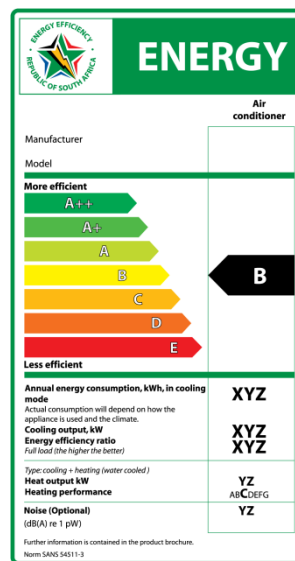


# Marching to Digital Era



## Approach Report

FOR

*Determine the Viability of Including a QR Code on the Existing South African Appliance Energy Label*

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## Table of Contents

1.	Background .....	3
1.1	Overview of digitalization of energy labeling programs globally .....	3
1.2	South African energy labeling program.....	3
1.3	South Africa’s basis for developing QR code and smart phone APP for energy label .....	6
2.	Case studies of QR code and smart phone APPs for appliance energy labeling programs.....	6
2.1	QR code system.....	6
2.2	Smart phone APPs.....	11
2.3	A proposal of features and user interface (UI) for South African smart phone APP .....	12
2.4	Better utilization of the digital tools .....	18
3.	Stakeholders Mapping and Advantage Analysis of Digital Measures.....	19
3.1	Policymakers.....	20
3.2	Manufacturers.....	22
3.3	Retailers.....	23
3.4	Consumers.....	24
4.	Resources for digitalization .....	<b>Error! Bookmark not defined.</b>
4.1	Team and budgeting.....	<b>Error! Bookmark not defined.</b>
5.	Conclusion.....	24

# 1. Background

## 1.1 Overview of digitalization of energy labeling programs globally

Over the past decade, informational and communicational technologies, such as database, QR (Quick Response) code application, smart phone and 4G (fast speed) mobile network, etc., have developed very fast and reached maturity in many places globally. Thanks to these technological developments, appliance energy labeling programs are no longer constrained to the limited-sized physical stickers, but have the option to march to digital measures.

Globally, a few appliance energy labeling programs have adopted or are on their way to adopting digital measures. Some examples are China Energy Label, EU Eco-design and Australia Energy Rating program. They have the following activities, either already in place or under development, in common:

1. Establishing database of products for a registration system;
2. Utilizing digital measures (e.g. QR code) to make the database more interactive with consumers and other stakeholders;
3. Developing smart phone APPs.

There are obvious advantages when moving to digital measures. Some examples are:

1. Database enhances the efficiency and effectiveness of product registration, which will result higher satisfaction from industry players.
2. QR code label and smart phone APP could make it easier for market inspection officers to check the labeled information against registered information, e.g. determine if labeled information is accurate.
3. Digital labels could draw a closer connection amongst stakeholders, such as consumers, policymakers, manufacturers and researchers. For example, digital labels could help policymakers promote their policies to millions of consumers; manufacturers could use digital label for promotion of efficient appliances; digital labels could help collect consumer purchase and usage pattern and help researchers better understand energy saving potentials; and they can make repair and recycling of appliances easier for consumers and more controllable for policymakers.
4. Database-based digital labels are easier to manage and maintain. Digital labels are built upon database and the product information incorporated in them could be maintained and updated as frequently as needed, which is not the case for hard copy material, i.e. information on physical labels cannot be modified once printed and attached to appliances.

In a nutshell, digitalization helps dig up many more potentials of energy labeling programs through a backstage database and interactive user interfaces.

## 1.2 South African energy labeling program

### Current status

The South African energy labeling programs was designed and implemented to “remove inefficient household appliances and encouraging the penetration of new energy efficient appliances in the South African market<sup>1</sup>”. As of November 2018, the program covers 12 types of products, mandatorily requiring 11 of them to display energy labels, and optional for one product<sup>2</sup>.

The existing energy label mainly provides consumers with energy efficiency information, and a couple of other performance parameters, which may vary by products. The information could equip consumers with basic knowledge to differentiate products in terms of their energy efficiency levels, but not much more. Also, consumers may not be able to verify the information printed on the label because although there is requirement for registration for these appliances, the registered data is not easily accessible by the public due to lack of digital measures such as a public-facing database or a consumer-faced tool between the database and consumers.

Energy label and market regulators are facing another problem due to the fact that they are heavily depending on hard copy material and spreadsheets to manage the registration. Manufacturers need to register their products to South African government and obtain authority letter before they could sell these products on the market. Thanks to the development of economy, South Africa is experiencing a booming market of household appliances. The number of application for registration has gone up from 300 in 2014 to 1,500 a month<sup>3</sup> in 2018. This has caused short-handed situation at National Regulator for Compulsory Specifications (NRCS), and they had to extend the application processing time significantly and it has drawn complaints from the industry.

### **Solution for improvement**

Realizing the issue, UNDP South Africa is supporting Department of Energy of South Africa (DoE) and NRCS establishing a database. The database will enable registration to be filed and processed online, with much less intervention from personnel. Manufacturers could submit registration online and regulators can provide feedback online, too, thus reducing a lot of time spent on back-and-forth communications through mails. The system embeds in the automated validation feature, which significantly reduces staff time spent on processing applications, e.g. verifying product data against standard requirements. In this way, staff is able to shift time of verifying application material to processing other aspects of registration and enhancing the overall efficiency. The database will be used to host all registered data. Comparing with reviewing and/or updating hard copy materials, managing database saves regulators vast amount of time.

