEK report (Final report April 1997) commissioned by the Department of Mineral and Energy where the late Mike Smoog was acknowledged. The situation has not changed and the findings show that the energy efficiency label will reduce energy used by these household appliances. The standards used for the performance of many appliances is the same however many have had the compulsory safety specification added. The safety specification is based on the IEC document and has been over printed by the SABS.

The RDSM team also prioritised the Demand Side Management (DSM) initiatives from a cost point of view as well as from the speed with which results could be achieved and measured. Appliance labelling was given a low priority by the team due to the low costs benefit ratio and long time for the

reduction in energy use to be achieved. This recommendation is under debate and the cost to implement the energy labelling system is high and the benefits are long term but are real.

The current local status is that the industry is prepared to work with bodies to implement an energy labelling system provided that the cost benefit can be seen and that they will not be expected to fund the whole scheme. The competitiveness in the industry is such that the companies will follow the energy labelling system if it is to their advantage and of course to the Country's as well.

Miele and Defy representatives were concerned that other companies may use the energy label to their disadvantage, if it was implemented too fast and they would not be able to react quick enough. This was expressed because many white appliances were imported and therefore importers from countries were energy labelling exists could have the initial advantage or disadvantage depending on how other companies react. Due to the order and delivery time, goods can arrive with the energy label creating an advantage however other importers may bring in lower energy efficient goods and under cut the prices. The local manufacturer may be required to alter their manufacturing plant and capital budgets may not be available in the current short- term plans.

4 POTENTIAL FOR SAVINGS THROUGH LABELLING AND INVOLVED COST

The study by Eskom of the energy use of appliances in the South African home was used to draw up the table of the estimated cost and savings. The following are the assumptions made with the knowledge available at this time.

4.1 Assumptions in the estimated costs and reduction in Total Energy for South Africa and individual Users.

4.1.1 General Factors

The 1998 global figure of house households in the RSA was used for existing households.
New households were taken as 10% increase in houses built across the board.
The number of households with appliances was taken to be the same for existing and new.
Existing households would replace appliances after a number of years and this is given below for each appliance.
The energy efficiency was based on the expected savings due to the label and not on the total annual energy used by the appliance.
The energy used by the appliance was taken from the "Eskom ElektroWISE Focus on Electricity in and around the house".

4.1.2 Water Heaters

The monthly consumption of electricity is the total for the losses as well as the hot water used. Typically the losses would be 3.5 kWh per day for a standard SABS mark bearing geyser and the improved insulated geyser may reduce this by 1 kWh per day resulting in a saving of 30 kWh per month. The saving on the 450 kWh per month used is therefore a saving of 6.7%.
The existing geyser would be replaced after 15 years.

Other energy source water heaters were not included due to lack of specifications and usage information.

4.1.3 Refrigerators

The refrigerators are operating all day and the reduction in energy due to a label system will reduce this load as a total and not only the wall insulation standing losses but in addition the losses due to the door seals and shelving arrangements.
For ease and simplifying the expected benefits a table of three groups of refrigerators were used and not the 10 groups used by the European system.
Single door refrigerators used 49 kWh per month, two door refrigerators use 107 kWh per month and freezers used 45 kWh per month. The average energy savings are expected to be 5%.
Existing refrigerators and freezers would be replaced after 15 years.

4.1.4 Washing Machines

Two groups were used in the study namely the top load and front load type of machine.
The energy used was based on a standard cycle and water heating was included in the front load machine in the wash cycle but a cold wash was used in the top load machine. The energy used per month was taken as 23 kWh for front load washers and 16 kWh for top load washers and an average saving of 5% could be expected.
Spin drying was not included in any detail and was included as part of the standard cycle.
Existing washing machines would be replaced after 15 years.

4.1.5 Tumble Driers

Only one group was used in this study consuming 72 kWh per month and an average energy 5% saving was proposed.
Existing Tumble Driers would be replaced after 15 years.

4.1.6 Stoves

Fixed electric stoves were used in the estimate of the potential savings as there are few standards and user information for other types of energy source small portable or fixed stoves used by all income groups. The fixed electric stoves have the greater influence on the use on electrical energy and there is little data for other energy sources hence further investigation is required. The major influence by an energy label system is expected to be from the fixed electric stoves with ovens.
Savings in plate design and the oven insulation will be the main factors.
Savings of 1% of the total month energy of 279 kWh was used.
Existing fixed electric stoves would be replaced after 15 years.

4.1.7 Dishwashers

There are few dishwashers used in the RSA as a percentage of all households and many of these are imported and hence the energy label could be brought in with the appliance.
Savings of 10% are expected on the monthly energy used of 25 kWh due to the older designs currently installed in RSA.
Existing Dishwashers would be replaced after 15 years.

4.1.8 Space Heating

The standard electric element heaters have no temperature controls and savings can be achieved here.
Air conditioners can make a large contribution to reduce energy used but there are only a few units used in the homes. The units will be bought from suppliers and they may have energy labels in the country of origin hence they are included on a voluntary basis.
The winter use of electric space heating results in 150 kWh consumed monthly for the winter 4 months only. There are no figures for the number of other energy source space heaters, and these are considered small and should be brought into the second phase of the project.
Air conditioners use about 600 kWh per month and here energy efficiency labels could result in saving of 5%.
Existing electric space heaters and air conditioners would be replaced after 15 years.

4.1.9 Phasing-in of The Energy Label Programme

The phasing in of the energy label and acceptance of the label will depend on the strategy used in the awareness campaign. In this study a basic 5% annual growth in the use of the energy label was assumed.

The number of each type of unit sold per year will need to be verified and more work is required in this section to predicted more accurate energy savings.

4.1.10 Cost of Electricity, Money and Discount Rate

Cost of electricity and the cost savings have been done in the model using a cost of 30 cents per kWh and no interest rate nor annual electricity tariff increase rate has been applied. The lower income from the sales of electricity for the utility due to energy efficiency must consider in the annual revision of their tariff and this may add to the cost of electricity to the customer and to the utility. The aim would be that those participating in the scheme will be neutral in cost increases while those not participating will not benefit and will pay higher energy bills.

4.2 Tables of the Costs and Benefits for the Country

Table 1: Estimated Energy Reduction by Appliance

Market size Households 8,639,000 year 1998

line	Description of appliance	% of House-holds (Hhs) existing that have appliance	Number of existing units in Hhs	New units in new Hhs at 10% growth from 1998	Units replaced after 15 yrs No per year	Estimate units bought per year	Estimate Annual energy per unit in kWh	Estimate energy reduct % of annual energy	Estimated annual Energy reduction for units sold / yr in GWh	Estimate total reduction of all existing and new units in 15 yrs GWh
1	**Water heaters**									
1.1	Electric	28	2,418,920	241,892	161,261	403,153	5,400	7	152	2,286
2	**Fridges**									
2.1	Fridge single dr	18	1,555,020	155,502	103,668	259,170	588	5	8	114
2.2	Fridge two door	29	2,505,310	250,531	167,021	417,552	1,284	5	27	402
2.3	Freezer all	22	1,900,580	190,058	126,705	316,763	540	5	9	128
3	**Washing machines**									
3.1	front load	17	1,468,630	146,863	97,909	244,772	281	5	3	52
3.2	top load	11	950,290	95,029	63,353	158,382	192	5	2	23
4	**Tumble driers**									
4.1	front load	13	1,123,070	112,307	74,871	187,178	864	5	8	121
5	**Stoves**									
5.1	Electric	37	3,196,430	319,643	213,095	532,738	3,353	5	89	1,340
5.2	Electric hot plate	18	1,555,020	155,502	103,668	259,170	2,520	5	33	490
6	**Dishwashers**									
6.1	front load	5	431,950	43,195	28,797	71,992	300	10	2	32
7	**Space heating**									
7.1	Electric	28	2,418,920	241,892	241,892	483,784	450	5	11	136
7.2	Air conditioner	3	259,170	25,917	25,917	51,834	1,800	5	5	58
								Total	348	5,182

Table 2: Estimated Energy and Cost saving over a 5 Year period phasing in the Energy Label

line	Description	Estimated annual Energy reduction for units sold / yr in GWh	Estimate total reduction all existing & new EE units in 15 yrs GWh	Estimate Energy reduction in GWh per year 1	Estimate Energy reduction in GWh per year 2	Estimate Energy reduction in gWh per year 3	Estimate Energy reduct. in GWh per year 4	Estimate Energy reduction in GWh per year 5	Estimate Energy reduction in GWh per year 1 to 5	Estimated Rand Saving at 0.3 /kWh year 1 Rand x 1000	Estimate Rand Saving at 0.3 /kWh year 2 Rand x 1000	Estimated Rand Saving at 0.3 /kWh year 3 Rand x1000	Etimated Rand Saving at 0.3 /kWh year 4 Rand x1000	Estimated Rand Saving at 0.3 /kWh year 5 Rand x1000	Estimated Rand Saving @ 0.3 /kWh all exist units replaced + 15 years new EE units Rand x1000
	VOLUNTARY														
1	**Water heaters**														
1.1	Electric	152	2,286	8	15	23	30	38	114	2,286	4,572	6,858	9,144	11,429	685,764
2	**Fridges**														
2.1	Fridge single door	8	114	0.4	0.8	1.1	1.5	1.9	5.7	114	229	343	457	571	34,288
2.2	Fridge two door	27	402	1.3	2.7	4.0	5.4	6.7	20.1	402	804	1,206	1,608	2,011	120,631
2.3	Freezer all	9	128	0.4	0.9	1.3	1.7	2.1	6.4	128	257	385	513	641	38,487
3	**Washing machines**														
3.1	Wash m/c front load	3	52	0.2	0.3	0.5	0.7	0.9	2.6	52	103	155	206	258	15,465
3.2	Wash m/c top load	2	23	0.1	0.2	0.2	0.3	0.4	1.1	23	46	68	91	114	6,842
4	**Tumble driers**														
4.1	Tumble front load	8	121	0.4	0.8	1.2	1.6	2.0	6.1	121	243	364	485	606	36,387
5	**Stoves**														
5.1	Stoves Electric	89	1,340	4.5	8.9	13.4	17.9	22.3	67.0	1,340	2,679	4,019	5,358	6,698	401,887
5.2	Electric hot plate	33	490	1.6	3.3	4.9	6.5	8.2	24.5	490	980	1,469	1,959	2,449	146,949
6	**Dishwashers**														
6.1	Dish washer front load	2	32	0.1	0.2	0.3	0.4	0.5	1.6	32	65	97	130	162	9,719
7	**Space heating**														
7.1	Space heater	11	136	0.5	1.1	1.6	2.2	2.7	8.2	163	327	490	653	816	40,819
7.2	Air conditioner	5	58	0.2	0.5	0.7	0.9	1.2	3.5	70	140	210	280	350	17,494
	Total Voluntary	348	5,182	17	35	52	70	87	261	5,221	10,443	15,664	20,885	26,107	1,554,732
8	**Mandatory**														
8.1	Water Heater Mandatory	152	2,286	30	76	122	137	152	518	9,144	22,859	36,574	41,146	45,718	685,764
8.2	Stoves Mandatory	89	1,340	18	36	71	80	89	295	5,358	10,717	21,434	24,113	26,792	401,887

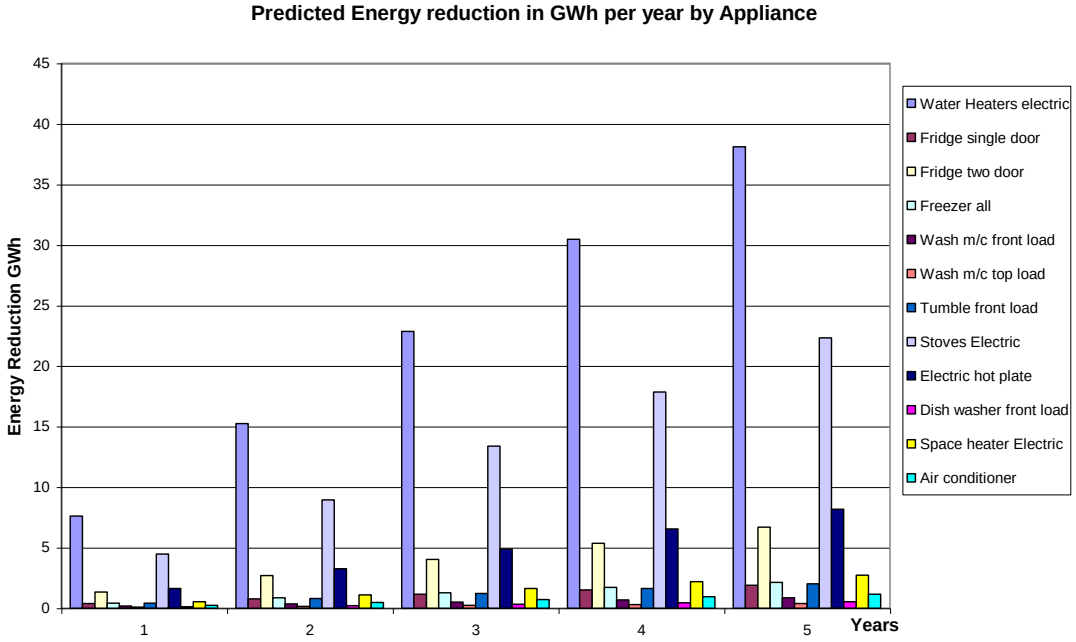


Figure 1: Estimated Energy reduction of Electrical Appliances in GWh per year.

