Provision of Technical Assistance to Enhance Vanuatu's Market for Energy Efficient Appliances

Market and Policy Analysis for Energy Efficient Appliances in Vanuatu

(Refrigerators, Freezers, Air Conditioners, Televisions, Clothes Washers, and Lighting Products)

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Acronyms and Abbreviations

AEER	Annual Energy Efficiency Ratio
ACOP	Annual Coefficient of Performance
AS/NZS	Australian/New Zealand Standards
CAGR	Compound annual growth rate
CEC	Comparative Energy Consumption
CTCN	Climate Technology Centre and Network
DOE	Department of Energy
ESM	Environmentally Sound Management
GCF	Green Climate Fund
GEMS	Greenhouse and Energy Minimum Standards
HIES	Household Income and Expenditure Surveys
HS code	Harmonized Commodity Description and Coding System
MEPS	Minimum energy performance standard
MEPSL	Minimum energy performance standard and labelling
MV&E	monitoring, verification, and enforcement
PALS	Pacific Appliance Labeling and Standards
PEEP2	Promotion of Energy Efficiency in the Pacific – Phase 2
PELS	Pacific Efficient Lighting Strategy
PICTs	Pacific Island Countries and Territories
PRS	product registration system
REEEP	Renewable Energy and Energy Efficiency Partnership
SPC	Secretariat of the Pacific Community
SPM	supporting policies and mechanisms
S&L	standards and labelling
URA	Utilities Regulatory Authority
UNELCO	Union Electrique de Vanuatu Limited
UN Comtrade	United Nations Commodity Trade
VeSW	Vanuatu Electronic Single Window
VNSO	Vanuatu National Statistics Office
VUI	Vanuatu Utilities and Infrastructure Limited

1 INTRODUCTION

This *Market and Policy Analysis for Energy Efficient Appliances in Vanuatu* (*refrigerators, freezers, air conditioners, televisions and clothes washers, and lighting products*) report was prepared for the Department of Energy under the **"Enhance Vanuatu's Market for Energy Efficient Appliances"** project, funded by the Green Climate Fund (GCF) through the Climate Technology Centre and Network (CTCN). The project objective is to support accelerating the transition to energy-efficient appliances through 1) improvement of the recently introduced standards and labelling programme; 2) introduction of MV&E activities and a product registration system; and 3) introduction of financial mechanisms.

Implementation of the project is carried out through the following 5 tasks.

- Task 1 - Development of implementation planning and communication documents
- Task 2 - Comprehensive market and policy analysis for higher efficiency refrigerators, freezers, air conditioners, and lighting products
- Task 3 - Assessment and upgrade of the existing Vanuatu Electronic Single Window (VeSW) registration system and development of an MV&E plan
- Task 4 - Development of financing mechanisms for the incentivization towards the purchase of energy efficient appliances
- Task 5 – Project closure

This report summarizes findings from the comprehensive market assessment for energy efficient refrigerators, freezers, air conditioners, televisions, clothes washers, and lighting products in Vanuatu, analysis of the existing Minimum Energy Performance Standards and Labelling (MEPSL) program and recommendations on possible improvements of the MEPSL program.

1.1 Objectives of the Assessment and Analysis

The main objectives of the market assessment are to understand the overall market characteristics of refrigerators, freezers, air conditioners, lighting products, televisions and clothes washers in Vanuatu, to evaluate the current stock and market growth, to estimate the ownership and saturation of household appliances, and to understand the dynamics of lighting and appliances supply in Vanuatu. The findings from the market assessment provided a basis for the analysis of the MEPSL program and for the evaluation of the overall effectiveness and efficiency of the MEPSL program in Vanuatu. The conclusions and recommendations on possible improvements of the existing MEPSL program were made based on the findings from the market assessment and evaluation of MEPSL program.