Database is the basis for further digitalization measures. Meanwhile, it can be better utilized if more tools are developed. These tools include, but not limited to, QR code and smart phone APP.

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<sup>1</sup> *A Guide for Energy Efficiency Labelling*, <https://www.savingenergy.org.za/wp-content/uploads/2017/11/A-guide-to-energy-efficiency-labelling.pdf>

<sup>2</sup> For more details, see [www.savingenergy.org.za](http://www.savingenergy.org.za)

<sup>3</sup> According to NRCS at the industry workshop in October, 2018 in Johannesburg.

Figure 1. Example of QR code



Figure 2. Snapshot of smart phone APP



QR (Quick Response) code responds to scanning through WiFi or mobile data network. It is a technology that provides scanners with information, which is stored in a particular space, such as in a server. In other words, because the amount of information is more than that can be, or should be, hosted on physical (hard copy) media, it is stored online and a unique QR code is created to direct the scanners to access this information. Because this QR code is uniquely created, it only links to one destination, and all scanners of a specific QR code will see the same information after scanning it.

Smart phone APP shares some common functionalities with QR code, such as presenting products' information. But it also works to fill the gaps of QR code system. For example, smart phone APP could push notifications to millions of consumers, while QR code only re-acts after being scanned. Smart phone APP also enable consumers to have an overview of all products in the database and select products for comparison, while QR code is more of showing detailed information of the product that is scanned.

All these tools and features are extensive utilization of the database that is being built, making the best use of it and the investment in it. With these tools in place and well utilized and managed, the South African energy labeling program could be a global leader in digitalization.

### **1.3 South Africa's basis for developing QR code and smart phone APP for energy labeling program**

As mentioned above, a database is being established for South African energy labeling program. When completed, this database will form the fundamental basis for QR code system and smart phone APP.

Furthermore, smart phone penetration rate in South Africa has reached 51%<sup>4</sup> by mid-2018, up by 5% from April 2017<sup>5</sup>. Also, 4G mobile data network (fast speed mobile network) coverage has reached 68.3%<sup>6</sup> by the end of 2017. These numbers show that a big proportion of South African consumers have the mobile technologies in place to use energy label in a more sophisticated way, and this number is rising. Online retail, or e-commerce, has been skyrocketing over the past a few years, too. It is forecasted to remain at a high speed increase in the foreseeable future<sup>7</sup>. It will have a mutual facilitation effect with QR code and smart phone APP.

From political perspective, South African policymakers hope that further energy savings could be captured on top of the achieved success from the labeling program, so that to curb the soaring consumption of electricity<sup>8</sup>. South African consumers consider energy efficiency/saving as a very important factor when purchasing appliances<sup>7</sup>. With proper guidance, they will undoubtedly learn more about energy efficiency and apply the knowledge to saving money from energy bills.

## **2. Case studies of QR code and smart phone APPs for appliance energy labeling programs**

This section presents some existing cases of QR code system and smart phone APPs. They are being used for appliance energy labeling programs. We will look at their features, both the ones that work well and those do not. We will also discuss other potential features that could be helpful.

### **2.1 QR code system**

#### **Most up-to-date version of China QR code energy label as of October 2018**

At the moment this report is prepared, China Energy Label is the only appliance energy labeling program in the world that has adopted the digital measure of QR code. The picture below is

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<sup>4</sup> <https://businesstech.co.za/news/internet/255995/more-than-half-of-south-africans-now-own-a-smartphone-study>

<sup>5</sup> [https://en.wikipedia.org/wiki/List\\_of\\_countries\\_by\\_smartphone\\_penetration](https://en.wikipedia.org/wiki/List_of_countries_by_smartphone_penetration). In comparison, China's penetration rate was 55.6% and US 71.5%.

<sup>6</sup> [https://en.wikipedia.org/wiki/List\\_of\\_countries\\_by\\_4G\\_LTE\\_penetration#2017\\_Q1\\_rankings](https://en.wikipedia.org/wiki/List_of_countries_by_4G_LTE_penetration#2017_Q1_rankings). Original report by OpenSignal.com

<sup>7</sup> CONSUMER APPLIANCES IN SOUTH AFRICA by Euromonitor International, December 2017

<sup>8</sup> <http://www.poweroptimal.com/infographic-eskom-tariff-increases-vs-inflation-since-1988-projections-2017/>

an example of it. The sample label is downloaded from an online retailer.

Figure 3. China Energy Label



The information on the label is translated and explained above. As to QR code, when it is scanned, consumers will be directed to a webpage, which contains a few different types of contents. Below is a demonstration and explanation of some of them.

Table 1. Contents in QR code landing page of China Energy Label

1	2
<p><b>[备案公示] KFR-26GW/(26592)FNhAa-A1 能效相关</b></p> <p>能效标识管理中心</p> <p>有鱼绿色消费数据开放平台提供技术支持</p>	<p><b>[质量提示] KFR-26GW/(26592)FNhAa-A1 能效卸妆行动报告</b></p> <p>能效标识管理中心</p> <p>有鱼绿色消费数据开放平台提供技术支持</p>
<p>Basic information of the product, e.g. energy efficiency level (this is a Level 1 product<sup>9</sup>), registration number, and manufacturer.</p>	<p>A project that aims to expose those products that over-declare their energy performances.</p>

<sup>9</sup> China's energy efficiency standard and labeling program categorize appliances' energy efficiency using numbers rather than letters or star symbols. Some types of products have five levels of energy efficiency and some have three. Level 1 means the most efficient and Level 3 or 5 means the entry level, i.e. the least efficient ones that are allowed on the market.