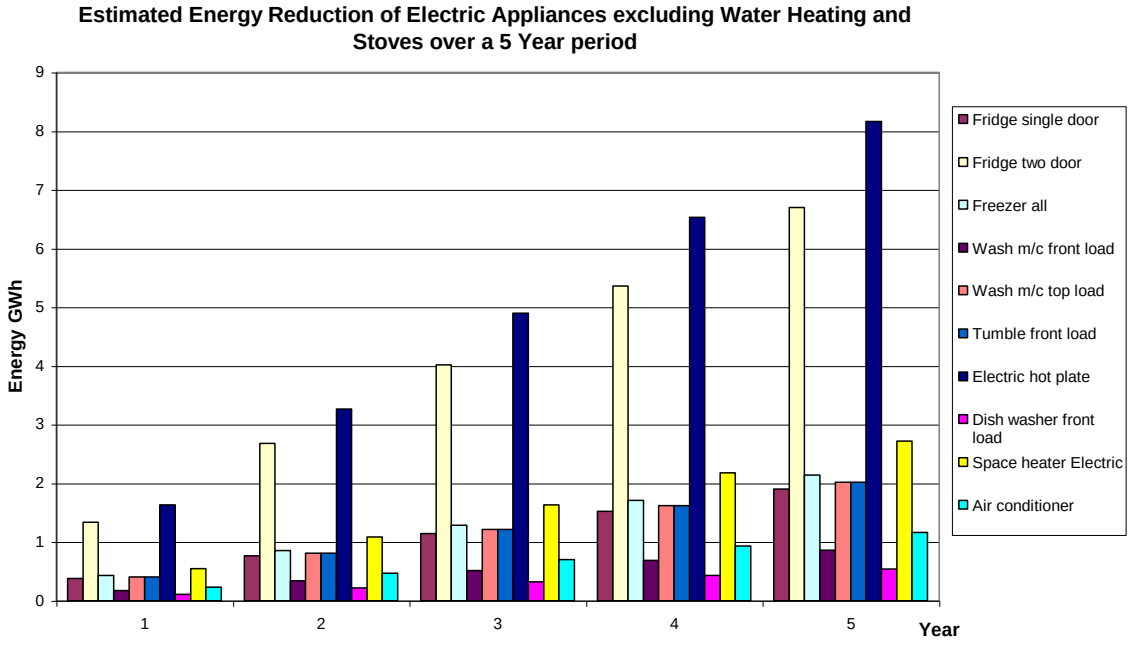


Figure 2: Estimated Energy Reduction of Electrical Appliances excluding Water Heating and Electric Stoves

4.3 Tables of the Costs and Benefits for the User

Table 3: Energy and Cost Reduction for Water Heaters Electric

Rand savings per unit over 10 years **elec. tariff R/kWh = 0.3**

				Annual reduction in energy as % of energy used					Electricity savings in Rand at R0.3/kWh				
Line	Description	Max	Energy	10%	20%	30%	40%	50%	10%	20%	30%	40%	50%
A	Open outlet type												
1	100	2.16	788.40	79	158	237	315	394	R 237	R 473	R 710	R 946	R 1,183
2	125	2.38	868.70	87	174	261	347	434	R 261	R 521	R 782	R 1,042	R 1,303
3	150	2.59	945.35	95	189	284	378	473	R 284	R 567	R 851	R 1,134	R 1,418
4	175	2.78	1,014.70	101	203	304	406	507	R 304	R 609	R 913	R 1,218	R 1,522
5	200	3.02	1,102.30	110	220	331	441	551	R 331	R 661	R 992	R 1,323	R 1,653
6	250	3.46	1,262.90	126	253	379	505	631	R 379	R 758	R 1,137	R 1,515	R 1,894
B	Cistern type												
1	100	2.81	1,025.65	103	205	308	410	513	R 308	R 615	R 923	R 1,231	R 1,538
2	125	3.02	1,102.30	110	220	331	441	551	R 331	R 661	R 992	R 1,323	R 1,653
3	150	3.24	1,182.60	118	237	355	473	591	R 355	R 710	R 1,064	R 1,419	R 1,774
4	175	3.44	1,255.60	126	251	377	502	628	R 377	R 753	R 1,130	R 1,507	R 1,883
5	200	3.67	1,338.46	134	268	402	535	669	R 402	R 803	R 1,205	R 1,606	R 2,008
6	250	4.10	1,496.50	150	299	449	599	748	R 449	R 898	R 1,347	R 1,796	R 2,245
C	Pressure type												
1	100	2.16	788.40	79	158	237	315	394	R 237	R 473	R 710	R 946	R 1,183
2	125	2.38	868.70	87	174	261	347	434	R 261	R 521	R 782	R 1,042	R 1,303
3	150	2.59	945.35	95	189	284	378	473	R 284	R 567	R 851	R 1,134	R 1,418
4	175	2.78	1,014.70	101	203	304	406	507	R 304	R 609	R 913	R 1,218	R 1,522
5	200	3.02	1,102.30	110	220	331	441	551	R 331	R 661	R 992	R 1,323	R 1,653
6	250	3.46	1,262.90	126	253	379	505	631	R 379	R 758	R 1,137	R 1,515	R 1,894

Table 4: Energy and Cost Reduction for Refrigerators and Freezers			
Rand savings per unit over 10 years		elec. tariff r/kWh =	0.3

				Annual reduction in energy as % of energy used					Electricity savings in Rand at R0.3/kWh				
Line	Description	Max Standing losses / 24h kWh	Energy per year kWh	10% energy kWh	20% energy kWh	30% energy kWh	40% energy kWh	50% energy kWh	10% savings Rand over 10 years	20% savings Rand over 10 years	30% savings Rand over 10 years	40% savings Rand over 10 years	50% savings Rand over 10 years
A	Single Door												
1	100	0.74	268.30	27	54	80	107	134	R 80	R 161	R 241	R 322	R 402
2	150	0.77	279.95	28	56	84	112	140	R 84	R 168	R 252	R 336	R 420
3	200	0.80	291.60	29	58	87	117	146	R 87	R 175	R 262	R 350	R 437
4	250	0.83	303.25	30	61	91	121	152	R 91	R 182	R 273	R 364	R 455
B	Double Door Refrigerator / freezer												
1	100	1.04	380.70	38	76	114	152	190	R 114	R 228	R 343	R 457	R 571
2	150	1.15	419.55	42	84	126	168	210	R 126	R 252	R 378	R 503	R 629
3	200	1.26	458.40	46	92	138	183	229	R 138	R 275	R 413	R 550	R 688
4	250	1.36	497.25	50	99	149	199	249	R 149	R 298	R 448	R 597	R 746
C	Freezer Chest												
1	100	0.62	225.60	23	45	68	90	113	R 68	R 135	R 203	R 271	R 338
2	150	0.68	247.90	25	50	74	99	124	R 74	R 149	R 223	R 297	R 372
3	200	0.74	270.20	27	54	81	108	135	R 81	R 162	R 243	R 324	R 405
4	250	0.80	292.50	29	59	88	117	146	R 88	R 176	R 263	R 351	R 439
C	Freezer Upright												
1	100	0.91	333.20	33	67	100	133	167	R 100	R 200	R 300	R 400	R 500
2	150	0.98	356.80	36	71	107	143	178	R 107	R 214	R 321	R 428	R 535
3	200	1.04	380.40	38	76	114	152	190	R 114	R 228	R 342	R 456	R 571
4	250	1.11	404.00	40	81	121	162	202	R 121	R 242	R 364	R 485	R 606

Table 5: Energy and Cost Reduction for Stoves Electric													
Savings per unit over 10 years						elec. tariff r/kWh =			0.3				
				Annual reduction in energy as % of energy used					Electricity savings in Rand at R0.3/kWh				
Line	Description	Max SABS losses in kW per sq. m	Energy per year kWh	10% energy kWh	20% energy kWh	30% energy kWh	40% energy kWh	50% energy kWh	10% savings Rand over 10 years	20% savings Rand over 10 years	30% savings Rand over 10 years	40% savings Rand over 10 years	50% savings Rand over 10 years
A	Electric ovens	0.6											
1	All 600x600x400 used for 1 hour per day	1.01	367.92	37	74	110	147	184	R 110	R 221	R 331	R 442	R 552
2	All 600x600x400 used for 2 hour per day	2.02	735.84	74	147	221	294	368	R 221	R 442	R 662	R 883	R 1,104

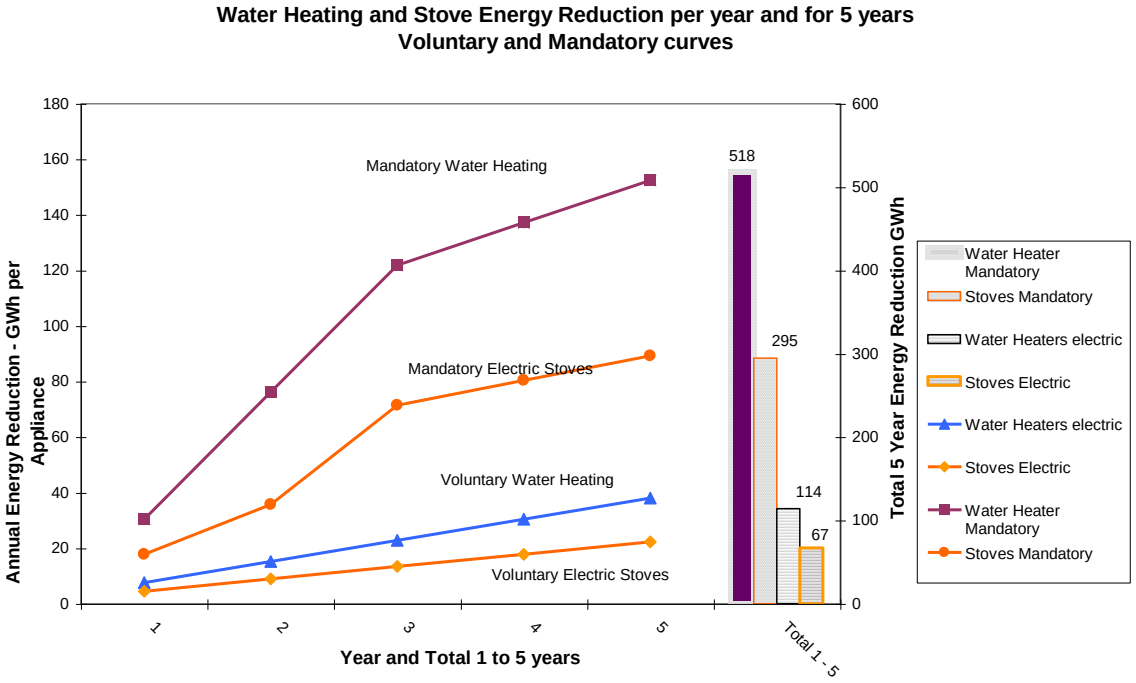


Figure 3: Estimated Energy reduction using Energy Labels on a voluntary versus a Mandatory Basis

4.4 Benefits and Costs

4.4.1 To the Nation

The cost to the nation to introduce energy efficiency labels will be high due to high publicity and marketing costs. The cost to prepare and flight a television advent may be much as R500 000. A number of radio adverts would be a similar cost. The print media and school education programmes will be necessary at a estimated cost of R1 million. The awareness and educational programmes will be required to run over at least five years at the above estimated cost. Thus the total awareness campaign should have a minimum budget of R10 million to introduce the energy efficiency label into South Africa.

The cost may be shared with the suppliers and other Stakeholders by doing joint campaigns and sharing advertising costs.

The benefits to the nation are large and will be much greater than the above awareness costs. The energy efficient label on the water heaters, with a reduction of losses of 20% over a 5 year period and with mandatory implementation, is expected to be in the order of to the R155.44 million to the customers. If all the selected appliances have an energy label that produces a reduction of about 5% in the energy used will produces a reduction in energy bills estimated at R1,554 million.

These energy costs are avoided cost to the customer resulting in the more disposable income.

4.4.2 To the Customer / User and Manufacturers

Customer will benefit from the Energy Efficiency label in that they will be able to purchase more energy efficient appliances with the resulting lower energy bills. The energy efficient appliances may initially be a higher cost than the normal appliances but will save to a short time period. The energy efficient appliances will eventually become the norm as the numbers purchased increase and the bulk buying power lowers their price.

The cost for an energy efficient water heater may increase the cost by R100 (retail) and the unit will have lower heat losses resulting in a saving on the electricity bill. The energy saving may be 10% of the losses resulting in an annual saving of R33.10 and a payback period of three years. (Ref. Table 3: Water heater type C 200 litre.)

The cost of an energy efficient refrigerator may have an initial increase cost of R200 and lower the energy used by 20% giving an annual electricity cost saving of R18.20, giving a payback period of 10 years. The refrigerator has a life of 15 years resulting in the R274 saving to the customer. (Ref. Table 4:- Single door 250 litre refrigerator with 20% higher efficiency.)

The manufacturers will have added costs to make appliances energy efficient. These costs could be as high as R4 million if the complete product is redesigned and new tooling is required. These costs will be amortised over the life of the product and the cost per appliance is then reduced to about R100 each at manufacture but the mark up is about 2x resulting in the retail price increasing to R200. The redesign of appliance is the normal progression of a product and can be included in the normal costing. The energy efficient component may be the added insulation or improved compressor or condensing coil and this cost is expected to vary from R30 to R100 per product. The increased cost is therefore about 10% of the manufacture cost and will through the retail system increase the price to the customer by a similar 10%. The increased costs are a “once off payment,” while the benefits are an annual energy and cost saving, resulting that if the increased costs are managed, the payback period will be 10 years. Major energy efficiency improvements will be a high cost to the manufacturer but if these are phased in the costs can be managed.

Table 6: Costs and Benefits for Water Heaters and Refrigerators.

Description	Cost at manufacture Rand	Cost at Retailer Rand	Energy reduction over 10 years kWh	Rands saved over 10 years
Water Heaters				
Added Insulation	R50	R100	1100	R331
Refrigerators	Cost at manufacture Rand	Cost at Retailer Rand	Energy reduction over 15 years kWh	Rands saved over 15 years
Energy efficient compressor	R20			
Tooling Costs	R20			
Added insulation and door seals	R60			
Both EE compressor, insulation and door seals	R100	R200	915	R274

The introduction of energy efficiency labels should investigate and facilitate funding schemes to lower the increased manufacturer cost for energy efficiency. For example there may be funds to reduce green house gasses by improved energy efficiency.

5 LEGISLATION FROM OTHER COUNTRIES

5.1 International Experience

Some of the existing international energy labels in use are illustrated in Annex A.

The International status is that may countries have an energy labelling system to name some as follows: - Australia and New Zealand, Malaysia, India, Ghana, USA and Canada, the European Countries. Many of these systems were initiated in the mid- 1970's with the oil crisis. The label systems have been updated and the energy efficiency of many products has increased by 15% or more. The Indian energy labelling system has legislated that no technology older than 10 years may be imported.

The European energy label (See Annex A) with levels A to G where A is the most efficient and G the lowest level have found that currently the levels of refrigerators in the levels D to G are not available on their market. The levels for freezers have only lost the levels F and G. There is a consideration now under discussion of introducing the level A+ and A++.

The current European system has introduced the ECO label where the concept from "cradle to grave" or life cycle basis using a matrix system is under investigation. The energy label is part of this system. The number of products groups in this system is currently 11 groups and the participating countries are 17. Energy labelling was introduced overseas in the 1970's and it has taken many years for them to reach its current acceptance level and understanding by the customers. They are now revising their system to the ECO label and a table of products and countries using the ECO label are given below:-