1.2 Market Assessment Methodology

Assessment of the appliance market in Vanuatu in this report is based on three main secondary resources: 1) the UN Comtrade which provides statistical data on electrical appliances exported to Vanuatu from 2012 to 2021; 2) the Vanuatu Electronic Single Window (VeSW) system containing energy efficient (EE) appliance product certificates approved by the Department of Energy (DOE), and 3) various reports and studies on electricity supply and household surveys in Vanuatu.

Characteristics of the electrical appliance market in Vanuatu were analyzed based on the UN Comtrade statistics, and penetration of energy efficient appliances (in terms of their availability) was analyzed based on the number of certified products in the Vanuatu Electronic Single Window (VeSW) system, published on DOE's website. The estimated stock of household appliances was computed based on the number of electrified households and appliance penetration rates obtained from various reports and studies.

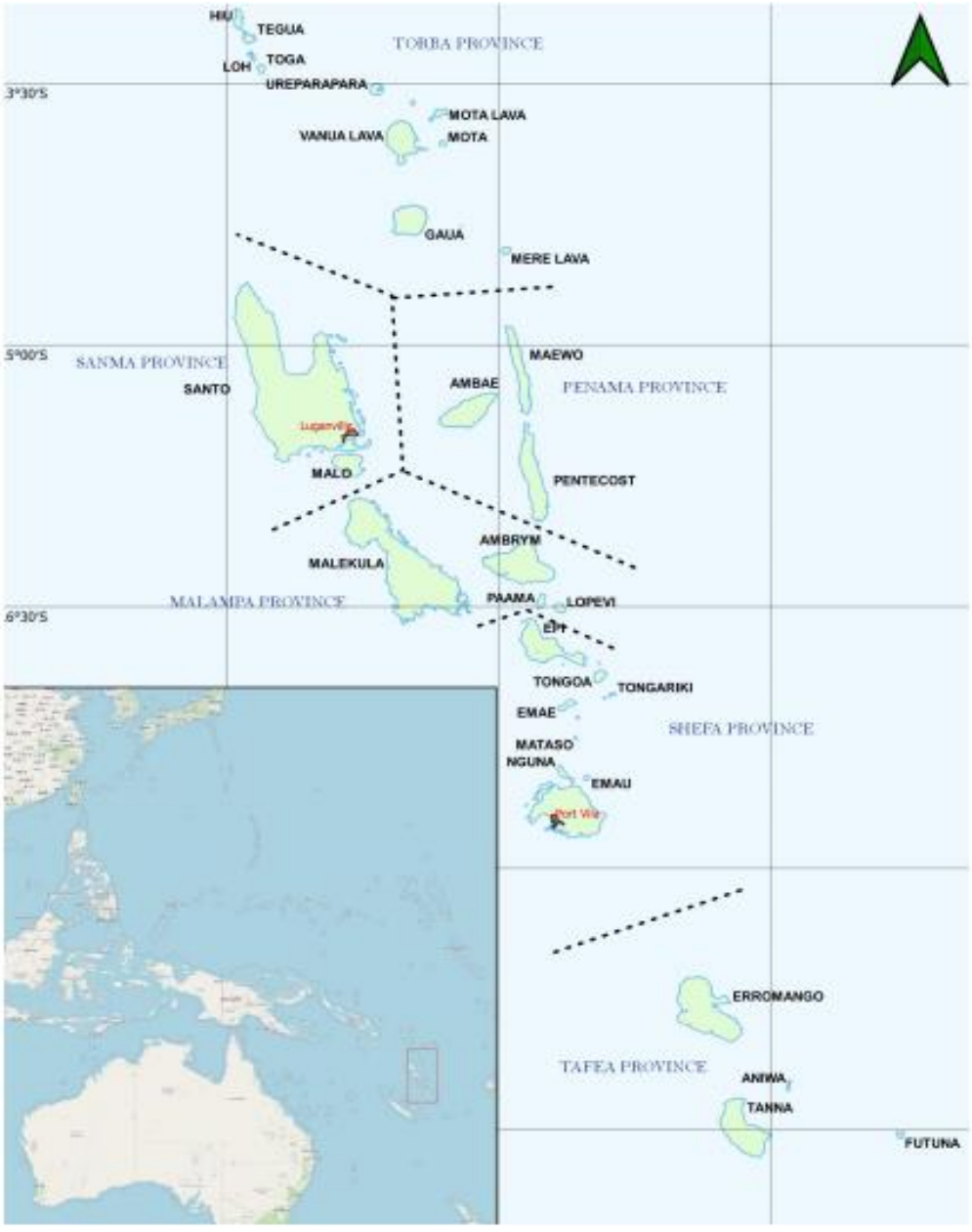
The analysis covers the following five selected major electrical appliances:

- Refrigerators and Freezers: HS code 4818
- Air conditioning machine (all types): HS code 8415
- Lighting lamps: HS code 8539
- Households Washing Machines: HS code 8450
- Television: HS code 85287

2 COUNTRY BACKGROUND

2.1 Geographical Area

Vanuatu consists of 82 islands, of which about 63 are permanently inhabited, covering a total land area of about 12,281 km^2 and a sea area of about 71,000 km^2. It consists of six provinces (Torba, Sanma, Penama, Malampa, Shefa, and Tafea). Port Vila, the capital and largest of two urban centres, is located on the island of Efate (Shefa province) which is the most populous island. The small urban centre of Luganville is on Espiritu Santo, located in Sanma province.



Source: 2020 National Population and Housing Census Report, Volume 1 (VNSO)

Figure 2-1: Map of Republic of Vanuatu, showing its location in the Pacific, provincial names.

2.2 2020 Population and Housing Census Report

The 2020 census report indicated a total population of 300,019 people in Vanuatu, which increased from 272,459 people in 2016. The average population growth rate is 2.3% per year. The total number of private households in 2020 was 66,365 with 293,963 household members or 4.7 persons per household on average (Table 2-1).

Table 2-1: Population and Households by Province (2020)

Place of residence	Number of total population (people)		Number of private households		Average Household size	
	2016	2020	2016	2020	2016	2020
VANUATU (Total)	**272,459**	**300,019**	**55,527**	**66,365**	**4.8**	**4.7**
URBAN	**67,749**	**66,753**	**14,048**	**14,702**	**4.8**	**4.5**
PORT VILA	-	49,034	-	11,195	-	4.4
LUGANVILLE	-	17,719	-	3,617	-	4.9
RURAL	**204,710**	**233,266**	**41,479**	**48,663**	**4.8**	**4.8**
TORBA	10,161	11,330	1,980	2,392	5.0	4.7
SANMA	54,184	43,165	10,792	9,306	4.9	4.6
PENAMA	32,534	35,607	7,001own	7,863	4.5	4.5
MALAMPA	40,928	42,499	8,925	9,715	4.5	4.4
SHEFA	97,602	54,953	19,962	11,148	4.8	4.9
TAFEA	37,050	45,714	6,867	8,239	5.4	5.5

Source: 2020 National Population and Housing Census Report, Volume 1 (VNSO) [1]

2.3 Household Access to Electricity

Based on the Socio-Economic Atlas (SEA) report, Section C: Household Living (Dwelling) Conditions[2], 28% of households in Vanuatu have electricity from the main grid as the main source of lighting (Table 2-2). Of which 80.2%% are urban households in Shefa province (Port Vila) and Sanma province (Luganville).

It should be noted that the 2020 census reported only the percentage of households using ''Solar'' as the main source of lighting, while the data on the households using electricity from the main grid was not presented. The data in the SEA report was derived based on the Vanuatu 2009 Census data and 2010 HIES data. Therefore, it is assumed that increasing electricity sources from solar will substitute for decreasing the use of diesel generators, and households with access to electricity from the main grid in 2020 were approximately at the same level as the 2009 Census data.