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3



[优惠活动] 邀请您参与蓝天行动 节能有奖问答!

Consumer survey. A basic survey to attract consumers' attention on energy saving.

4



[绿色回收] 央视调查：每年上千万吨废家电都去哪了？

A piece of news regarding appliance recycling, revealing illegal recycling would cause serious environmental problems.

---

Each of these pictures is a link. When consumers hit these pictures, they will be directed to next level of webpages, which contain more detailed information. Below is an example of the "next level" information of Picture 1: the Basic Information.



Figure 4. Example of deeper level of product information

Information box shown on the landing page after scanning QR code.

**1级能效**  
 备案号: 2015-33-324-1231287  
 公告时间: 2015-08-13  
 生产者名称: 珠海格力电器股份有限公司  
 与产品相关

[备案公示] KFR-26GW/(26592)FNhAa-A1 能效相关

能效标识管理中心



When going deeper to next level of information, an electronic certificate issued by China National Institute of Standardization (CNIS) is shown. CNIS manages China Energy Label and they have the authority to approve manufacturers' registration. This certificate certifies that this product has registered to China Energy Label.

< 返回      能效备案信息

**中国标准化研究院能效标识管理中心**

兹证明

珠海格力电器股份有限公司

KFR-26GW/(26592)FNhAa-A1型号

转速可控型房间空气调节器 修订 产品

已完成能效标识备案, 特此证明。

备案号: 2015-33-324-1231287  
 公告时间: 2015-08-13

2015年08月13日

备案信息	
额定制冷量	2600(W) 收起 ▾
表示空调的制冷能力, 制冷量约等于1 匹	
额定制热量	3600(W) 解读 >
制冷季节耗电量	318(kW·h) 解读 >
制热季节耗电量	229(kW·h) 解读 >
全年能源消耗效率	4.53[W·h/(W·h)] 解读 >

There are also other information sections on the landing page and next level pages, but they

are much less relevant, or not relevant, to energy efficiency.

### Previous version of QR code features of China Energy Label

While the above-mentioned is the most up-to-date version of QR code features, it may not be the most effective or informative. It has shaken off some useful functions that were designed and incorporated into the QR code when it was first implemented. The user interface (UI) was more straightforward and easier for consumers to grasp and use. Below is an example of the first version of the QR code landing page and features.

Figure 5. First version of QR code landing page of China Energy Label







As shown on the figure above, the first section is product information, including energy efficiency level, model number and manufacturer, etc. When hitting the link to access more details, energy efficiency value and explanation of terms of energy efficiency will pop out, helping consumers to better understand the difference between efficiency levels, thus encouraging them to purchase more efficient appliances. The next section is for government and other stakeholders (e.g. manufacturers and retailers) to advertise their programs that promote efficient appliances. The big box on the left of Section 3 is to disclose products' market surveillance results. It serves as deterrence to manufacturers (could also to retailers if they were held accountable). If their products fail market surveillance or if they sell noncompliant products, consumers will know about it as soon as they scan those products. With this feature in place, manufacturers will pay more attention to self-control of product quality and retailers will make sure they only sell compliant products. To the right, the four

subsections are “purchase”, “usage”, “repair” and “recycle”. These subsections help consumers from the time they purchase an appliance to the end of life of the appliance, e.g. replacement. They provide consumers with comparison functionality for purchase, product electronic user manual, phone numbers of official customer service, and a list of contact information of qualified recycling companies. They cover a wide range of services to consumers and help government with electronic waste control. Moving down, the green box is for rolling news related to energy efficiency, consumer surveys, etc. The last section is usage tips for consumers to make the best use of their appliances.

## 2.2 Smart phone APPs

There are a few existing smart phone APPs developed for the energy labeling programs globally. Below are some examples. South Africa also has an APP, but for the moment it is only designed to calculate appliances’ annual operating costs and compare this number between products.

Table 2. Examples of existing smart phone APPs developed for energy labeling programs

APP Name	China Energy Label*	BEE Star Label	EcoGator**	Energy Rating Calculator
APP logo				
Country/Region	China	India	EU	Australia

Note:

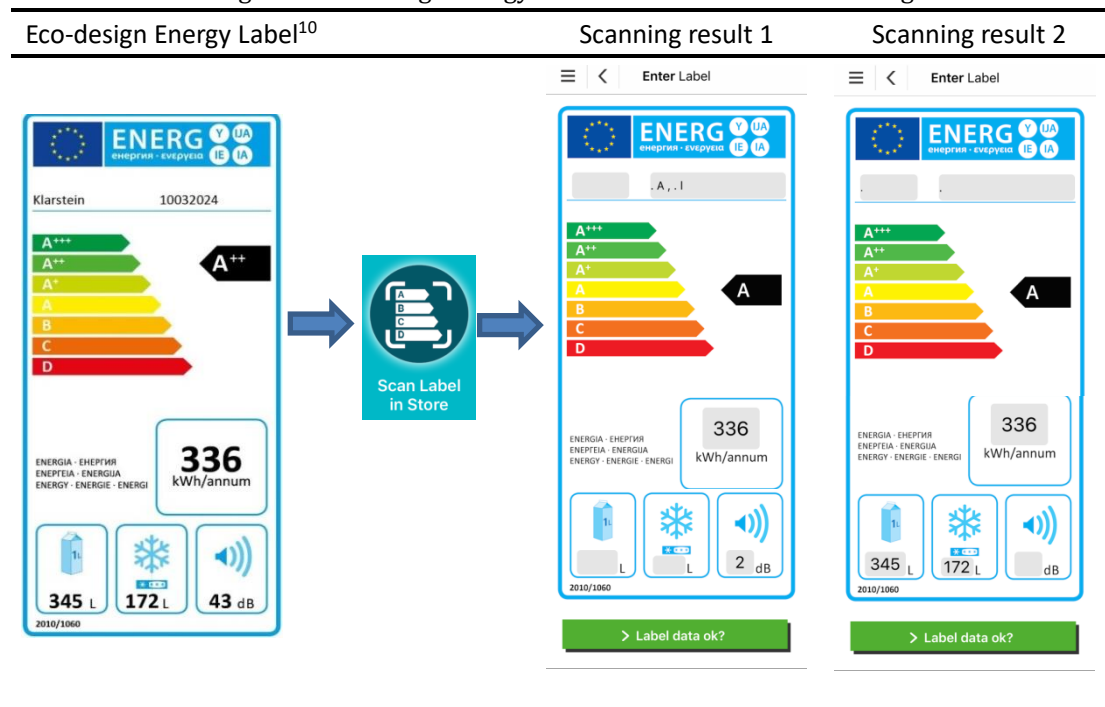
\*Only available for Android system.

\*\*Uses OCR (optical character recognition) technology to read energy labels.

The Chinese APP was published in May 2016. It has the feature of QR code scanning, so that to work seamlessly with QR code labels. However, the number of download of the APP is as low as 387 by end of October 2018. Partly it is because it is only available for Android system, but the main reason is lack of promotion. If Chinese policymakers had used QR code to promote the APP to consumers, the number of download and usage will be a lot more and so will be the energy savings. The EcoGator has scanning feature, too. However, the purpose of the feature is simply to recognize the information on the label, e.g. numbers and letters, so that consumers do not need to manually put them in to calculate energy bill. It uses OCR (optical character recognition) to read and extract information from labels. It is important to mention that the OCR technology applied to EcoGator may suffer from accuracy problem. When tested using a downloaded label<sup>10</sup>, two scanings are made and the results are shown below. As can be seen, the accuracy rate is low. It may leave out important information, and even read the energy efficiency level wrong. As the feature only reads the label rather than providing further information to consumers, and suffers from the accuracy issue, the OCR technology is unlikely to attract or help consumers. However, the EU may go with QR code

label after they finish establishing their product database and completing the pilot project of Digi-Label. The Australian Energy Rating Calculator is similar to the South African APP, and it is mainly for consumers to know energy bills of appliances and make comparisons between them. The Indian APP of BEE (Bureau of Energy Efficiency) Star Label is being renewed for its license with Apple Store and Android, thus not functioning at the moment.

Figure 6. Eco-design energy label and results of OCR scanning


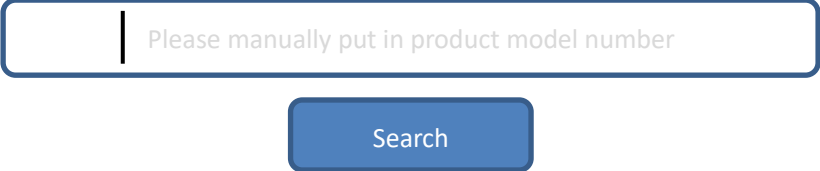


### 2.3 A proposal of features for South African smart phone APP

Based on experiences related to consumer surveys on energy labeling programs and QR code, a list of features are proposed for South African smart phone APP, if it were to be developed. These features can help build a practically useful APP for consumers and policymakers of South Africa. They will enable the maximum utilization of the database being developed, thus the investment in it. The illustration of each proposed feature below is based on existing APPs as introduced in Table 2. Because each APP may have some special features of its own, the screenshot in Table 3 are from several of them rather than any single APP. And there are features that none of them have at the moment, therefore, some screenshots in Table 3 have been modified to meet the need of illustration.

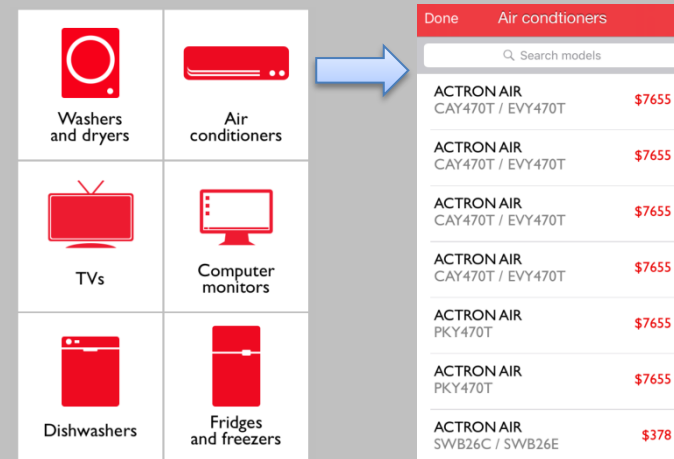
<sup>10</sup> [https://images-na.ssl-images-amazon.com/images/I/71wKQUWPX1L\\_SL1500\\_.jpg](https://images-na.ssl-images-amazon.com/images/I/71wKQUWPX1L_SL1500_.jpg)