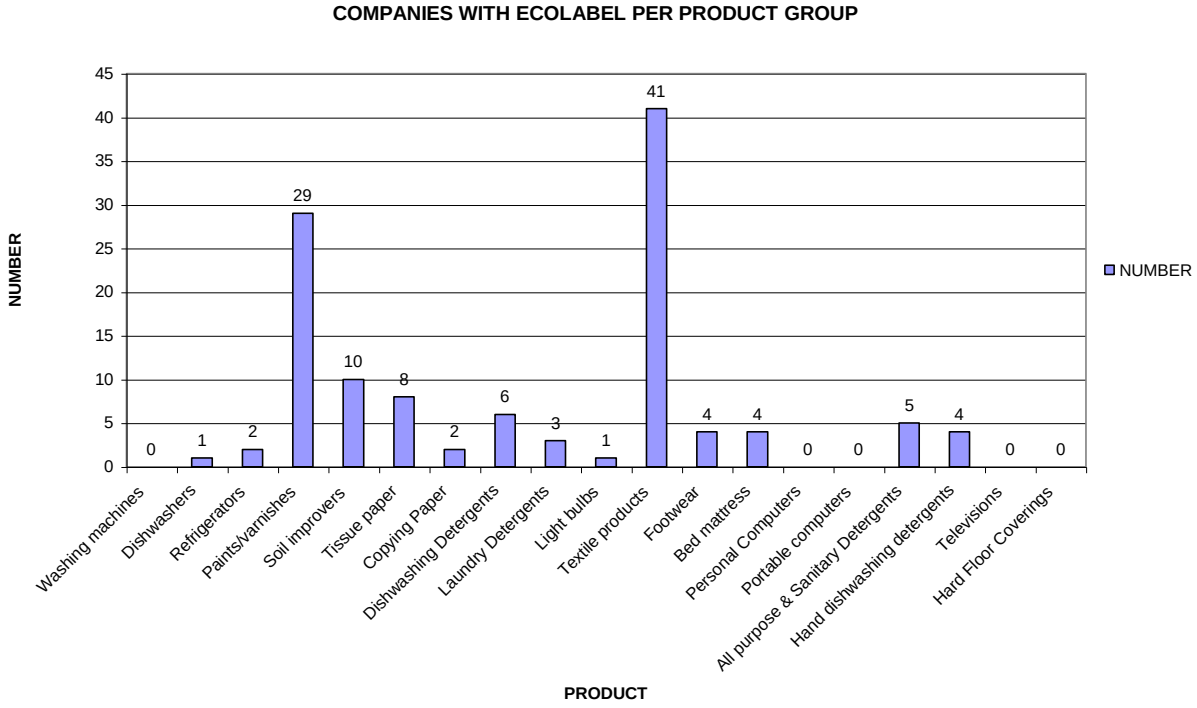


Figure 4:- Companies with ECO-label per Product Group

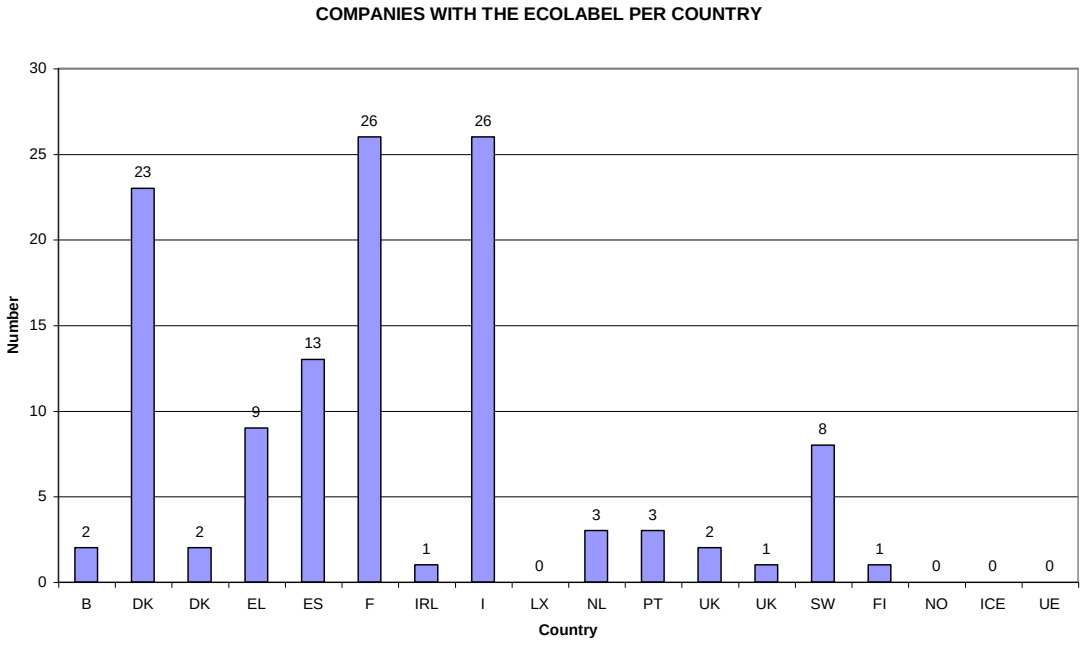


Figure 5:- Companies with ECO-label per Country

From the above, it can be seen that the European Countries who have had an Energy labelling system, have only made small in roads with the new ECO label. We must take note that the energy label will take time to be accepted by both the manufacturers and the consumers.

Another factor that must be considered is the energy source available to these northern hemisphere customers such as gas or oil and where towns have district heating systems, whereas in South Africa we are dependent on coal and electricity.

Table 7. Use of Labels, Standards and Targets Programmes for Major Home Appliances (as of June 2000)

	Number of Countries and EU		Countries and EU
	Labels	Standards or Targets	l = mandatory label; s = mandatory standard; t = target; vl = voluntary label; vs = voluntary standard
Refrigerators and Freezers			Australia (l,s); Canada (l,s); European Union (l,s); Hungary (l,s); Japan (vl,s)*; New Zealand (vl);
IEA	8 + EU	6 + EU	Norway (l), Switzerland (l,t); United States (l,vl,s)
Non-IEA	15	10	Brazil (l,vs); Bulgaria (l,s); China (s); Chinese Taipei (vl,s); Hong Kong China (vl); India (l,vs)*; Indonesia (vl)*; Iran (l,s); Korea (l,s)*; Lithuania (l); Mexico (l,vl,s), Philippines (l); Poland (l,s); Romania (l), Russia (s); Singapore (vl);* Thailand (vl)*
Clothes Washers			Australia (l); Canada (l,s); European Union (],vs); Hungary (l); New Zealand (vl),. Norway (l);
IEA	7 + EU	4	Switzerland (l,t); United States (l,vl,s)
Non-IEA	8	2	Bulgaria (l); China (s); Chinese Taipei (vl); Hong Kong China (vl); Lithuania (l); Mexico (l,s); Poland (l); Romania (l); Singapore (vl)
Clothes Dryers			Australia (l); Canada (l,s); European Union (l);
IEA	6 + EU	3	Hungary (l); New Zealand (vl), Norway (l); Switzerland (l,t); United States (S)
Non-IEA	4		Bulgaria (l); Lithuania (l); Poland (l); Romania (l)
Dishwashers			Australia (l); Canada (l,s); European Union (l);
IEA	7 + EU	3	Hungary (l); New Zealand (vl); Norway (l); Switzerland (l,t); United States (l,vl,s)
Non-IEA	4	1	Bulgaria (l); Lithuania (l), Poland (l); Romania (l); Russia (s)
Room Air Conditioners			Australia (l); Canada (l,s); Japan (vl,t,s);
IEA	5	3	New Zealand (vl); United States (l,vl,s)
Non-IEA	8	8	Brazil (l); China (s); Chinese Taipei (vl,s); Hong Kong China (vl); India (vs); Korea (l,s); Mexico (l,vl,s); Philippines (l,s), Russia (s); Singapore (vl,s);Thailand (vl)
Electric Water Heaters			Australia (s); Canada (s); New Zealand (vl);
IEA	2	3	United States (l,s)
Non-IEA	-	3	Chinese Taipei (s); Mexico (s); Russia (s)

Lighting Equipment			Canada (s); European Union (l); Hungary (l); Japan (l,s); Norway (l); Switzerland (l); United States (l,s)
IEA	5 + EU	3	
Non-IEA	11	5	Bulgaria (l); Chinese Taipei (vl,s); Hong Kong China (vl), Korea (l,s); Lithuania (l); Malaysia (s); Mexico (vl,s); Philippines (l,s); Poland (l); Romania (l); Singapore (vl); Thailand (vl)

Source: International Energy Agency (IEA)
* Refrigerators refers to refrigerators and combination refrigerator-freezers.
** Applicable to refrigerators and refrigerator-freezers only, not stand-alone freezers.

5.2 The Comparison of Standards or Targets Versus Labels.

5.2.1 Energy Standards

The South African Industry has jointly with users, introduced a number of standards for the safety and performance of domestic appliances through the SABS. Some of these are compulsory while others are voluntary standards. A list of applicable household standards is given in Annex B.

The compulsory safety standards and those performance specifications included in the compulsory Code of Practice for the Wiring of Premises SABS 0142 part 1 are monitored by the SABS and by the Department of Labour regional inspectors. Suppliers of equipment are responsible for compliance with these specifications and penalties may be imposed should they fail to comply and the goods may be destroyed. The builder and electrical contractor must ensure that certain materials meet the minimum specifications and therefore call for SABS mark bearing materials. The fixed electric water heaters and stoves must be approved by an acceptance panel before they can be installed and accepted under the Certificate of Compliance in terms of the Code of Practice for the wiring of premises SABS 0142. The acceptance is generally that they comply with the SABS performance specification or equivalent standard in the country of origin.

The voluntary specifications are imposed so that the consumer may purchase goods manufactured to a standard with a guarantee that it will be of quality and meet the expected performance. Many of these specifications were prepared for large organisations, such as the Public Works Department, Local Municipalities and Eskom, so that they could purchase goods manufactured to a common standard. The standard was set at a level that the small consumers would be able to benefit and afford. The user must request that the voluntary specifications must be complied with when purchasing goods.

Energy efficiency is generally incorporated in both these standards with a level set that must not exceed. For example the 24h standing losses of electric water heaters must not exceed a set figure depending on the type and volume. The test method is also included in the specification. Electric stoves have a similar requirement for the heat lost from the oven. The cooking top plates must also comply with a performance specification.

5.2.2 Energy Labels

Goods may display the energy used as required by the existing SABS or SABS IEC specifications. This is usually displayed on the model and serial number tag at the back of the appliance and not visibly from the front of the appliance. The marking does not carry a norm or “bench marked” figure. The customer cannot compare the energy efficiency of one make to another or to a norm for that type of appliance.
The energy efficiency label not only states the energy used by that manufacturer’s appliance but shows how this appliance compares with the industry norm – worst and best model on the market. The label also allows that existing manufacturers with better than the minimum specification appliances to claim credit. The energy label will allow the manufacturers to be more competitive.

5.2.3 Legislation of Energy Labels and Standards.

The RSA industry may voluntary adopt the energy efficiency label to be competitive however when goods are imported, such is the RSA situation, importers may bring in goods without the label at lower prices and poorer performance. They can sell these at a low price. To avoid the possibility of have these goods in the RSA market, legislation must be put in place to stop these goods at the point of entry.

The time for legislation to be put in place is long. Legislation requires that the goods will have to comply with some entry requirement and hence some measure / performance specification will be required. The measure may be that the current performance specification must be met and not voluntary as is the current practice is for portable white goods. The legislation should govern that goods must meet a specification. Later as the industry grows to accept the energy label improvements may be affected by changing the specification without changing the law.

In South Africa under the Standards Act of 1993, the minister has made some SABS and or SABS IEC Standards compulsory. Other voluntary standards may now be necessary to be made compulsory. While such action is taking place, the specifications can be amended to include the energy efficiency label in the sections of marking. The test methods are in place and the industry has accepted the current levels of performance and the introduction of energy efficiency labels will stretch them. This will improve the energy efficiency of the goods as well as make them more competitive when exported.

From the Table 1, the system used in other countries can be seen to vary depending on the appliance and the country. Generally countries use a combination of mandatory labels and standards as well as voluntary labels and standards.

5.3 The Advantages and Disadvantages of each system

Table 8 : Legislation only for labels and standards

Line	Advantages	Disadvantages
1	Energy labels can be enforced at point of entry	Require baseline data for advanced energy label
2	Phasing in of the energy label and performance enhancement possible within a fixed time period	Require time to draft new legal documents and Gazette publication
3	Can policed in the market	Require buy-in from users to be accepted
4	Stops dumping or poor imports	Requires buy in from suppliers due to change of thinking
5	Can use the overseas experiences	Requires a reference to measure against the industry norm
6	Standards Act Exist	
7	Users and suppliers will benefit	

Table 9 : Standards and energy labels only voluntary

Line	Advantages	Disadvantages
1	Quick to put in place if the industry and market accept them	Cannot be enforced
2	Requires buy-in from users to see benefit only purchase energy labelled goods	Some specifications exist and require amendments but why create additional costs
3	Requires buy-in from manufacturers	Test methods exist but why test the appliances and increase costs
4	A base line exists in the current SABS or equal mark bearing goods	No data base exists and hence no norm so nothing to compare the advantages

The use of the European Energy Label was reported to be free to the European manufacturers, however we consider that there will be a cost for its use in RSA. No costs for the use of the EU energy label in South Africa has been received from the European energy label rights holder and a provisional cost based on the ECO label costs has therefore included below. The cost is expected to be a small cost compared to the benefits / savings and awareness campaigns costs. All the ECO Label and energy labelling systems have a copyright and their label system can be implemented by “competent bodies”. The usual fee to use the ECO label system (about 500 EUROs (R5000) to apply and a fee of 0.15 percent of the annual volume of sales for the ECO label). The fee is used to approve, control the competent bodies and users and to police the system. The local energy label systems implemented in each country has had little impact as they may vary and it is difficult implement on a large scale and then to control. The European motivation for the new ECO label is to unify their energy labelling systems and so enrich the system.

The international legislation depends on the country with the buildings having to comply to maximum energy usage per square meter to including one or more energy efficient appliances in the building and / or household. The United Kingdom have legislated that three energy efficiency devices shall be in the households by the year 2015. The new ECO label system has its goals at one level “A” appliance in each household (100 million) by the year 2015.

The Collaborative Labelling and Appliance Standards Program (CLASP) was introduced into Ghana in their buildings and the air conditioning standards were implemented.

In Annex A some of the existing Energy Labels currently in use are given.

6 THE CAPACITY AT NATIONAL / PROVINCIAL LEVEL TO SUPPORT LABELLING

6.1 National / provincial support

The national support for energy efficiency is growing in RSA with the acceptance of the Energy Efficient Lighting programme and motivated by the cost of electricity and other fuels increasing. The Eskom ElektroWise initiatives have broken some of the ice to show customers how appliances can be used and how the use of energy can be reduced. The DME, the DTI with the SABS and a similar projects by NEDLAC on energy efficiency are showing a concern that energy use should be reduced for the benefit of all. The DME energy month is a major annual programme.

The customer has little or no knowledge on energy labelling resulting that a new team of advisors must be trained and motivated to make customers aware of the system. New skills will have to be taught and this should be done in conjunction with the implementation of a energy labelling scheme. An awareness campaign must be planned and implement in all sectors.

The policing of the energy label scheme is critical in the implementation and maintenance of the energy label system. A controlling body must be present in RSA. The main controlling body is usually the owner of the label who can appoint regional bodies to support them. The controlling body may be the existing SABS or local / regional inspectors, however the staff will require training and have the skills to identify marked and poor unmarked products. Workshops will have to be held in the regions to provide the skills. The regional inspectors will be required to monitor the energy efficiency label in the factories, retailers and in the homes.

6.2 Test houses

There should be one or more test houses for local manufacturers to have their products tested and accepted. These test houses must be approved / accredited by the energy efficiency label owner. The SABS Test house is the major test house in RSA and they award the current SABS mark. There is another test laboratory for electrical measurements, TRAC laboratories that can undertake energy measurements but will not carry out the full mechanical testing of appliances.

As well as the SABS test house, Manufacturers have in house test facilities for quality control and development work and these could be accredited to make energy measurements under the SANAS system. Defy factories and the factory in Swaziland would be able to do this work for

refrigerators. Washing machines may be tested by Defy or TRAC Laboratories. Stoves may be tested by the local manufacturers and the above, independent laboratories. Electric water heaters may be tested by the manufacturers, TRAC laboratories and the SABS. TSI has ISO certified laboratories and these could be up graded to be an accredited laboratory as the demand requires.

7 PROPOSED PLAN OF ACTION

7.1 Methodology of Implementation

7.1.1 Action Programme

Local South African legislation / regulations have the Code of Practice for the Wiring of Buildings (SABS 0142) and the Building regulations (SABS 0400) that are enforced regulations for all new work. These are enforced in the formal sector and hence fixed appliances such as Electric Stoves and Water heaters can be with be introduced as the first phase. These technical performance specifications can be amended and then they can be legislated to be compulsory specifications.

The second group of appliances selected for the energy labelling system will be for appliances that are connected to the switch socket outlets. These are the following:-

Water Heaters – Gas, paraffin, coal and solar
Refrigerators and freezers - Gas, paraffin and solar
Stoves – Gas, paraffin, coal and solar
Space heating – Electric, gas, paraffin, coal and solar

Here the legislation for the control of imports must be visited and higher duties applied to poor efficiency products versus more efficient products. Import permits may also be control for the importing of old technologies similar to the Indian scheme.