[1] https://vnso.gov.vu/index.php/en/statistics-report/census-report/national-population-and-housing-census/province

[2] https://vnso.gov.vu/images/Special_Report/Vanuatu_Socio-Economic_Atlas/Household_Living_Dwelling_Conditions.pdf, (published on VNSO's websites in 2020)

Table 2-2: Main Sources of Household Lighting by Province

Place of residence	% Household that has electricity as main source of lighting (Main grid, solar system, generator)[3]			% Households using solar as main source of lighting (2020)
	Main grid	Solar system or solar lamp	Generator	
VANUATU	**28.0%**	**6.3%**	**1.70%**	**67.3%**
URBAN	**80.2%**	**1.1%**	**1.6%**	**15.4%**
PORT VILA	83.4%	0.9%	1.7%	13.2%
LUGANVILLE	68.0%	1.4%	2.2%	22.2%
RURAL	**12.1%**	**8.1%**	**2.0%**	**83.0%**
TORBA	1.3%	7.5%	2.0%	94.4%
SANMA	10.1%	7.2%	2.0%	88.1%
PENAMA	2.5%	2.5%	2.0%	95.8%
MALAMPA	6.5%	9.9%	2.0%	87.3%
SHEFA	30.5%	7.0%	2.0%	62.3%
TAFEA	8.4%	13.1%	2.0%	84.9%

Source: The Socio-Economic Atlas (SEA) report, Section C: Household Living (Dwelling) Conditions, and the 2020 National Population and Housing Census Report, Volume 1 (VNSO)

On average, the monthly household expenditure was around VT 10,470. Energy cost was the second major household-related expense, with about 48.5% of households' energy incurred being for electricity, and household appliances purchase was approximately 12.5% of household spending[4].

2.3.1 Electricity Supply in Vanuatu

In Vanuatu, grid-connected electricity is supplied by private entities operating under concession agreements granting them exclusive rights to supply the electricity in four main islands (Efate, Espiritu Santo, Tanna, and Malekula). The two concession areas in Efate and Espiritu Santo islands are operated by two private entities, UNELCO and VUI[5]. UNELCO is the largest electricity utility in Vanuatu supplying Shefa, Malampa, and Tafea provinces on Efate, while VUI is supplying Sanma province on Espiritu Santo. For Tanna and Malekula islands, UNELCO has chosen not to renew the government's offer to extend its concession agreement; the Government of Vanuatu is temporarily operating and managing the system until a new concession is completed[6].

The Utilities Regulatory Authority (URA) regulates the electricity market and set tariffs relating to the concession agreements. The Efate concession agreement covers the capital, Port Vila, and most of the island's coastline. Port Vila and the Efate gird is the largest grid and supplies over 80 percent of the country's total generated electricity. Electricity is mostly generated using diesel along with a small mix of copra oil, and hydro, with some renewable energy (RE) in the form of solar PV and wind power.

[3] https://vnso.gov.vu/images/Special_Report/Vanuatu_Socio-Economic_Atlas/Household_Living_Dwelling_Conditions.pdf (VNSO)

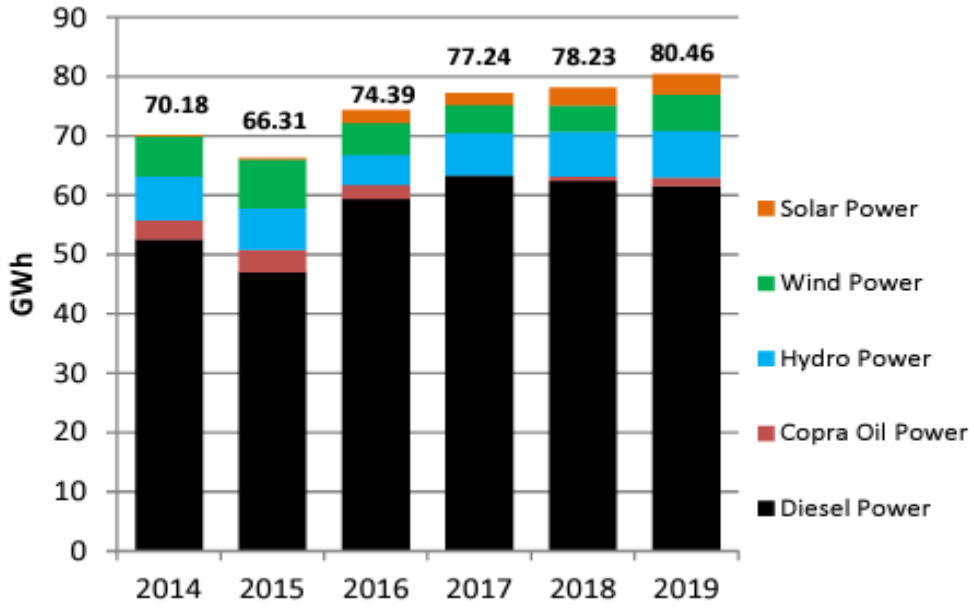
[4] https://vnso.gov.vu/images/Special_Report/Expenditure_Patterns/2013VanuatuLivingConditionSurvey.pdf