Table 3. Proposed features for smart phone APP for South African energy labeling program

No.	Features	Purposes	Illustration and notes
1.	<b>QR code scanner</b>	<p>1. For consumers in front of appliances at store or browsing online to scan QR code on energy label. The feature enables the APP and QR code energy label work seamlessly.</p>	<div data-bbox="1370 344 1675 647" style="text-align: center;">  <p>The illustration shows a white square with a green QR code scanner overlay. The text "Scan QR Code" is at the top, and "or Extract from phone" is at the bottom.</p> </div> <p>The feature should also be able to extract and read QR code in mobile devices. After scanning QR code on the label or reading extracted QR code from phone, the webpage that consumers would see should be similar to Figure 5.</p>
2.	<b>Manually put in product model number</b>	<p>2. In the situation that consumers know the model number that they want to learn about;</p> <p>3. In case QR code scanner does not work, e.g. no camera on the mobile device (could be rare cases);</p>	<div data-bbox="1149 807 1966 978" style="text-align: center;">  <p>The illustration shows a search interface with a text input field containing the placeholder text "Please manually put in product model number" and a blue "Search" button below it.</p> </div> <p>When consumers do not want to or cannot scan QR code, they may also choose to put in product model number manually. There is a chance that some products share the same model number. In this case, consumers will see all of them. Consumers may further differentiate them by applying other criteria, like manufacturer and product type.</p>

3. **Product index for accurate and fuzzy search**

4. Provides a straightforward UI;



When consumers want to have a general idea of what the market is like for a certain type of product, they may use this feature to find out. After selecting a product type, they may see an exhaustive list of all products that have registered. This feature also functions as “Manually put in product model number”, e.g. after choosing product type, consumer may put in product model number in the “search” box. While the example picture only provides limited information of a product, South African APP may add more, such as energy efficiency level as a minimum, and enable consumers to sort and filter products. Other information for consideration to include in the exhaustive list may include brand, energy efficiency rating, and typical annual energy bill. This feature provides a more friendly UI to consumers, ensuring a more pleasant usage experience.

- 4. Filtering and Sorting**
5. Filtering enables consumers to screen out the products they are interested in.
6. Sorting enables consumers to see the listing in the order they prefer. The APP may apply various criteria, e.g. brand, size, energy efficiency, etc.;

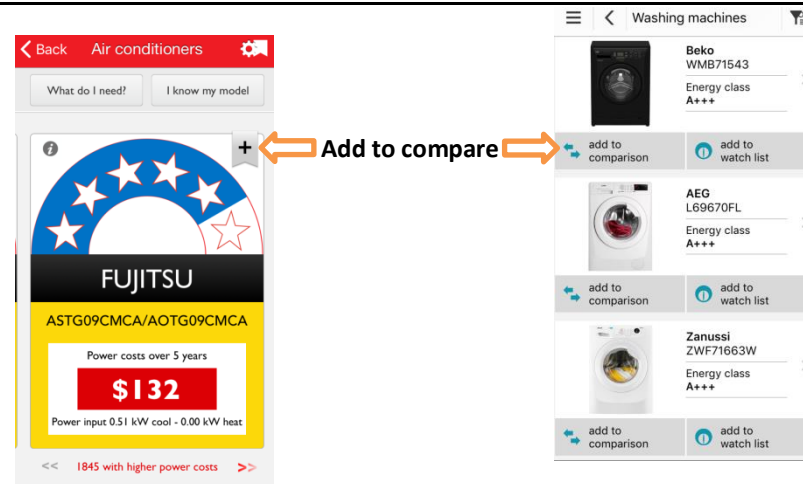
Filter (multi-selection):	Sort by:
Inverter	Brand
Fixed Speed	Energy Efficiency
Energy Efficiency Level A	Energy Efficiency Level
Energy Efficiency Level B	Cooling Capacity
Energy Efficiency Level C	Heating Capacity
Cooling Capacity Range xxxx - xxxx	Physical Size
Heating Capacity Range xxxx - xxxx	

Examples of criteria for filtering and sorting.

- 5. Energy efficiency (consumption) range and ranking**
7. When these two features work together, they provide consumers with a straightforward and clear picture of energy efficiencies (consumptions) of the most and least efficient appliances that are available on the market, and the ranking of the product they are looking at.
- Energy efficiency (consumption) range and ranking could be combined within one figure. This figure should be updated real-time or regularly, e.g. every week. Please see Section 2.4 and Figure 7 and Figure 8 for details.

6. **Product comparison**

8. Enables users to compare products.

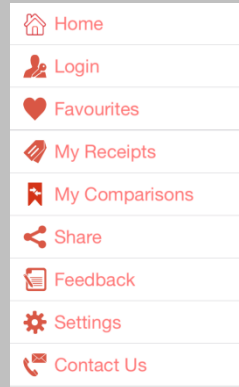


The APP would need a feature that enables users to select the products for comparison. The comparison should at least cover major performance parameter of the products, such as brand, energy efficiency level, energy efficiency ranking, annual energy bill, and previous market check results if possible. The APP may also incorporate auto-save function that saves the products scanned and viewed by the user in the last several hours or a couple of days, so that if consumers want to compare the products they considered purchasing earlier, they may do so with convenience.