The proposed system for each appliance is given below:-

Table 10 : Recommendation for South Africa by Appliance Group

A	Electric Water Heaters - fixed	
Step	Standard	Legislation
1	Safety standards exist and require amendment for markings	Safety specification is compulsory
2	Performance specification exists and require amendment for energy levels and labels	Performance specification is compulsory through the approval system of SABS 0142
3	Require data of standing energy losses to be collected to create a database and a norm	No new legislation required
4	Amend the performance specification to include the energy label	

B	Electric Stoves - fixed	
Step	Standard	Legislation
1	Safety standards exist and require amendment for markings	Safety specification is compulsory
2	Performance specification exists and require amendment for energy levels and labels	Performance specification is compulsory through the approval system of SABS 0142
3	Require data of standing energy losses to be collected to create a database and a norm	No new legislation required
4	Amend the performance specification to include the energy label	

C	Refrigerators and Freezers	
Step	Standard	Legislation
1	Safety standards exist and require amendment for markings	Safety specification is compulsory
2	Performance specification exists and require amendment for energy levels and energy label to be stated	Requires that the European performance specification to be made compulsory
3	Require data of annual energy losses to be collected to create a norm	Requires drafting of the legislation to control only energy labelled and efficient products to enter RSA
4	Compare SABS specifications to the European energy label classification	
5	Accept and implement the European energy label system	

D	Clothes Washers	
Step	Standard	Legislation
1	Safety standards exist and require amendment for markings	Safety specification is compulsory
2	Performance specification exists and require amendment for energy levels and energy label to be stated	Requires that the European performance specification to be made compulsory
3	Require data of annual energy losses to be collected to create a norm	Requires drafting of the legislation to control only energy labelled and efficient products to enter RSA
4	Compare SABS specifications to the European energy label classification	
5	Accept and implement the European energy label system	

E	Clothes Dryers / Tumble Dryers	
Step	Standard	Legislation
1	Safety standards exist and require amendment for markings	Safety specification is compulsory
2	Performance specification exists and require amendment for energy levels and energy label to be stated	Requires that the European performance specification to be made compulsory
3	Require data of annual energy losses to be collected to create a norm	Requires drafting of the legislation to control only energy labelled and efficient products to enter RSA
4	Compare SABS specifications to the European energy label classification	
5	Accept and implement the European energy label system	

F	Dish Washers	
Step	Standard	Legislation
1	Safety standards exist and require amendment for markings	Safety specification is compulsory
2	Performance specification exists and require amendment for energy levels and energy label to be stated	Requires that the European performance specification to be made compulsory
3	Require data of annual energy losses to be collected to create a norm	Requires drafting of the legislation to control only energy labelled and efficient products to enter RSA
4	Compare SABS specifications to the European energy label classification	
5	Accept and implement the European energy label system	

G	Room Air Conditioners	
Step	Standard	Legislation
1	Safety standards exist and require amendment for markings	Safety specification is compulsory
2	Performance specification exists and require amendment for energy levels and energy label to be stated	Requires that the European performance specification to be made compulsory
3	Require data of annual energy losses to be collected to create a norm	Requires drafting of the legislation to control only energy labelled and efficient products to enter RSA
4	Compare SABS specifications to the European energy label classification	
5	Accept and implement the European energy label system	

H	Electric Lamps and Luminaires	
Step	Standard	Legislation
1	Safety standards exist and require amendment for markings	Safety specification is compulsory
2	Performance specification exists and require amendment for energy levels and energy label to be stated	Requires that the European performance specification to be made compulsory
3	Require data of annual energy losses to be collected to create a norm	Requires drafting of the legislation to control only energy labelled and efficient products to enter RSA
4	Compare SABS specifications to the European energy label classification	
5	Accept and implement the European energy label system	

I	Gas. Paraffin, Coal, Solar and "other than electric" energy household appliances	
Step	Standard	Legislation
1	Some safety standards may exist and require amendment for markings – stoves, lights and other appliances	Safety specification is compulsory where existing for stoves and lights
2	Performance specification where existing, require amendment for energy levels and labels	Requires that the amended performance and new specification is made compulsory
3	New performance specifications may be required for refrigerators, water heaters, etc.	Requires drafting of the legislation
4	Require data of annual fixed energy losses to be collected to determine the norm for the appliances	

8 CONCLUSION

From the estimated savings and the discussions with some of the suppliers its is invisaged that Energy Labelling will reduce the energy consumed by these domestic appliances. In the article *"Observed energy savings from appliance efficiency standards"* by A K Meier publisher Elsevier July 1930, he states that "*No country has directly measured the actual energy savings resulting from efficiency standards, but many studies – mostly North American – have indirectly observed savings,"* and *"actual savings correspond closely to those predicted in laboratory tests,"* hence we conclude that, the energy label scheme will work in South Africa. The monitoring and measurement of the savings should be done remotely by monitoring sales of goods and the efficiency of these goods on a bi-annual survey.

The implementation will take long to introduce however because many European countries have already introduced the system in their home countries and that they are South Africa's larger trading partner these can easily and quickly be introduced into our market. The South African standards will however have to have sections added or amended to describe the energy label levels and method of testing. This can be achieved by setting up work groups of the Technical

Committees, for each appliance and changing the standard as required. The South African National Standards have agreed to start this work.

The legislation can be changed to make the voluntary Standard a compulsory standard as given in the Annex F where the Plastic Bag Regulation or the Existing Standards for Gaming Devices or Medium Voltage cables became compulsory standards. These are typical example s as to how the legislation can be changed.

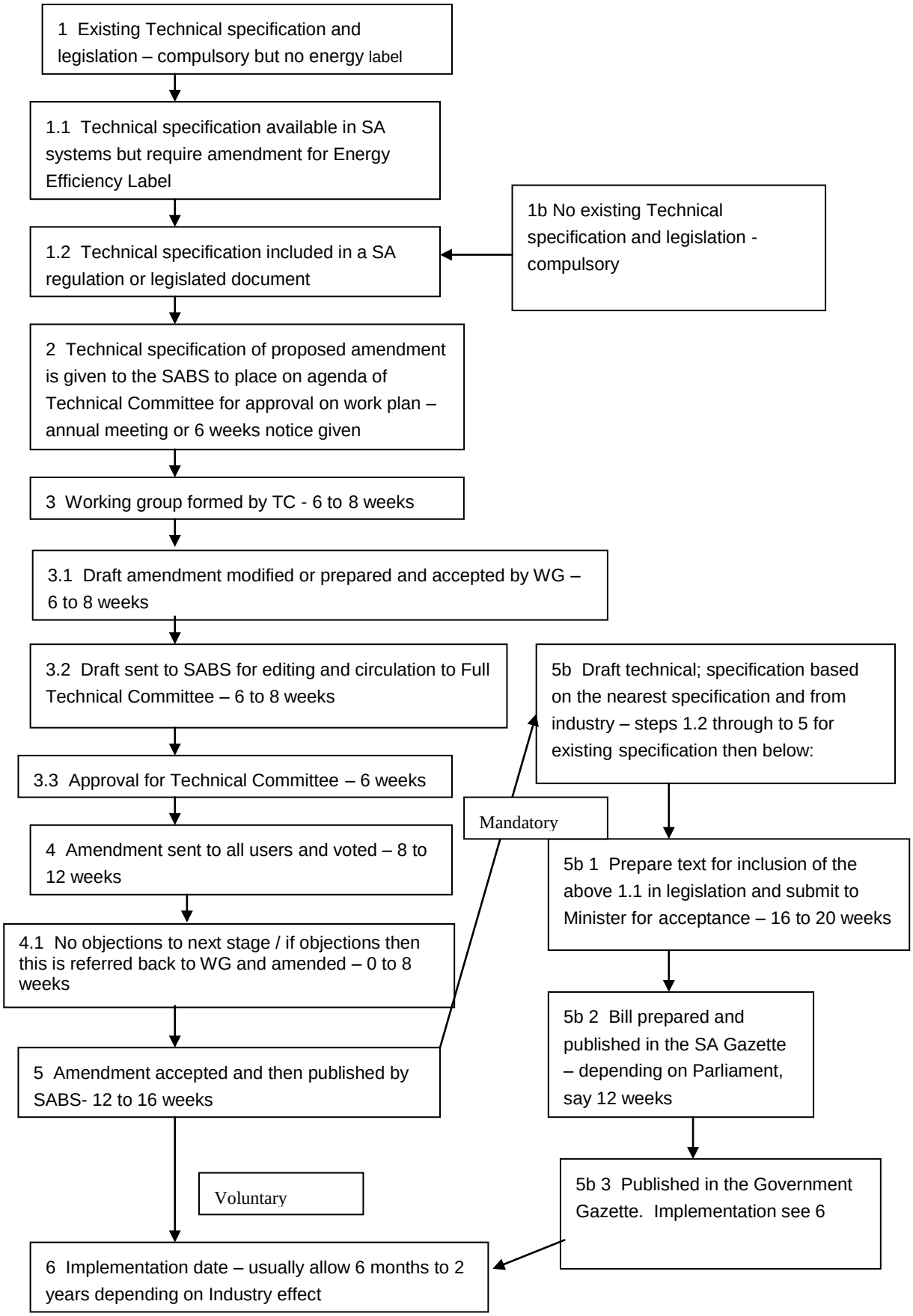
9 RECOMMENDATIONS FOR LEGISLATION / REGULATION TO BE IMPLEMENTED

9.1 Recommendation on the requirements for labelling

The study looked at the current specifications in South Africa and compared these with the international standards. We have approached the SABS and they have offered to look at amending existing performance specifications on our recommendation or to over print the European standards if they are suitable. This will be proposed for consideration at the next technical committee.

Legislation will take a long time and it may not be necessary if the above could be accepted. For information the following flow table is the expected path for the Energy label system to be approved. Both paths are shown with an estimated time included for each stage.

Table 11: Estimated Time for Standards and Legislation to be Published



With our experience at testing and working with the drawing up of regulations / legislation / specifications it is far quicker to adopt existing specifications and or amend documents. The study has identified that fixed appliances, namely the fixed electric water heater and electric stoves, can be addressed through the existing legislation and regulations namely the wiring regulations SABS 0142 and the Building Regulations. The existing SABS specifications for electric water heaters and stoves have a maximum standing loss test and value for compliance, therefore the table should be changed to allow for improved values and that these are recognised by use of an energy efficiency label. These two appliance groups have the higher usage and resulting reduction in energy.

The second group of appliances, have compulsory safety standards but no performance standards hence legislation will be required to address this group of products after the technical performance specifications are in place.

10 DRAFT LAW TEXT FOR LABELLLING OF HOUSEHOLD APPLIANCES

The existing Standards for many of the domestic appliances in South Africa have a compulsory Safety Standard however the performance part of the standard is voluntary. In the case of energy reduction and in keeping with the "Energy White Paper," it will be necessary to make the performance standard compulsory.

The Department of Trade and Industry have under the "Standards Act" been able to make some performance standards compulsory and so has the Minister of Environmental Affairs and Tourism. The Minister of Mineral and Energy may be able to follow these examples using the current "Draft Energy Bill" and to "save the environment" be able to legislate that all domestic appliances shall comply with the performance standards.

The benefits for making the performance standard compulsory with the associated energy reduction varies from one appliance to the next. The additional cost to the manufacturer to achieve energy efficiency improvements is claimed to exceed the energy reduction benefits, but there is continual improvement in industry and the "Energy label" will encourage further improvement and will give the manufacturer the opportunity to claim credit for their improvement. The benefits have already be stated that they are difficult to measure be a direct means and indirectly world-wide Energy Labels have improved the efficiency of appliances and reduced the energy used.

It is recommended that the examples of the amendments are used to make the performance standards for the following appliances be made compulsory:

Fixed Water Heaters
Fixed Electric Stoves
Refrigerators and Freezers
Electric Lamps filament and all discharge lamps
Washing machines – Laundry Treatment machines.

A secondary part of making these performance standards compulsory will enable the controlling bodies to stop poor energy efficient appliances no longer accepted in Europe and America from

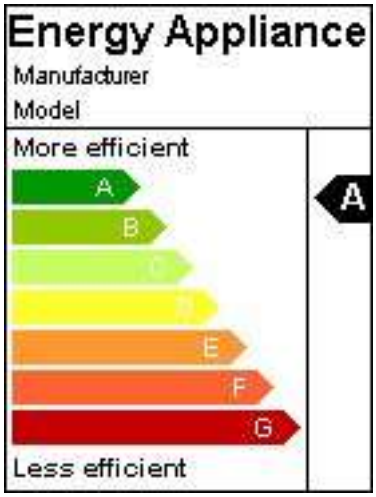
being exported to South Africa. These controlling bodies will have the tools to stop issuing import permits and to stop the appliances entering the market.

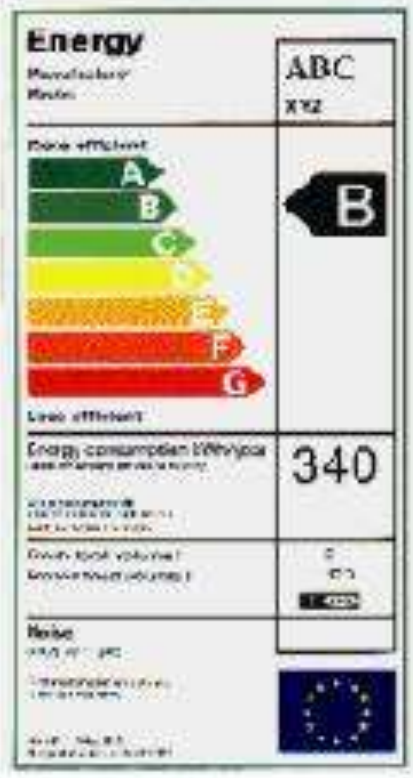
11 ANNEXES

11.1 Annex A : - Existing Energy Labels in Use in other Countries

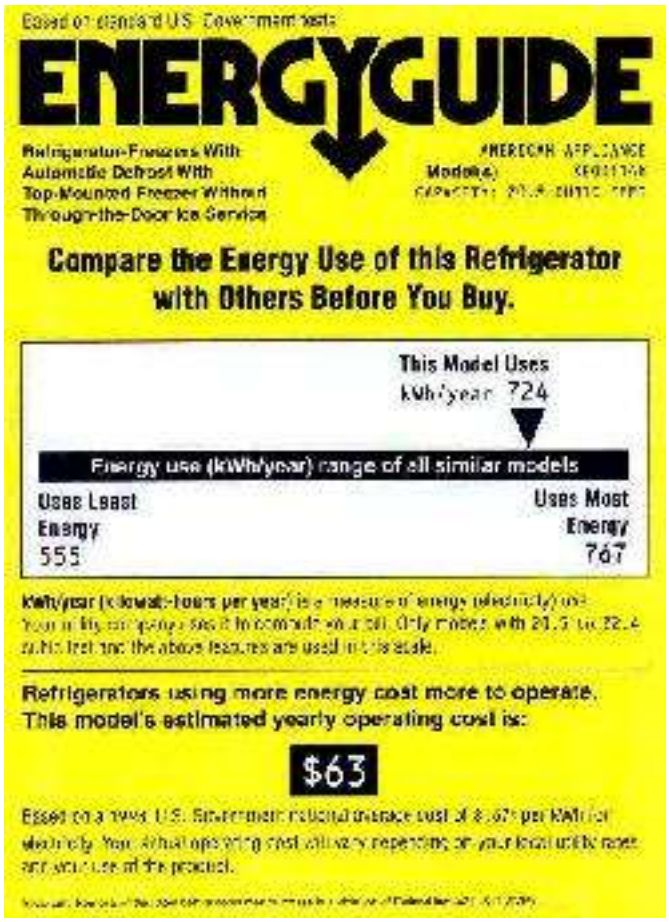
This was based on from where the majority of appliances are imported and where the exports are destined and what energy labels exist in the market.

A.1 European Energy Efficiency Label.

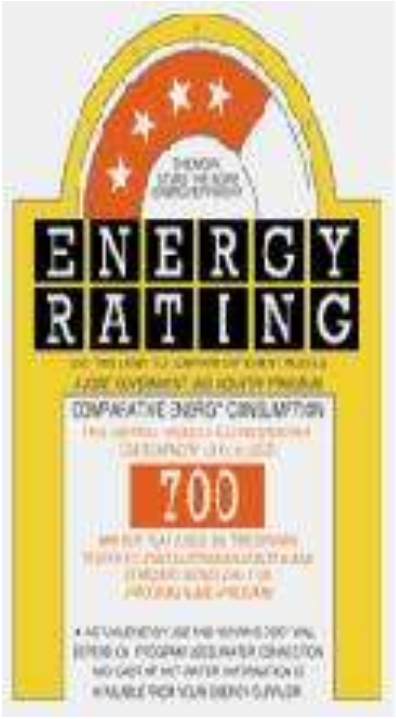




A.2 Current U>S> Energy Guide Label (Modified 1994)



A.3 Australian Energy Label



11.2 Annex B : - Letter to the SABS asking for amendments to the water heater and stove standards.

South African Bureau of Standards
Private Bag X191
Pretoria
0001

Attention Mr A J Claasen

Date	Your reference	Our reference	Enquiries
25 October 2002		App lab EES/rjh	Robert Henderson Tel 011 629 5276 Fax 011 629 5264 Mobile 083 960 3631

Dear Sir,

Energy Efficiency Labelling – Domestic Appliances

Energy efficiency labelling of domestic appliances has been introduced in many countries within the European Union, United States of America, Canada, Australia and New Zealand, India, Ghana, to name a few; with the objective to reduce the energy used by these appliances. The reduction in energy use has the benefit of lower electricity bills for the customers and the Nation as well as the reduction of greenhouse gas benefits to save the Planet. The use of more efficient appliances will also save fuel and water resources.

This is to request that the SABS Technical Committees consider the introduction of Energy Efficiency labels on:-

- Electric Water Heater Fixed - SABS 151
- Electric Stoves - SABS 153 and SABS 154
- Electric Refrigerators and Freezers – SABS ISO 7371, SABS ISO 8187 and SABS ISO 8561
- Domestic Electric Laundry Treatment Machines SABS 1422

Please note that there may be other specifications for these appliances not listed above.

The proposal is to use the European Energy Labelling system were existing energy efficiency standards are available and to adapt their system on the Electric stoves and fixed water heaters as there is no European energy efficiency standard available. The motivation to use the European Energy Efficiency Label is because

many of our South African Standards are based on, or are over prints of, the ISO and IEC standards plus South Africa's major trading partners are Europe.

Proposal 1 - Electric Water Heater – Fixed SABS 151

It is requested that a new table be introduced after Table 2

Table 2B Energy Efficiency Rating

Energy Rating	24h Standing Loss Energy improvement above the maximum allowed in Table 2
A	40% reduction in losses
B	35% reduction in losses
C	30% reduction in losses
D	25% reduction in losses
E	20% reduction in losses
F	10% reduction in losses
G	Comply with SABS 151 table 2

An addition clause

> 7.1.1 f) the energy efficiency label rating. An Energy Efficiency label Sticker shall also be included so that this can be fixed in the water heater supply distribution board.

Proposal 2 - Electric Stoves - SABS 153 and SABS 154

The construction of the electric cooking tops varies from the spiral to the quick heat solid plates and these are covered by their individual specifications. These contribute to an energy reduction and the other major reduction can be achieved is to lower the losses from the oven by the use of improved.

It is requested that the stove specification have an additional clause added after 4.2.2 as follows:- Should the oven heat loss be less than the above, then the manufacturer can apply an energy efficiency label for the oven. The Energy Efficiency label shall rate the oven as listed in Table A:-

Table A Energy Efficiency Rating

Energy Rating	Oven heat loss improvement above the maximum allowed in Clause 4.2.2
A	40% reduction in losses
B	35% reduction in losses
C	30% reduction in losses
D	25% reduction in losses
E	20% reduction in losses
F	10% reduction in losses
G	Comply with Clause 4.2.2

Later a similar table may be developed for the Cooking top.

Proposal 3 - Electric Refrigerators and Freezers and
Proposal 4 - Domestic Electric Laundry treatment Machines

It is recommended that the European Energy Efficiency label system is adopted and a copy is attached. This is a translation of the German document.

It is recommended that this be included in the performance specifications for these appliances.

We will be pleased to discuss these proposals with you before the meeting on the 13 November 2002. We will attend this meeting to answer any questions form the National Technical Committee.

Yours faithfully,

Robert Henderson
Principal Engineer
TSI – Eskom

Attached: Energy Consumption Label – Technical Specifications

South African Bureau of Standards
Private Bag X191
Pretoria
0001

Attention Mr A J Claasen / Mr D Smit

Date	Your reference	Our reference	Enquiries
10 February 2003		App lab EES/rjh	Robert Henderson Tel 011 629 5276 Fax 011 629 5264 Mobile 083 960 3631

Dear Sir,

Energy Efficiency Labelling – Domestic Appliances
Fixed Electric Water Heaters SABS 151.

Energy efficiency labelling of domestic appliances has been introduced in many countries within the European Union, United States of America, Canada, Australia and New Zealand, India, Ghana, to name a few; with the objective to reduce the energy used by these appliances. The reduction in energy use has the benefit of lower electricity bills for the customers and the Nation as well as the reduction of greenhouse gas benefits to save the Planet. The use of more efficient appliances will also save fuel and water resources.

This is to request that the SABS Technical Committee consider the introduction of Energy Efficiency labels on Electric Water Heater Fixed - SABS 151

The proposal is to use the European Energy Labelling system were existing energy efficiency standards are available and to adapt their system on the Fixed Electric Water Heaters as there is no European energy efficiency standard available. The motivation to use the European Energy Efficiency Label is because many of our South African Standards are based on, or are over prints of, the ISO and IEC standards plus South Africa's major trading partners are Europe.

Proposal - Electric Water Heater – Fixed SABS 151

It is requested that a new table be introduced after Table 2

Table 2B Energy Efficiency Rating

Energy Rating	24h Standing Loss Energy improvement above the maximum allowed in Table 2
A	40% reduction in losses
B	35% reduction in losses
C	30% reduction in losses
D	25% reduction in losses
E	20% reduction in losses
F	10% reduction in losses
G	Comply with SABS 151 table 2

An addition clause under Markings

> 8.1.1 g) the energy efficiency label rating. An Energy Efficiency label Sticker shall also be included so that this can be fixed in the electrical distribution board feeding the water heater.

It is recommended that the above Standard be amended to include the above.

Motivation.
The motivation for the Energy Efficiency Label on fixed electric water heaters is that the water heater in a home is permanently connect to the electricity supply and it has standing losses. The losses can be reduced without or with small costs to the manufacturer. The customer will have lower electricity bills due to the improved efficiency of the water heater. The savings will depend on the type of water heater and the improved efficiency, for example improved insulation value.

Typically the savings at 30 cents a kilowatt-hour for an improvement of 20% on the standing losses on a pressure type water heater of 200 litre, will is be 1 kWh per day and an annual saving of R109. The life of a water heater is longer than 10 years resulting in a simple saving to the customer of R1 090.
The water heater manufacture may have additional costs and if these are R50 per geyser the savings to the customer will be halved in the first year and then the full savings can be achieved.
The fixed water heater is part of the building costs and are financed through the home bond hence the added capital cost will result in a lower monthly payments when considering the home bond and electricity payments.

We will be pleased to discuss these proposals with you before a meeting.

Yours sincerely,

Robert Henderson
Principal Engineer
TSI – Eskom

South African Bureau of Standards
Private Bag X191
Pretoria
0001

Attention Mr A J Claasen / Mr D Smit

Date	Your reference	Our reference	Enquiries
10 February 2003		App lab EES/rjh	Robert Henderson Tel 011 629 5276 Fax 011 629 5264 Mobile 083 960 3631

Dear Sir,

Energy Efficiency Labelling – Domestic Appliances
Fixed Electric Stoves SABS 153.

Energy efficiency labelling of domestic appliances has been introduced in many countries within the European Union, United States of America, Canada, Australia and New Zealand, India, Ghana, to name a few; with the objective to reduce the energy used by these appliances. The reduction in energy use has the benefit of lower electricity bills for the customers and the Nation as well as the reduction of greenhouse gas benefits to save the Planet. The use of more efficient appliances will also save fuel and water resources.

This is to request that the SABS Technical Committee consider the introduction of Energy Efficiency labels on Electric Stoves - SABS 153.

The proposal is to use the European Energy Labelling system were existing energy efficiency standards are available and to adapt their system on the Fixed Electric Stoves as there is no European energy efficiency standard available. The motivation to use the European Energy Efficiency Label is because many of our South African Standards are based on, or are over prints of, the ISO and IEC standards plus South Africa's major trading partners are Europe.

Proposal - Electric Stoves – SABS 153

The construction of the electric cooking tops vary from the spiral to the quick heat solid plates and these are covered by their individual specifications. These can contribute to an energy reduction in an electric stove however the other major reduction can be achieved is to lower the losses from the oven by the use of improved insulation.

It is requested that the stove specification SABS 153 be amended to have an additional clause added after 4.2.2 as follows:-

"Should the oven heat loss be less than the above, then the manufacturer can apply an energy efficiency label to the oven. The Energy Efficiency label shall rate the oven as listed in Table A:-

Table A Energy Efficiency Rating

Energy Rating	Oven heat loss improvement above the maximum allowed in Clause 4.2.2
A	40% reduction in losses
B	35% reduction in losses
C	30% reduction in losses
D	25% reduction in losses
E	20% reduction in losses
F	10% reduction in losses
G	Comply with Clause 4.2.2

The oven's energy efficiency label rating shall be included on the fixed manufacturer's label and a sticker label shall be available to be placed in the electricity distribution board supplying the stove."

Later the Technical Committee can develop an energy efficiency label for the Cooking top and table top stoves.

It is recommended that the above Standard be amended to include the above.

Motivation.
The motivation for the Energy Efficiency Label on fixed electric stoves is that the stove is part of the fixed home appliances and that the oven has losses. The losses can be reduced without or with small costs to the manufacturer. The customer will have lower electricity bills due to the improved efficiency of the oven insulation. The savings will depend on the type of stove oven and the improved efficiency, for example improved insulation value.

Typically the savings at 30 cents a kilowatt-hour for an improvement of 20% on the oven's losses, will is be 147 kWh per year and an annual saving of R442. This is based on the oven being used for 2 hours per day and the efficiency improvement of 20% of the losses. The oven losses were taken as 2 kW.
The stove manufacture may have additional costs and if these are R50 per stove, the savings to the customer will be initially reduced in the first year and then the full savings can be achieved.
The fixed electric stove is part of the building costs and are financed through the home bond hence the added capital cost will result in a lower monthly payments when considering the home bond and electricity payments.

We will be pleased to discuss these proposals with you before a meeting.

Yours sincerely,

Robert Henderson
Principal Engineer
TSI – Eskom

South African Bureau of Standards
Private Bag X191
Pretoria
0001

Attention Mr A J Claasen / Mr D Smit

Date	Your reference	Our reference	Enquiries
10 February 2003		App lab EES/rjh	Robert Henderson Tel 011 629 5276 Fax 011 629 5264 Mobile 083 960 3631

Dear Sir,

Energy Efficiency Labelling – Domestic Appliances
Electric Refrigerators and Freezers, Domestic Electric Laundry treatment Machines and Dish Washers

Energy efficiency labelling of domestic appliances has been introduced in many countries within the European Union, United States of America, Canada, Australia and New Zealand, India, Ghana, to name a few; with the objective to reduce the energy used by these appliances. The reduction in energy use has the benefit of lower electricity bills for the customers and the Nation as well as the reduction of greenhouse gas benefits to save the Planet. The use of more efficient appliances will also save fuel and water resources.

This is to request that the SABS Technical Committees consider the introduction of Energy Efficiency labels on Electric Refrigerators and Freezers, Domestic Electric Laundry treatment Machines and Dish Washers.

The proposal is to use the European Energy Labelling system were existing energy efficiency standards are available and to adapt their system on these appliances. The motivation to use the European Energy Efficiency Label is because many of our South African Standards are based on, or are over prints of, the ISO and IEC standards plus South Africa's major trading partners are Europe.

It is recommended that the European Energy Efficiency label system be adopted and a copy is attached. This is a translation of the German document.

It is recommended that the above be included in the performance specifications for these appliances.

Motivation.
The motivation for the Energy Efficiency Label on Electric Refrigerators and Freezers, Domestic Electric Laundry treatment Machines and Dish Washers is that these are the next largest electrical energy users after fixed electric water heaters and the electric stove in a home. The efficiency of these appliances can be improved without or with small costs to the manufacturer. The customer will have lower electricity bills due to the improved efficiency and if the washing cycle is improved can result in lower water usage. The savings will depend on the type of appliance and the improved efficiency. The Technical Committee be asked to accept the European Energy Efficiency labelling system and / or comment on what changes should be made. The Technical Committee must meet to discuss this proposal before an amendment can be recommended.

Typically there are energy and cost savings with the improvement of the efficiency of these appliances. The costs to achieve these savings must be discussed with the suppliers and in many cases the equipment on the South African market has an energy efficiency label in the country of origin and can be used in South Africa. Where the appliances do not have an energy label and would require redesign, this should be discussed in a working group. It is recommended that a working group be formed by the Technical committee, for the preparation of the standards for an energy efficiency label for these appliances in South Africa.

We will be pleased to discuss these proposals with you before a meeting.

Yours sincerely,

Robert Henderson
Principal Engineer
TSI – Eskom

11.3 Annex C : - South African Domestic Appliance Standards

Product	Standard number / year	Title
1	SABS 153 - 1981 SABS 154 - 1999	Electric Stoves, cooking tops, ovens, grills, and similar appliances
2	SABS 1422-1987	Domestic electric laundry treatment machines
3		Refrigerators and Freezers
4	SABS IEC 60335-2-24 - 2000	Safety of household and similar electrical appliances part 2-24 particular requirements for refrigerating appliances, ice-cream appliances and ice-makers
5	SABS ISO 7371 - 1995	Household refrigerating appliances – Refrigerators with or without low-temperature compartment – characteristics and test methods
6	SABS ISO 8561 - 1995	Household frost-free refrigerating appliances – Refrigerators refrigerator- freezers, frozen food storage cabinets and food freezers cooled by internal forced air circulation – characteristics and test methods
7	SABS IEC 60335-1 2001	Household and similar electrical appliances – safety Part 1 General requirements
8	SABS 1125 - 2001	Room air conditioners and heat pumps
9	SABS ISO 8187- 1991	Household refrigerating appliances – refrigerator – freezers – Characteristics and test methods
10	SABS IEC 60335 range	Safety specifications for appliances complete range
11	SABS 0142 part 1	Code of practice for the Wiring of Premises
12	SABS 0254	Code of practice for the Installation of water heaters
13	SABS ISO 14020	Environmental labels and declaration – General Principles
14	SABS 1356	Instantaneous Water heaters fixed
15	SABS 1307	Solar collectors domestic water heaters
16	SABS 1808 – 24	Gas powered domestic water heaters
17	SABS 1111	Coal water heaters
18	SABS 1403	Wood water heaters
19	SABS 151	Electric fixed Storage water heaters
20	SABS ISO 7371	Refrigerator Test method
21	SABS ISO 8187	Test method
22	SABS ISO 8561	Test method
23	EN 60456	Washing performance specification
24	SABS 181	Thermostats for electric storage water heaters

11.4 Annex D : - European and German Refrigerator and Freezer Energy Label Standard

TRANSLATION FROM GERMAN

ENERGY CONSUMPTION LABEL

Technical specifications

Issued by:
Zentralverband ElektrotechniK-
und Elektronikindustrie e.V.
Fachverband Elektro-Haushalt-Grossgeräte