**7. User account**

- 9. Encourages consumers to register to the APP so that they have the privilege to have access to some customized features.
- 10. Helps policymakers reach out to a “targeted” group of consumers.



This feature draws closer connection between policymakers and consumers. The APP may allow registered users to add their favorite products, save their product comparisons, storage their receipts online and provide feedback and file complaints using the APP. Registered users may also get customized push notifications, such as market surveillance results of the appliances they purchased and trade in programs for their appliances.

**8. Push notification**

- 11. Helps policymakers to reach to millions of consumers to advertise their programs, promote efficient appliances, and conduct surveys.



Policymakers and energy labeling program managers may want to push notifications to APP users of relevant news and programs. Over time, these push notifications will educate the public knowledge of energy related policies, the necessity of saving energy, and gain their understanding and support.

## **2.4 Better utilization of the digital tools**

The global experiences introduced above could help South African policymakers design and implement a set of digital tools for the energy labeling program. If policymakers hope to squeeze the most potential of energy label for energy saving and accelerated market transformation toward efficient appliances, more features may be considered for QR code and smart phone APP. Below is an extensive explanation of two features introduced above in Table 3.

### **Energy efficiency (consumption) range and ranking**

The feature of energy efficiency (consumption) range has been adopted by US Energy Guide. As shown below in Figure 7, the label tells consumers that the lowest energy bill is \$105 for this product type, and the highest \$176. With the energy bill number for this specific product, which is \$152, interpolated in between, the label shows where the product stands in terms of yearly energy bill when comparing with its peers on the market, or as registered.

While it could be an effective feature that encourages consumers purchase more efficient appliances, it has some flaws. First, as appliance technologies evolve fast, new comers to the market are more likely to consume less energy, meaning the lowest energy bill number could drop to lower than \$105 as soon as this label is printed and attached to the product. Second, although the most energy consuming product costs \$176 annually, consumers cannot tell the percentage of these products at the high energy consuming end. For example, consumers may think that the product that costs \$152 per year is a reasonable product when comparing with the one that costs \$176. However, there is a possibility that there is only one model of product, of just a couple of models, that consumes \$176 of electricity on the market, and \$152 is actually among the top five models in terms of energy consumption. With energy efficiency (consumption) ranking feature incorporated into database, QR code and smart phone APP, these issues no longer exist.

Energy efficiency (consumption) ranking is the ranking of energy efficiency (consumption) of a specific product amongst its peers. The ranking gives consumers a more direct view of the energy efficiency level of the product they are thinking about purchasing. When it works together with the feature of energy efficiency (consumption) range, it would provide consumers with both a big picture and details to make the purchase decision.

Database contains all registered products, and it can do real-time calculation of ranking of energy efficiency and energy consumption. The calculation result could be presented to consumers through QR code and smart phone APP and whenever consumers see the energy efficiency, energy consumption energy bill cost, or ranking, it is always the most up-to-date. After combining the ranking feature, the energy label may look like the neighboring Figure 8 as below.

Figure 7. An example of US Energy Guide label



Figure 8. After including the energy efficiency(consumption) ranking feature



### Push notifications through smart phone APP

The most obvious advantage of smart phone APP over QR code is that it can push notifications to APP installers, while QR code has to wait to be scanned to present the information to consumers. Policymakers and energy labeling program managers may want to use this advantage to push notifications to APP users of relevant news and programs, such as incentive programs, market surveillance results, and electricity tariff change, etc. Over time, these push notifications will educate the public more knowledge of energy related policies, the necessity of saving energy, and gain understanding and support from them on the policies and the work that policymakers do.

## 3. Stakeholders Mapping and Advantage Analysis of Digital Measures

Energy labeling programs need collaboration among many stakeholders, such as policymakers, manufacturers, retailers, and consumers. Each of them has a role to play, and this role would need others' support to accomplish. Thus, it is important to learn what these roles are, and the capacity and concerns of each stakeholder.

QR code provides a lot more useful information to consumers than physical labels. However, QR is a negatively reacting tool, i.e. it has to be scanned before it can provide consumers with useful information. It means that consumers must have access to QR codes on the labels in order to retrieve the information contained in the codes. Smart phone APP could tackle the disadvantages of QR code. The two digital measures could make a perfect team for energy labeling program and benefit all stakeholders.

### **3.1 Policymakers**

Policymakers design, implement and enforce policies that encourage and secure energy savings. They are the most important stakeholder. Without their political will, no progress will be made. Policymakers' goal is to design effective policies that can also be implemented and enforced without uncontrollable barriers. However, due to various reasons, they may lack of input from different stakeholders to design an effective policy, may lack of support when they need to implement a policy and lack of effective media channel when hoping to spread the results of supervision and enforcement.

#### **Better consumer education on energy efficiency and energy saving**

Physical stickers contain limited information. It may only cover energy efficiency and energy efficiency level (e.g. Grade A, B, and C). It may have energy consumption numbers for certain products and such information may be able to help consumers differentiate products of different energy efficiency levels, but is definitely not enough to educate them of the true gap between efficient appliances and inefficient ones, and what the gap could mean for them and the environment. Studies show that South African consumers consider "energy efficiency / consumption" as a very important factor when selecting appliances<sup>7</sup> due to electricity blackouts and tariff increases of 300% from 2008 to 2013<sup>8</sup>. This means South African consumers have a good sense of energy saving and have great potential to purchase energy efficient appliances. Policymakers may want to utilize digital energy label to educate consumer how to do so and help themselves secure these energy savings.

QR code could help better educate consumers by directing them to informative webpages, where they can find much more information than on the stickers. They will have the opportunity to know products' energy efficiency (consumption) range and ranking, compare different products to find out the most energy conservative one, learn about the actions taken by the government to tackle energy issues, find qualified recycling companies to dispose their old appliances or see if there is a program for them to trade in the old appliances for new ones, etc. Appliance usage tips could also be added for consumers to learn how to save energy every day while not sacrificing any performance of their appliances. Better education means better awareness on energy saving and less greenhouse gas (GHG) emissions.

#### **Enhanced communication with stakeholders**

Communication is always a barrier for policymakers. Inefficient and ineffective communication with stakeholders would normally result in less effective policies. Policymakers may want to understand the best measures to implement a new policy and the potential impact of it, including energy labeling program and the best ways is to have sufficient communication with stakeholders like consumers, retailers and manufacturers. Consumers are much dispersed and with big diversity. Traditional methods of reaching out to a representative number of them requires huge amount of financial and human resources. For example, when policymakers plan to carry out an incentive program to promote the sales of efficient appliances, they need to use many channels to spread the word so that most consumers would be aware of it. These channels may include advertisements in various media, notifying and training retailers and

manufacturers, and extending the length of the program in the hope that longer time will bring more participants.

With digital measure, e.g. QR code and a smart phone APP, policymakers can push message of incentive programs with sufficient details to millions in minutes. These recipients will refer to one resource: the link directed from QR code or the smart phone APP rather than individual sales staff or media, which may cause different understanding among consumers. It is also easier for different retailers to align in understanding program rules, ensuring many less confusions for themselves and consumers. As the message could be delivered so promptly, the program implementation period could be shortened and it will save management costs.

QR code can help obtain a lot more inputs from these stakeholders through providing an easy communicational portal. Policymakers may design a portal for multiple purposes, such as consumer complaints and consumer surveys. When conducting consumer surveys, the difficulty always lies in reaching out to a sizable sample that is big enough to represent the whole consumer group. The traditional way of carrying out consumer surveys is to hire a survey company and have their staff go on to the street, talk to people and try to collect as many feedbacks as possible with limited budget and time. With QR code and smart phone APP, every appliance on the market is a potential surveyor. They are able to collect many more feedbacks in a much shorter timeframe, which have been proven in China. In short, with QR code and smart phone APP in place, South African policymakers would be able to design and implement more efficient and effective policies with much less budget.

QR code can also help with providing most up-to-date information to consumers. Some programs use the amount of annual utility bill of an appliance and the ranking it stands amongst its peers as an indicator of how efficient or inefficient the appliance is. This is a very good indicator, e.g. clear and straightforward. However, once the ranking is printed, it could not be changed or adjusted. And the problem is that as technology improves, newer published models of products may consume significant less energy than previous ones but the printed ranking information cannot be modified. Similarly, when energy performance standards are upgraded, i.e. energy efficiency requirements are improved in stringency, energy efficiency levels may be re-defined but these changes cannot be reflected on the previously attached labels. With QR code, all of these issues could be tackled. Maintenance staff could update the database real-time and the updates will be reflected when consumers scan QR codes. Detailed explanations could also be provided to avoid confusions.

As to whether consumers will scan the QR code when seeing it, according to experiences, where there is a culture of QR code scanning, e.g. if QR code has already been applied to commercial activities and have been widely accepted, consumers are very likely to scan the code. Even without a QR code culture, either out of curiosity or due to the recommendation of sales staff, many consumers would still choose to scan it, especially when they learn that the QR code is issued by the government, which means no worries needed for scams.

### **Strong support for market surveillance**

One of the challenges energy labeling programs face globally is market supervision. While appliances attach energy labels as required, it could be difficult to tell if displayed information is correct as registered and/or tested. Although some energy labeling programs have database, such as database of registration information, which can be used to verify the information on the labels, it could be time and energy consuming for market supervisors to open the webpage on their mobile devices, manually type in product names and long model numbers to gain access to the registered data.

QR code provides an effective solution to this problem. With one scan, market supervisors will be directed to the official page of the product and have access to every piece of information they would need for the energy label information check<sup>11</sup>. In this way, market supervisors' working efficiency will be greatly improved.

Given its ability of reaching out to millions of consumers, policymakers may also want to use QR code to deter manufacturers of poor quality control. When market check testing is performed, policymakers may use QR code to inform consumers of the test results in proper ways. Purchasers of failed products may be granted the right to claim certain types of compensation. In this way, manufacturers will pay more attention to product quality and market supervisors may eventually spend much less time dealing with quality complaints.

### **Better solid waste control**

Most household appliances have fully saturated into the life of the public and it is going to be the same for new appliance categories. Appliance recycling is a topic faced by global policymakers. Without regulation and government intervention, solid waste, including electronic waste, could cause serious environmental problems. However, if properly regulated and guided, it could develop into a promising industry, providing jobs to thousands of people and help protect environment.