April 1988

Page 2

ENERGY CONSUMPTION LABELLING OF DOMESTIC APPLIANCES

1. Introduction

The domestic electricity consumption during the year 1996 measured approximately 134 billion kWh i.e. about 5% of the entire energy consumption in Germany. About 30% of the entire domestic electricity consumption (appendix 1) approximately 45 billion kWh is attributed to large electrical domestic appliances ("white goods").
Being responsible for about 1.7% of the total energy consumption large electrical domestic appliances could contribute to energy savings, although certainly not substantially. Yet, discussions on energy savings focus on large electrical domestic appliances. Every household has several "white good" appliances, starting with refrigerators to electric stoves and washing machines or dish washers. Energy and electricity consumption have become a crucial issue due to their impact on the environment and natural resources. The media and most consumers limit energy savings exclusively to reduced electricity consumption of large domestic appliances. Advertisements, product information, product tests or EVU documentation - just to name a few - concentrate on the electricity consumption of appliances. The German manufacturers already reacted at an early stage to this energy saving trend. The energy and water consumption of their appliances has constantly and clearly been reduced over the years (appendix 2).
However, the European comparison revealed that considerable differences in the energy consumption of domestic appliances still exist. The European Commission is therefore aiming at enlightening consumers in order to increase their demand for energy saving appliances. In September 1992 the EU issued guidelines 92/75/EWG regarding "the display of the energy consumption and consumption of other resources of domestic appliances by means of standard labels and product information". These guidelines formed the basis for a European standard declaration of essential parameters of large domestic appliances. These basic guidelines only became a national (German) law by the introduction of the energy consumption labelling law (EnVKG) dated 1 July 1997.
In addition, the implementation guidelines and to a certain degree extensive new testing standards had to be developed and passed for individual product groups. Thus it is not surprising that this process still continues and that up to now only some household appliances can be labelled accordingly (appendix 3).
Page 3
The energy consumption label aims at informing consumers to such an extent that they can "chose energy conserving appliances" (guideline 92175/EWG). However: all domestic appliances use energy to achieve a desired output. The term "energy efficiency" refers to the relationship between input (e.g. energy) and output (e.g. washing efficiency). This is the reason why both, the energy consumption and the attainable effect are displayed on the energy label.
As the practical application of individual types of domestic appliances differs considerably, it was not possible to design a totally standardised energy label. However, energy labels have one common characteristic Insofar as the energy consumption is divided into seven grades (classes), marked "A" to "G", which are divided into coloured bars ranging from green to red. Other important information, e.g. the washing effect are indicated by using a seven-step classification system, whereby the letter "A" always indicates "good / efficient" while "G" stands for "bad / inefficient".
The energy label is made available by the manufacturers free of charge.
The label is divided into two parts, a neutral basic label and an appliance specific data strip. Appliances are accompanied by the respective data strips. In addition, appliance specific data are included in the sales documents.
The offerer (trade) undertakes to attach the energy label exclusively to all appliances displayed in his showrooms. The basic label and the appliance specific data strip are combined and attached to the

appliance in such a way that the information is clearly visible. The direct-mail selling trade must include in their catalogues certain data copied from the label.
Furthermore, offerers must include in their brochures and catalogues certain important data which are to be printed in a specific form allowing the buyer to compare various information. It is the intention to make buyers aware of essential characteristics of an appliance prior to making any purchase decision.
Page 4

2. The energy label for refrigerators and freezers

The energy label for refrigerators and freezers means that the focus is on the energy consumption. Because refrigerators and freezers differ considerably from a construction point of view and their field of application, extensive test were conducted on all appliances produced and marketed up to now. The market was investigated and the potential for further energy savings was assessed.
Based on the results of this investigation the Commission of the European Union issued guidelines 94/2/EU entitled "Energy labelling and standardised product Information for electric domestic refrigerators and freezers." These guidelines control the classification of appliances according to type, size and electricity consumption.
The energy consumption is assessed in accordance with the European Specification EN 153 and is transferred to the energy label (appendix 4) in terms of the energy efficiency classification and annual energy consumption. Due to different structural designs refrigerators and freezers were - for the time being - divided into 10 categories (appendix 5). Thereby and with the assistance of various correcting factors - which are to be explained later - considerable differences in style and design can be taken into consideration. however, the principle procedure adopted to determine the efficiency category remains the same for all appliances (appendix 6).
The efficiency classification of an appliance depends on Its energy consumption as well as the size and specific temperature in individual compartments.
The actual capacity - as indicated on the label - is not used as an operand, instead the corrected available capacity is used (appendix 7). This takes into consideration that for technical reasons the energy consumption in compartments with different temperatures varies. In this calculation the temperature in the cooling compartment is taken as + 5 ºC as standard design temperature. All other compartments are allocated a coefficient ≠ 1 which takes the deviation in the designed temperature and the temperature in the standard compartment into consideration. The corrected capacity is the sum total of the weighted volume of individual compartments and individually determined coefficients. The ACTUAL energy consumption according to the label in (kWh/a) - taking the corrected actual volume into consideration - is linked to the DECLARED energy consumption.
Page 5
The DECLARED energy Consumption (appendix 8) is a defined European average value for an appliance of this type and size as determined by this guideline. The relation value is called the "index" of the energy efficiency (%) and determines the energy efficiency category (see appendix 9).
Some examples (appendix 10 and 11) illustrate the method employed for calculating the energy efficiency category.
Appliances belonging to the energy efficiency category "A" thus use less than 55% of the energy of an average appliance belonging to this category and consequently are more environmental friendly.
Page 6

3. The energy label for washing machines, driers and dish washers

3.1 The energy label for washing machines

The top section of the energy label for washing machines (appendix 12) consists of the same coloured blocks used for all domestic appliances depicting energy categories A to G. Additional information - essential for individual groups of appliances - are included in the bottom section of the label.

3.1.1 Label contents

The most important Information is the energy category, highlighted with an arrow (appendix 13). All domestic appliances are classified according to a standard scale divided into 7 grades (A to G). Washing machines are graded according to their specific energy consumption, i.e. consumption/kg capacity. The

measured energy consumption for normally soiled cotton materials washed 60 ºC (programme for whites/coloureds) is used as a basis. The table in appendix 13 stipulates the specific values which must be observed in terms of the mentioned EC guidelines. The absolute energy consumption figures for a standard nominal load size of 5 kg are included for easier comprehension.
The absolute numerical value must also be indicated on the label. For technical reasons the specific consumption of appliances with smaller capacities is of course higher compared to normal size appliances while, on the other hand, the absolute consumption is lower.
The Information on the label must include a distinct classification of the washing effect attainable with the energy and water consumption in form of a washing-effect-index P, which is an absolute innovation as far as the declaration of information is concerned. The letters A - G are again used for the classification. This is actually a performance information which is of vital interest to consumers - e.g. customers purchase washing machines because they want clean laundry. Of course, it is easy to save energy if the efficiency of appliances is reduced. To make matters worse, technically simple appliances, i.e. inexpensive appliances use under certain circumstances little energy. but the washing effect is also limited. The main task of washing machines is cleaning and rinsing of laundry, consequently. data to this effect must be made available.
Page 7
Obviously. in this connection, the duration of washing programmes must be taken into consideration. Washing effects belonging to category A and B combined with acceptable rinsing results and low residual moisture normally require programmes lasting 105 to 125 minutes. Unfortunately this important parameter is not displayed on the energy label but only in tables included in the brochures.
The spinning effect is also graded according to the A - G method. In addition, the maximum spinning speed must be indicated as this figure often plays a decisive role when making purchase decisions. Values which must be observed are included in the table in appendix 13. Based on European experience, the spinning speed varies considerably, ranging from 300 rev/min to 1600 rev/min, consequently, the residual moisture also varies considerably ranging from 45 % to approximately 100 %. This made it necessary to allocate several spinning speeds to one category only. It remains to be seen if the important purchasing characteristic 'spinning speed' will be replaced by the 'spinning category'.
The nominal load is another essential information which must be indicated. It is a known fact that the nominal load does not correspond at all to normal average household loads. The actually loaded amount of laundry generally corresponds to the subjectively perceived "correct" loading rate. It may be safely assumed that less laundry is washed per washing programme in appliances with small drums but high nominal loads compared to appliances with large drums but realistically declared nominal loads. In order to come to a reliable assessment all tests which are essential for the classification must be undertaken with nominal loads.
Although the water consumption has been for years an essential characteristic of an appliance, the water consumption is only indicated on the energy label in the penultimate position. Of course, it would make sense to differentiate between specific and absolute values, however the lawmakers restricted themselves to the absolute value because classification of the water consumption is not envisaged. Similar to the double Information energy consumption/washing effect a double information water consumption/rinsing effect would be required. However, many departments express doubts whether the presently used test method is adequate to obtain sufficiently qualified (reproducible) results.

Page 8
For this reason data referring to the rinsing effect were dispensed with. However, efforts are presently made to find a suitable measuring method.
The energy label for washing machines may include one more information regarding the noise level during washing and maximum noise level during spinning. This information is not a statutory requirement provided the values do not exceed 80 db (A assessed sound intensity level).

3.1.2 Test conditions and technology

Essential test conditions (appendix 14) are based on the European specifications EN60456. In order to obtain comparable relative values for grading the washing effect, tests are undertaken in a reference washing machine under exactly defined conditions with the same test material load.
While the above conditions are strictly adhered to, at least 5 tests are undertaken in the domestic washing machine to be tested. The energy and water consumption, the spinning speed, residual moisture and washing effect are determined in a test approach. It is important to remember that a standard detergent must be used. It consists of non-phosphate basic detergent, perborate bleach and bleach coenzymes which are mixed in accordance with specifications prior to the tests.
The energy consumption figures must be converted after the test to the actually desired value of 15 ºC inflow temperature. Otherwise the admissible temperature range of +/- 2K could in isolated instances lead to an incorrect classification because of narrow class intervals for the specific energy consumption.
The actual washing effect is determined as the quotient of the average of the total remission values of the domestic and reference washing machines (appendix 15).
The spinning speed refers to the maximum spinning speed measured for a minimum of one minute and rounded off to 50 rev/min. The spinning effect is calculated as a percentage of the residual water in relation to the weight of the dry laundry batch. The correct classification letters can subsequently be allocated to the calculated values.
Page 9

3.1.3 Physical limits of the test method

It is easy to understand that the above test arrangement as well as the large number of manufactured washing machines require that the effect of tolerances and other influencing variables (appendix 16) are taken into consideration.
As far as the appliances are concerned, the component parts and their influences are of special Importance. This refers especially to variations in the water level regulator, the electrovalve and the thermostat which have a direct Influence on the result.
The quality of work done in the laboratory is equally important. It is essential to proceed very carefully when conducting these tests. The test strips still produce results which differ from load to load although considerable effort Is put into this problem. It thus requires years of experience to make a properly qualified assessment of the interrelation between measured cleaning effect and the appliance and/or the realised programme sequence.
Special attention must be paid to the reference washing machine. During extensive co-operative tests conducted during the development of the test specifications it transpired that the reference washing machine produced different results in various laboratories. Decimal calibration instructions were tried to find a proper basis for this important point.
The energy consumption of a domestic washing machine was tested under tolerance conditions, the results are shown in appendix 17. The amount of water used during the main cycle is represented by the abscissas while the ordinate represents the determined energy consumption. A considerable fluctuation in the water consumption is clearly visible. Naturally, water consumption is the most important influencing variable.
Deviations in the energy consumption, while the amount of water remains constant, could he caused by different inflow temperatures, different maximum temperatures or differences during the re-heating period.
Page 10
The range which must be observed for energy category B is marked in appendix 17. One can see that lower as well as upper deviations are possible for washing machines falling under category B. In order to make allowances for these facts admissible tolerances were defined (see appendix 18) in amendment 10 to EN60456. Different requirements apply to different parameters. Unfortunately is was often impossible to agree on an absolutely satisfactory compromise between limiting values, class intervals, admissible tolerances, attained measuring accuracy and a classification corresponding to the market supply.

Because of low absolute values for the energy consumption - often no more than just 1.2 kWh or 0.24 kWh/kg for the specific value, an amount of 0.024 kWh/kg already represents a deviation of 10 %. On the other hand the repeatability already amounts to 0.05 kWh and thus requires already half of the admissible tolerance if a machine with 5 kg nominal load is tested.
As far as the water consumption is concerned, the 10/15 % rule with further decreasing absolute values - nowadays often falling below the 50 litre limit - does not represent an easy to be observed limit. In terms of this ruling 3 appliances must be measured if rechecking of one appliance reveals a deviation of more than 15 %. If the mean value of these three appliances reveals a deviation of more than 10 %, it must be assumed that the declared value is incorrect.
A similar rule applies to the washing effect. The stipulated limit values for classification A and B are quite demanding. however, in view of the available test methods, the class intervals are very small.
The class intervals for classifying the spinning effect are relatively wide. This can cause difficulties only in the classification of the spinning speed when the residual moisture comes close to the class limits. It is relatively easy to prove the declared maximum spinning speed with the test methods. 'However, intelligent control algorithms, which for example plot the actual out-of-balance situation as a function of the speed, can lead to different results.
Page 11

3.2 The energy label for spin driers

The label for spin driers, introduced in terms of the EU guidelines 95/12/EU is shown in appendix 19. The upper half shows the energy classification in form of an arrow. Due to the different sizes of appliances the specific energy consumption was used as reference value.

3.2.1 Label contents

The measured energy consumption for the drying programme 'cotton, cupboard dry' is taken as a basis. Separate classification scales are used for exhaust air driers and for air condensation driers (see appendix 20).
Exhaust air driers take the air for drying directly from the place of installation. The air is discharged in form of warm and moist air from the place of installation, preferably via an exhaust ventilator cowl.
Air condensation driers have two air circuits, a closed circuit for the drying air and a separate circuit for the cooling air. Air is taken directly from the place of installation and is led via a heat exchanger to condense the moisture absorbed from the drying air. No moist air, with the exception of insignificant air flows due to leakages in the system, enters the place where these appliances are installed. The additionally necessary ventilator and higher operating temperature of air condensation driers mean that they use 10 % more energy compared to exhaust air driers. However, it must be taken into consideration that in the case of air condensation driers the entire absorbed energy remains in the place of installation which certainly contributes to keeping the room warm during the cold months, whereas in the case of exhaust air driers, most of the absorbed energy is lead to the outside via the exhaust ventilator cowl. Therefore, the European Commission decided to take these interrelations into consideration by introducing separate classification scales to prevent the more efficient air condensation driers - as far as the energy consumption is concerned - from being disadvantaged.
Page 12
The degree of condensation efficiency in condensation driers is not taken into account. Doubtlessly, appliances with an excellent degree of efficiency, i.e. low moisture discharge into the place of installation have a disadvantage, because as a rule, a good condensation effect is coupled with slightly higher energy consumption during drying. Technically 'worse' appliances with less condensation efficiency and therefore perhaps less energy consumption are thus slightly at an advantage under the present classification system. The lawmakers were unable to take these complex correlations in their entirety into consideration, which also concerned many other issues in connection with the energy label.
It is a known fact that since their introduction electric linen driers have been the subject of energetic discussions. However, during the years, the service value and advantages in handling laundry, as well as environmental conditions (e.g. space for drying, air pollution) have contributed to the fact that the market saturation of driers amounts to about 35 %. Apparently the EU commission is not interested in

the further promotion of driers. The limit values for the classification were thus determined in such a way that - taking a European average - most of to-days standard appliances can only be classified into class D. Class C can be reached, depending on the design of the appliance. Conventional appliances cannot reach class B. The consumer pays the price because due to insufficient differentiation he will find it difficult to decide which appliance to purchase. Customers will find a large selection of washing machines in energy class B, even class A.
They will look in vain for standard driers in these categories.
The limit values for driers in class A were determined in such a way that they can only be attained by driers with an additional electric heat pump.
The label for driers shows the absolute energy consumption, same as the label for washing machines. This means that the label for smaller appliances will show smaller absolute consumption values - depending on the degree of utilisation -.
An information analogous to the washing effect index P is not envisaged for driers. The appliance's efficiency refers to the drying of laundry. The expected drying efficiency for all appliances is exactly defined by determining the limit values for initial and final residual moisture.
Page 13
Deviations due to technical circumstances are eliminated by standardising the measured values to the nominal values of initial and final residual moisture.
With regard to driers, it could be possible to take the type of moisture control into consideration. As a rule, inexpensive appliances only have one simple adjustment possibility to set the drying time. Depending on the experience, the user can dry the laundry more or less exactly to his requirements. Investigations have shown that users tend to set excessive drying times. They certainly will have dry laundry, but as a rule it is overdried - while as a result more energy is used which could have been avoided. Technically more advanced appliances are equipped with an automatic control to obtain the desired residual moisture. The moisture in the laundry is measured via the electric resistance; the process is automatically interrupted as soon as the desired degree of dryness is reached. Energy consuming overdrying is thus avoided if the appliance is used sensibly. When designing the energy label the European Committee failed to take these important daily occurring interrelations into consideration.
The nominal load is also shown on the energy label - same as on the label for automatic washing machines - giving an indication of the size of the appliance.
Furthermore, the label contains information to the effect whether the appliance is an exhaust air drier or a condensation drier. Relevant technical connections were already discussed earlier.

Similar to the label for washing machines, essential user information concerning the drying times are not shown on the label but are only given in tables included in the brochures.

3.2.2 Test conditions and technology

The boundary test conditions were compiled in the European specifications EN 61121. However, parallel operation of a reference appliance is not required for testing driers.
A cotton laundry batch - corresponding to the nominal load - is used for the actual tests and the initial residual moisture of 70 % is obtained with a washing machine. The laundry is subsequently dried to 0 % residual moisture (drying programme 'cotton, cupboard dry').
Page 14
Corresponding figures i.e. 50 % and + 2 % which are applicable to the programme 'easy care, cupboard dry' are Included in the tables in the brochures.
Due to the fact that it is virtually impossible to maintain absolute accurate initial and final residual moisture percentages the specifications provide that the actual measuring values are converted to nominal values if they lie within a certain band width of the nominal value.
The composition of the test laundry batch follows the specifications for washing machine tests as per EN 60456. Obviously, test strips used for testing the washing effect are not required.
The initial residual moisture of 70 % can be obtained with a washing machine equipped with a spinning speed of 800 rev/min. The 800 rev/min washing machine was until recently the most popular appliance.

Today it can be assumed that as a rule driers are only operated in connection with washing machines offering a spinning speed of at least 1000 rev/min. Consequently, driers used under normal daily conditions use less energy than indicated on the label. This fact is taken into consideration in the tables included in brochures which also supply additional information concerning other spinning speed / drying rate combinations.

3.2.3 Physical limits of the test method

Same as with washing machines deviations are possible when assessing values measured at different laboratories.
The most important parameter having the largest influence is the laundry batch used in the tests. Same as tests conducted with washing machines deciding factors include the quality of the laundry batch - in spite of a standardised textile description - the treatment (absorbency) and the age of the laundry batch. The guidelines therefore allow a deviation of 10 % of the measuring values or 15 % in relation to the declared value of the appliance.
Page 15

3.3 The energy label for combination washer-driers

The label for combination washer-driers (appendix 21) contains information referring to washing and drying - depending on the design of the appliance.

3.3.1 Label contents

Although consumer studies revealed that combination washer-driers are primarily used only for washing while the built-in drier is relatively seldom used, the European Commission insisted on a classification based on the entire energy consumption for washing and drying nominal loads.
The total specific energy consumption of the washing programme 'cotton' at 60 ºC (identical to solo automatic washing machines) and the specific energy consumption of the drying programme 'cotton, cupboard dry' (appendix 22) was used for the classification which is also divided into 7 groups. The class is highlighted in the form of an arrow.
Analogous to automatic washing machines and driers the absolute total energy consumption is indicated on the label.
The above mentioned observation that the washing programme is primarily used is taken into consideration by separately indicating the absolute energy consumption of the used test (washing) programme.
The washing effect and the spinning speed are indicated - same as for automatic washing machines - however, classification of the final residual moisture depending on the spinning speed is dispensed with. The final residual moisture determines to a large extent the energy consumption during drying and is thus indirectly shown - via the spinning speed -. The nominal load for washing and drying is also shown.
The water consumption refers again to the combined washing and drying function of the appliance and the total absolute water consumption is shown. Normally condensation of absorbed moisture during drying requires a heat exchanger with water cooling.
Page 16

This could - in addition to washing operations - lead to a significant increase in water consumption (e.g. up to 30 l).
The last section of the label may include information regarding noise, separated according to various functions, e.g. washing, rinsing and drying.

3.3.2 Test conditions and technology

The washing programme is tested in accordance with stipulations as per paragraph 3.1.2 while the boundary conditions as per paragraph 3.2.2 apply to testing drying programmes.
It should be noted that the requirement "70 % initial residual moisture" does not apply to testing drying programmes. The initial condition for drying in combination washer-driers is based on the residual moisture which is obtained in the tested appliance by using the respective spinning speed.

From an energetic point of view it is considerably more advantageous to reduce the moisture in laundry by using **a** higher spinning speed instead of drying In warm air. A combination washer-drier with a high spinning speed is thus more suitable for effective drying. A higher spinning speed requires more advanced technical know-how which generally makes appliances more expensive. Therefore, in co-operation with the European commission it was decided to take this fact into consideration which, at first glance seems to unfavourably affect customers but is welcome from an energetic point of view, and to take it into account when determining the energy consumption' for classification in the described manner, thus allocating the appliance to a more favourable energy consumption category.

3.3.3 Physical limits of the test method

Washing programmes are tested in accordance with stipulations as per chapter 3.1.3, while the parameters as per chapter 3.2.3 apply to testing drying programs. By directly using the spinning results obtained after washing as initial residual moisture for the drying process, an additional variable has been introduced.

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3.4 The energy label for dish washers

The label for dishwashers (appendix 23) is the most recent energy consumption label to be introduced in Europe by 01.01.1998 (plus 6 months transition period).

3.4.1 Label contents

Completely new European specifications (EN 50242) had to be devised for the declaration of reliable and comparable values for dish washers. This kept many experts from the industry, test institutes and consumer organisations busy for more than three years and entailed extensive series of tests in many laboratories in order to guarantee the reproducibility of the results. According to the present state of the specifications it seems possible to grade - apart from the compulsory energy consumption - the cleaning effect and expected drying results by using the classification scale "A" to "G".

This was especially important in the absence of strict stipulations for specific dishwasher programmes to be used for testing. It is actually left at the manufacturer's discretion to chose a programme as "declaration programme". Due to the fact that the energy consumption depends on the temperature reached during a programme cycle which, in turn is coupled to the cleaning efficiency and even more so to the drying result, all the values for energy, cleaning efficiency and drying result must always be looked at jointly.

A dish washer belonging to energy class "B" and drying efficiency "D" in the declared programme may actually - in other programmes or with additional functions (e.g. fan type drying) - have a drying efficiency belonging to class "B" - which presumably will result in increased energy consumption not corresponding to energy class "B"!

Because the size of available dish washers varies considerably (ranging from table models to 70 cm wide free standing units) (only!) two adjustment formulae were included in the guidelines. They are used to convert the measured energy consumption into "standardised" energy consumption as a function of the possible maximum load of dish washers (appendix 24).

Page 18

Maximum loads are given in units of so-called standard covers consisting of the following articles as defined in the specifications:

1 Soup Plate, 1 dinner plate, 1 dessert plate, 1 cup, 1 saucer,
1 glass, 1 fork, 1 knife, 1 soup spoon, 1 dessert spoon, 1 table spoon,
plus serving items depending on the size of the machine.

The classification "A" to "G" (appendix 25) is based on the calculated standardised energy consumption. Two adjustment formulae were included in the guidelines because smaller appliances use less absolute energy but are systematically disadvantaged as far as the energy consumption/cover is concerned. Unfortunately the European Commission only referred to relatively incomplete prospectus analysis and came to the conclusion that one should distinguish between small appliances (45 cm width).accommodating less than ten standard covers and large appliances (60 cm width) accommodating

10 or more than ten standard covers. Subsequent technical studies revealed that it would have made sense to separate the group of table models (≤ 6 standard covers) from the group of 85 cm high free standing or built in models and to use separate adjustment formulae for these two groups. The result is that depending on the number of standard covers a technical inexplicable inconsistency exists in allocating the measured energy consumption to an efficiency class as a function of the number of standard covers.
Additional data on the energy label for dish washers include the water consumption/declared programme, as well as optional - the noise level during operations.

3.4.2 Test conditions and technology

Dish washers - similar to washing machines are tested to assess the cleaning and drying effect (appendix 26) under normal household conditions and typical degrees of soiling experienced on a daily basis. For this purpose most of the crockery and cutlery is smeared with an exactly defined amount of porridge, egg yolk, spinach, margarine, minced neat or tea following an exactly prescribed manner. These parts are dried for 2 hours at 80 ºC in a drying stove and thereafter loaded into the dish washer. In addition, milk in a glass is placed into a microwave oven and dried at about 180 ºC before loading into the dish washer.
Page 19
A defined amount of reference detergent (non phosphate, enzymatic) is used in the cleaning cycle forming part of the manufacturer's indicated “declaration programme". The required amount of electricity and water is measured. Afterwards the dishes are individually checked by experienced evaluators for dirt residues (cleaning assessment) or for residual moisture (drying assessment) and evaluated according to a six-stage (cleaning) or three-stage (drying) scale (appendix 27).
The overall assessment of an appliance depends on the average total of all individual tests (at least five tests are conducted), which does not suffice to make a statement regarding the quality of the appliance to 'be tested. Due to the multitude of marginal conditions which cannot be defined exactly, e.g. origin and consistency of soiling, the "daily frame of mind" of evaluators influencing their efficiency, etc. it is essential to operate parallel to the appliance to be tested a reference appliance, the functions of which do not fluctuate (also defined in the EN 50242) and to evaluate the performance of the reference appliance. The ratio between cleaning or drying evaluation of the test and reference appliance is a measure for assessing the efficiency of the dish washer and the subsequent corresponding classification Into class "A" to "C" (appendix 25) as displayed on the energy label.

3.4.3 Physical limits of the test method

The description of the test method already reveals that it is very difficult to observe the relatively narrow tolerances stipulated for the declared values of dish washers. While the tolerances for the energy and water consumption (appendix 28) are primarily due to component parts and manufacturing process tolerances, assessment of the cleaning and drying efficiency is in addition subject to inaccuracies caused by manual soiling of the dishes and the visual evaluation. Reliable evaluation of dish washers can therefore only be undertaken by test centres with many years of experience taking part in co-operative tests undertaken at various test centres producing consistent test results.
Page 20

4. Summary and prospects

The energy label can to a certain extent be compared to the product information system (PI), which was introduced in Germany during the Seventies. Standardised information in the manufacturer's catalogues and brochures made it possible to compare various appliances with one another. This market transparency encouraged the introduction of energy saying technologies. The energy consumption - depending on the type of appliance - could be reduced by 25 % to 50 % during the years 1978 and 1994 (appendix 2).
Something similar is expected to happen with the introduction of the energy label, although attainable future energy savings will not be as high in view of the highly efficient appliances on todays market.

Nevertheless it is expected that in Europe substantial energy savings will be achieved with domestic appliances once the energy label is introduced. Furthermore, additional measures to reduce the energy consumption are planned or have already been implemented by the EU. For example, an EU guideline (96/57/EU) prohibits the introduction and marketing of refrigerators and freezers belonging to "inferior" energy consumption classes (often C to G) as from 01.09.99.
A two-step voluntary undertaking by the European Domestic Appliances Industry has the effect that washing machines belonging to "inferior" energy consumption classes will no longer be produced or imported as from 31.12.97 and / or 31.12.99 (appendix 29).
The actual electricity consumption for domestic appliances depends only to a certain degree on their technical characteristics. Under practical conditions, the actual consumption may deviate considerably from the declared value. Firstly, the declared value applies only to exact test conditions stipulated in the specifications. Secondly, the electricity consumption is considerably influenced by the manner in which the consumer uses the appliance. It is therefore the consumer's responsibility to use domestic appliances sensibly and economically if the global goal to reduce environmental pollution is to he realised.

Appendix 1
ELECTRICITY CONSUMPTION - LARGE ELECTRIC DOMESTIC APPLIANCES
Electricity consumption figures German households 1996

	Saturation (per 100 households) [1]		Electricity consumption (tWh) [2]	Number of appliances (Mio. Pcs) [3]
	ABL	NBL		
Refrigerators and refrigerator / freezer combinations	97	97	11.7	36
Freezers	69	65	11.9	21
Electric stoves	86	60	10.9	31
Washing machines	94	94	4.9	34
Driers	31	5	3.0	10
Dish washers	49	20	3.0	14
Large e. appliances total			44.5	146

1 GfK/ZVEI AK Market research
2 VDEW, data catalogue for domestic electricity consumption 1997
3 Calculation based on: Central Statistical Office, number of households / saturation figures

Appendix 2

REDUCTION OF ELECTRICITY AND WATER CONSUMPTION

Development of electricity and water consumption of electric domestic appliances / report 1994

1) **Energy consumption**	**'94:'91 %**	**'94:'78 %**	**Consumption 1994**	With reference to:
Washing machines	-8.1	-36.9	1.86	(kWh) 95 C boil wash without prewash
Dish washers 60 cm	-5.9	-	-	
Dish washers 45 cm	-2.6	-	-	
Dish washers total	-5.5	-45.2	1.43	(kWh) per rinse cycle, most efficient programme
E stoves/baking ovens	-1.4	-22.8	1.03	(kWh) energy consumption of baking ovens incl. Preheating and continuous operation/hour
0-2 star refrigerators	-10.3	-30.1	0.4	kWh/100 1 capacity
3 star refrigerators	-10.0	-45.2	0.52	kWh/100 1 capacity
with 4 star compartment	-16.4	-30.6	0.47	kWh/100 1 capacity
Refrigerator/freezer combinations	-13.7	-37.5	0.46	kWh/100 1 capacity
Refrigerators total	-12.1	-38.9	0.46	kWh/100 1 capacity
Upright freezers	- 4.4	-38.9	0.73	kWh/100 1 capacity
Chest freezers	-12.6	-57.2	0.30	kWh/100 1 capacity
Freezers, total	- 3.7	-41.9	0.62	kWh/100 1 capacity
Refrigerating appliances total	-9.9	-41.4	0.50	kWh/100 1 capacity
2) Water consumption	**'94:'91 %**	**‘94:’85 %**		
Washing machines	-19.0	-45.0	65.2	litre/washing programme 95 0C without prewash
Dish washers, total	-7.7	-32.1	19.6	litre/rinse cycle most efficient programme

(Savings were calculated AND based on average energy and water consumption weighted with domestic sales)
Source: ZVEI

Appendix 3

GUIDELINES AND SPECIFICATIONS

Type of appliance	**Guidelines EG**	**applicable from**	**Specifications (most essential)**
Refrigerators and freezers	94/2/EC	01.09.94	EN 153
Washing machines	95/12/EC 96/89/EC	01.04.96	EN 60456 in revision EN 60456 pr A 10, 11, 12 EN 60704-2-4 EN 60704-3
Driers	95/13/EG	01.04.96	EN 61121 in revision EN 60704-2-4 EN 60704-3
Washer-driers combination	96/60/EG	01.08.97	EN 50229 EN 60704-2-4 EN 60704-2-6 EN 60704-3
Dish washers	97/17/EG	01.07.98	EN 50242 in preparation EN 60704-2-3 EN 60704-3
The energy label, general			

Appendix 4

DESIGN

Neutral, coloured basic label .... ENERGY

Appliance specific data strip

Manufacturer ABC
Model 123

Low consumption
A
B
C
D
E
F
G
high consumption

Energy consumption kWh/year (based on the result of the standard test for 24 h) XYZ

The actual consumption depends on the utilisation and the location of the appliance

Capacity refrigerator 1 xyz
Capacity freezer 1 xyz

* ***

Noise dB(A) re 1 pw xz

A data sheet with additional appliance data is included in the brochures

Specification EN 153, edition May 1990
Refrigeratorlfreezer guidelines 94/2/EG

The energy label for refrigerators and freezers

Appendix 5

APPLIANCE CATEGORIES

1 = Domestic refrigerators/freezers without low temperature compartments

2 = Domestic refrigerators/freezers with freezer compartment (5 ºC) and wine / beverage compartment (10 C)

3 = Domestic refrigerators/freezers with low temperature compartment without stars

4 = Domestic refrigerators/freezers with * compartment

5 = Domestic refrigerators/freezers with ** compartment

6 = Domestic refrigerators/freezers with *** compartment

7 = Domestic refrigerators/freezers with *(***) compartments

8 = Upright domestic freezers

9 = Domestic chest freezers

10= Domestic refrigerators/freezers with more than two doors and other appliances not forming part of this category

The energy label for refrigerators and freezers

Appendix 6

BASIC PROCEDURE

How to determine the energy efficiency for the energy label?