QR code could help policymakers disseminate to consumers a list of qualified solid waste handling companies, so that when appliance owners want to dispose their old appliances, they have an easy and convenient way to find the right recyclers.

## **3.2 Manufacturers**

Digital measures will not only help policymakers implement more effective labeling programs, but also help manufacturers in a number of ways.

### **Promotional sale**

Again, the most obvious advantage of digital measures is that it could reach millions of consumers in a timely manner while at low cost. This is exactly the measure manufacturers love to use for promotional activities. Energy label is a tool of the government to ensure product quality and cut GHG emissions, thus it cannot and should not be used for pure

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<sup>11</sup> Please note that here "energy label information check" only refers to examine if the information on energy labels is accurately presented. It does NOT involve any testing at laboratories.

commercial purposes. However, if the promotion is also about energy efficiency improvement, or energy saving, the labeling program regulators and manufacturers may work together and make the best use of the digital energy label to sell more energy efficient products and secure as many energy savings as possible. Nevertheless, energy labeling program regulators may want to establish rules for use of QR code as a promotional channel. Manufacturers' promotional language and the impact of promotional sale should be screened and approved before publishing.

#### **Use QR code to provide value added services**

Manufacturers may use digital label to provide value added services. Some examples are:

- Manufacturers may attach product e-manual to product's digital label so that when consumers need to look at the manual, they could scan the QR code and have easy access to the manual;
- Manufacturers may provide after sales service (e.g. repair, replacement, etc.) phone numbers. Different product categories may use different numbers. This will enhance the efficiency of answering customers' questions.

#### **QR code helps build a fair competition environment**

As mentioned before, QR code is able to deter manufacturers falsely claiming products' performance parameters and having loose quality control. It will help establish good order of the market and a fair competition environment.

### **3.3 Retailers**

#### **More efficient and effective training of energy labeling program**

South African government has worked with retailers on training of energy labeling program. As the program evolves, such trainings may be needed regularly and more frequently. With digital label, these trainings could be more efficient and effective. Policymakers may publish training material through QR code and/or smart phone APP. Retailers and sales staff may choose to participate in or watch trainings online through a portal specifically designed for them. This material could be updated as frequently as needed and is easy for retailers to access.

#### **Free and persuasive promotional material for efficient products**

One of the challenges sales staff face when trying to sell efficient products is that energy efficient appliances normally cost consumers somewhat more upfront and consumers may not be convinced that it is a good investment. Meanwhile, it is unlikely that sales staff could accurately tell consumers "how" efficient a product is, i.e. the energy efficiency ranking among its peers. Also, there may be credibility issue between consumers and sales staff, because consumers tend to believe that sales staff would like to sell the most profitable products rather than the most efficient ones.

With QR code, sales staff could better convince consumers of the long term benefit by showing them official numbers. Consumers would be able to see the real-time efficiency ranking of

appliances and retailers are very likely to increase sales of efficient products. Retailers may work with policymakers to design promotional programs for efficient appliances. This will further increase sales of efficient products, improve efficiency level of the market, and save more energy comparing with baseline scenario, helping policymakers achieve and even exceed their goal.

### **3.4 Consumers**

#### **Better knowledge of energy efficiency**

While the current physical sticker energy labels provide consumers with basic energy efficiency information, digital ones provide more details. It is understandable that not all consumers are interested in learning every piece of knowledge of energy efficiency, but many do. And for those who do and those who care about energy efficiency and energy conservation very much, QR code labels could help them. QR code could incorporate several levels of energy efficiency information. The first level could be the same as what is displayed on the current version of labels, together with the efficiency ranking, which is straightforward and could be very influential for consumers' decision making. Going one level deeper down, it may present to consumers of more parameters and what they mean. For example, lumen of a light bulb means how much light it gives out and standby power means the electricity consumed by the appliance while it is on sleep mode. Going even deeper to level three, there could be explanations of why certain parameters are evaluated and used to determine products' efficiency or general quality. Also, it could include introduction and explanation of what technology is the most efficient on the market, e.g. inverter air conditioners vs non-inverters. Each level of information satisfies a group of consumers.

#### **No good deals missed anymore**

Energy labeling program regulators may work with manufacturers and retailers to promote sales of efficient appliances. Policymakers may also use QR code label and smart phone APP to reach out to millions of consumers informing them of incentives for purchasing efficient appliances. Consumers will have prompt incoming messages about these incentives and good deals for efficient appliances and take advantages of them. As a result, retailers will sell more products and policymakers will gain more energy savings.

#### **Enjoy the convenience, savings and satisfaction of helping environment**

With QR code, consumers could have easy access to e-user manual, service numbers for repairing, etc. They could also use the smart phone APP to learn appliance daily usage tips, which will help them pay less for utility bills. For those consumers who care about environment, handling the old appliances to qualified recyclers may make them feel proud to have contributed to environment protection.

## **4. Conclusion**

Digitalization of appliance energy labeling programs is a global trend. It will greatly benefit all stakeholders and unleash a lot more potentials of energy labeling programs. Some programs



have already taken the first steps and seen the effects. South Africa has a sound basis to join the club and become a leader with the support from international agencies and collaboration between South African government agencies internally.

South African energy labeling program regulators may want to look to the existing experiences of digitalization measures and discover the right path for themselves based on the practical situation in South Africa. The cautions to bear in mind are mainly advanced and long term budgeting, and establishment of a dedicated and capable team for the innovation.