1. Calculate the corrected capacity for the appliance to be tested.
2. The nominal annual consumption which depends on the appliance category is allocated to the corrected capacity.
3. The actual annual consumption, i.e. 365 days, of the appliance is plotted as a function of the mathematically determined nominal annual consumption.
4. The result (in %) in converted into the so called efficiency category (from A to G).

The energy label for refrigerators and freezers

Appendix 7

CORRECTED CAPACITY

The corrected capacity takes into consideration that compartments with different temperatures use different amounts of energy.

Therefore, the capacity of all low temperature compartments, almost 0 ºC compartments, freezer compartments and star-compartment are weighted with a factor depending on their temperature level.

The following factors apply:

- cooling compartment 1.00
- winelbeverage compartment 0.75
- cold storage compartment 1.25
- freezer compartment without stars 1.25
- * star compartment 1.55
- ** star compartment 1.85
- 3 or 4 star compartment 2.15
- no frost compartment 2.58

* The corrected capacity is the sum total of weighted capacity of all compartments.

* Note: The index 2.15 for no frost compartments has been increased by factor 1.2 to 2.58. This takes a possible inconsistency in the testing method into account which does not take into consideration that no ice is formed in no frost appliances.

(1) The energy label for refrigerators and freezers

Appendix 8

DETERMINING THE DECLARED ANNUAL CONSUMPTION

- The declared annual consumption refers to the consumption of an average appliance depending on its size.
- The calculation is based on the corrected capacity.
- Two basic numbers M and N are allocated to each type of appliance (class).
  The following applies:
  - Nominal annual consumption = M x corrected capacity + N
  - M and N depend on the appliance class
- The basic numbers M and N were determined by determining a consumption average of all appliances in the market as a function of the capacity (mathematically: by a linear regression with the coefficient M and N).

Category	Compartments	M	N
1	Refrigerator	0.233	245
2	Appliance with refrigerator and wine / beverage compartment	0.233	245
3	Appliance without stars	0.233	245
4	* Compartments	0.634	191
5	** Compartments	0.450	245
6	*** Compartments	0.657	235
7	Refrigerator / freezer	0.777	303
8	Upright freezer	0.472	286
9	Chest freezer	0.446	181
10	Appliances with several doors and others	M-value of the compartment with the lowest: temperature	N-values of the compartment with the lowest: temperature

The energy label for refrigerators and freezers

Appendix 9

ENERGY EFFICIENCY CATEGORIES

The actual annual energy consumption of an appliance (365 days) is divided by the declared annual consumption. The resulting percentage value is used for grading into one of the categories A to G, the so called energy efficiency categories:

Category A	below 55 %
Category B	55 % to 75 %
Category C	75 % to 90 %
Category D	90 % **to 100 %**
Category E	100% to 110 %
Category F	110% to 125 %
Category C	more than 125 %

Category **A to C** refers to **excellent** appliances
Category **D** refers to **average** appliances
Category **E to G** refers to appliances **below average**

The energy label for refrigerators and freezers

Appendix 10

EXAMPLE 1

Calculation Example: Category 1

- Refrigerator capacity: 152 litres

Calculating the corrected capacity:
(152 1 x 1.00) = 152 litres

Calculating the declared annual consumption:
0.233 x 152 + 245 = 280 kWh

Calculating the actual annual consumption:
365 x 0.30 kWh = 110 kWh

Calculating the energy efficiency category:
110 kWh : 280 kWh = 0.39

- CATEGORY A

Calculation Example: Category 9

- *(***)-freezer compartment: 206 litres

Calculating the corrected capacity:
(206 1 x 2.15) = 443 litres

Calculating the declared annual consumption:
0.446 x 443 + 181 = 379 kWh

Calculating the actual annual consumption:
365 **x** 0.53 kWh = 193 kWh

Calculating the energy efficiency category:
193 kWh : 379 kWh = 0.51

- CATEGORY A

The energy label for refrigerators and freezers

Appendix 11

Calculation Example._Category 7

Refrigerator capacity: 158 litres

- *(***) freezer compartment: 40 litres

- wine / beverage compartment: 74 litres

Calculating the corrected capacity:

(158 1 x 1) + 40 1 x 2.15) + 74 1 x 0.75) = 299.50 l

Calculating the declared annual consumption:

0.777 x 299.50 + 303 = 535.71 kWh

Calculating the actual annual consumption:

365 x 1.21 kWh = 441.65 kWh

Calculating the energy efficiency category:

441.65 kWh : 535.7 kWh = 0.82

- CATEGORY C

Calculation Example: Category 2

- low temperature storage compartment: 46 litres (mathematically no frost)
- - wine / beverage compartment: 109 litres

Calculating the corrected capacity:

(46 1 x 1.25 x 1.2) + 109 1 x 0.75) = 150.75 litres

Calculating the declared annual consumption:

0.233 x 150.75 + 245 = 280.12 kWh

Calculating the actual annual consumption:

365 x 0.75 kWh = 273.75 kWh

Calculating the energy efficiency category:

273.75h : 280.12 kWh = 0.98

- CATEGORY D

The energy label for refrigerators and freezers

Appendix 12

DESIGN

Neutral, coloured basic label	Appliance specific data strip
ENERGY Manufacturer Model	Washing machine Logo ABC 123
Low energy Consumption A B C D E F G high energy consumption	
Energy consumption kWh/washing programme (based on the result of the standard test for washing programme "cotton". 60 ºC) The actual energy consumption depends on the utilisation of the appliance	XYZ
Washing effect A: good G: bad	AB **C** DEFG
Spinning A: good G, bad Spinning speed (rev/min)	 ABC **D** EFG 1100
Load (cotton) kg Water consumption l	y.z y.z
Noise washing dB(A) re 1 pw spinning	xy xyz
A data sheet with additional appliance data is included in the brochures	

Specification EN 60458
Guidelines 95/12/EC, Washing machine labels

The energy label for washing machines

11.5 Annex E : - Typical legislation

Example 1:

South Africa -- Plastic Bags Regulation

10/03/2002
GOVERNMENT NOTICE
DEPARTMENT OF ENVIRONMENTAL AFFAIRS AND TOURISM

No. R..... 2002

REGULATIONS UNDER SECTION 24(d) OF THE ENVIRONMENT CONSERVATION ACT (ACT NO. 73 OF 1989)

The Minister of Environmental Affairs and Tourism has, under section 24(d) of the Environment Conservation Act, 1989 (Act No. 73 of 1989), made the regulations as set out in the schedule hereto.

M.V. Moosa
MINISTER OF ENVIRONMENTAL AFFAIRS AND TOURISM

SCHEDULE

PLASTIC BAGS REGULATIONS

Definitions

1. In these regulations any word or expression to which a meaning has been assigned in the Environment Conservation Act, 1989 (Act No. 73 of 1989) (hereinafter referred to as "the Act") shall bear the meaning so assigned to it in the Act, and, unless the context indicates otherwise --

"commercial distribution" means making plastic bags directly or indirectly available for packaging or carrying goods or carrying of waste and distribution has a corresponding meaning;

"mark" whether used in a compound with any other word or not, includes any symbol, sign, drawing, design, badge, emblem, representation, heading, name, word, signature, letter or numeral, or any combination of two or more thereof;

"plastic bag" means --

(a) a plastic carrier bag with handles which is designed for the general purpose of carrying goods purchased by consumers;

(b) a plastic flat bag constructed with no gussets or handles which is designed for the general purpose of carrying goods purchased by consumers; and

(c) a plastic refuse bag which is designed for the general purpose of carrying waste;

“plastic bread wrapping” means --

(a) a flimsy bread bag with a wall thickness between 5 and 10 micrometres, which is designed for the

purpose of packaging bread;

(b) a shrinklene bread bag with a width of 500 millimetres and a wall thickness between 8 to 12 micrometres, which is designed for the purpose of packaging bread; and

(c) a bread bag, which is wicketed, with a wall thickness between 25 and 30 micrometres, which is designed for the purpose of packaging bread;

"plastic film" means a thin, unwoven membraneous skin or layer of flexible material made of polymers of ethylene or propylene and combinations thereof; and

"trade" means the sale of plastic bags to any person, including but not limited to manufacturers, wholesalers and retailers of goods, for use in the Republic of South Africa.

Prohibition of certain plastic bags

2.

(1) The manufacture, trade and commercial distribution of plastic bags, made of plastic film, for use within the Republic of South Africa, with a wall thickness of less than 80 micrometres is hereby prohibited.

(2) Notwithstanding subsection (1), plastic bags, made of plastic film, with a wall thickness of between 30 and 80 micrometres may be manufactured, traded and commercially distributed, for use within the Republic of South Africa, provided they do not, unless required by law, have printing, painting or marks of any kind.

(3) Notwithstanding subsection (1), bread bags, made of plastic film, with a wall thickness of between 25 and 80 micrometres may be manufactured, traded and commercially distributed, for use within the Republic of South Africa, if they do not, unless required by law, have printing, painting or marks of any kind.

(4) The prohibition contemplated in subsection (1) will not apply to shrinklene and flimsy bread bags, made of plastic film.

Offences and penalties

3.

(1) Any person who contravenes regulation 2(1) shall be guilty of an offence and liable on conviction --

(a) to a fine not exceeding R100 000; or

(b) to imprisonment for a period not exceeding 10 years; or

(c) to both such a fine and such imprisonment; and

(d) to a fine not exceeding three times the commercial value of any thing in respect of which the offence was committed.

(2) Any person convicted of an offence in terms of these regulations, and who after such conviction persists in the act or omission, which constituted such offence, shall be guilty of a continuing offence and liable on conviction to a fine not exceeding R250 or to imprisonment for a period not exceeding 20 days or to both such fine and such imprisonment in respect of every day on which such offence continues.

Commencement date

4. These regulations come into effect one year from the date of publication of this notice.

EXPLANATORY MEMORANDUM

The collection and disposal of plastic bags is a growing waste problem in South Africa. The use of plastic bags made of thin plastic film has increased significantly in recent years. The discarding of large numbers of bags results in the degradation of the environment. Thin non-reusable bags are indiscriminately dumped and not collected for recycling or disposal because the thin plastic film they are made of has little commercial value, either as a cost to the consumer, or a raw material for recyclers. The problem is severe in low-income areas where waste collection services are inadequate.

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Example 2:

STAATSKOERANT, 5 APRIL 2002 **No.** 23277 11

DEPARTMENT OF TRADE AND INDUSTRY

No. R. 374 **5 April** 2002

STANDARDS ACT, 1993

PROPOSED DECLARATION OF COMPULSORY SPECIFICATION FOR MEDIUM-VOLTAGE ELECTRIC CABLES

It is hereby made known under section 22 (1) (a) (ii) of the Standards Act, 1993 (Act No, 29 of 1993), that the Minister of Trade and Industry intends to declare the specification for the safety of medium-voltage electric cables, as set out in the schedule to be a compulsory specification.

Any person who wishes to object to the intention of the Minister to thus declare the specification to be compulsory, shall lodge his objection in writing with the President, South African Bureau of Standards, Private Bag XI gl, Pretoria, 0001, on or before the date two (2) months after publication of this notice.

A ERWIN
Minister of Trade and Industry

12 No.23277 GOVERNMENT GAZETTE, 5 APRIL 2002

SCHEDULE

PROPOSED COMPULSORY SPECIFICATION FOR THE SAFETY OF MEDIUM-VOLTAGE ELECTRIC CABLES

1 Scope

This specification covers the requirements for single-core and three-core paper-insulated and XLPE-insulated cables with rated voltages in the range 3,313,3 kV to 19/33 kV, but excluding pressure-assisted cables.

2 Definitions

For the purposes of this specification, the definitions given in SABS 97 and SABS 1339 apply.

3 Requirements

3.1 Medium voltage paper-insulated electric cables

Medium voltage paper-insulated electric cables shall comply with the relevant requirements of SABS 97, *Electric cables – Impregnated paper-insulated metal-sheathed cables for rated voltages 3,3/3,3 kV to 19/33 kV (excluding pressure assisted cables), as* published by Government Notice No. 973 (Government Gazette No. 21605) of 6 October 2000, as amended from time to time.

3.2 Medium voltage XLPE-Insulated electric cables

Medium voltage XLPE-insulated electric cables shall comply with the relevant requirements of SABS 1339, *Electric cables - Cross-linked polyethylene (XLPE) insulated cables for rated voltages 3,816,6 kV to 19133 kV,* as published by Government Notice No. 773 (Government Gazette No. 22577) of 24 August 2001, as amended from time to time.

Example 3:

STAATSKOERANT, **5** APRIL 2002 No.23277 **13**

R. 375 **5 April 2002**

STANDARDS ACT, 1993

PROPOSED DECLARATION OF COMPULSORY SPECIFICATION FOR GAMING DEVICES AND ASSOCIATED APPARATUS

It is hereby made known under section 22 (1) (a) (ii) of the Standards Act, 1993 (Act No, 29 of 1993), that the Minister of Trade and Industry intends to declare the specification for gaming devices and related apparatus, as set out in the schedule to be a compulsory specification.

Any person who wishes to object to the intention of the Minister to thus declare the specification to be compulsory, shall lodge his objection in writing with the President, South African Bureau of Standards, Private Bag X191, Pretoria, 0001, on or before the date two (2) months after publication of this notice.

A ERWIN
Minister of Trade and Industry

SCHEDULE
COMPULSORY SPECIFICATION FOR THE CONTROL OF GAMING DEVICES AND RELATED APPARATUS

1 Scope

This specification is also applicable to wagering record-keeping systems used by Bookmakers.

2 Definitions

For the purposes of this specification, the definitions given in SABS 171 8 and its various parts apply.

3 Requirements

3.1 General requirements

3.1.1 Gaming devices and the operation thereof shall be sufficiently controlled that it is possible to ensure that gaming, gambling and bookmaking is:
Fair,
Safe,
Secure,
Reliable,
Auditable.

3.1.2 Taxation levies derived from the operation of gaming devices and related apparatus shall be able to be correctly calculated and collected by the relevant legislative authorities.

Note: The requirements specified in this standard are supplementary to and do not replace any of the requirements of relevant Acts or supporting Regulations of the legislative Authorities (National and Provincial Gaming or Gambling Boards) in South Africa-

3.2 Particular requirements

Gaming devices and related apparatus that comply with a specific part of SABS 1718 are deemed to comply fully with the requirements of this standard. The gaming device or apparatus intended to be covered by a specific part of SABS 1718 is detailed in the scope of the specific part referred to.