The data of household income and expenditure survey in the Pacific Living Condition Survey Report in 2013 is the latest published document available on the Vanuatu National Statistics Office website.

[5] Union Electrique de Vanuatu Limited (UNELCO), Vanuatu Utilities and Infrastructure Limited (VUI)

[6] Powering the Pacific – A Guide to Investing in Renewable Electricity Generation in Pacific, 2021

The energy mix in Vanuatu by the source of energy generation for all concession areas is shown in Figure 2-2. On average, diesel generation contributed 76.6% followed by a hydro contribution of 9.7%, while RE (wind, solar, and Copra oil) contributed around 13.7%. The total installed capacity for electricity generation in Vanuatu was 32.41 MW in 2019, with a peak demand of 15.08 MW, and the electricity generation was 80.48 GWh[7]. UNELCO's generation accounted for 82.1% of total electricity generation in 2019, and VUI's generation accounted for only 14.9% in the same year.



Source: URA Electricity Fact Sheet 2014-2019.[8]

Figure 2-2: Energy Mix in Vanuatu by Source of Energy Generation for all Concession Areas

Table 2-3 summarizes Vanuatu's electricity generation and share of electricity supplied by each utility in 2019.

Table 2-3: Vanuatu Electricity Generation in 2019[9]

Island	Concession Holder	Installed Capacity (MW)	Peak Demand (MW)	Electricity Generation (GWh)	Share of total electricity generation (%)	Share of RE (%)
Efate	UNELCO	22.66	12.40	66.04	82.1%	17%
Espiritu Santo	VUI	4.32	2.21	11.98	14.9%	65%
Tanna	Government of Vanuatu (until new tender is completed)	0.72	0.22	1.40	1.7%	3%
Malekula	Government of Vanuatu (until	0.71	0.25	1.06	1.3%	3%

[7] URA Electricity Fact Sheet 2014-2019

[8] http://ura.gov.vu/attachments/article/97/Electricity%20Fact%20Sheet%202014%20-%202019%20-Final.pdf

[9] http://ura.gov.vu/attachments/article/97/Electricity%20Fact%20Sheet%202014%20-%202019%20-Final.pdf

Island	Concession Holder	Installed Capacity (MW)	Peak Demand (MW)	Electricity Generation (GWh)	Share of total electricity generation (%)	Share of RE (%)
	new tender is completed)					
Total		**32.41**	**15.08**	**80.46**		

Source: URA Electricity Fact Sheet 2014-2019.

2.4 Development of MEPSL in Vanuatu

Vanuatu and the Pacific Island Countries and Territories (PICTs) rely heavily on imported diesel fuel to generate electricity at a high cost to consumers and face growing demands for power. In addition, PICTs have faced adverse consequences and effects of climate change. Residential is one key end-user sector that can be addressed to reduce their national energy use and contribute effort to resilience to the impact of climate change. Especially inefficient electrical appliances that are lower in quality and more costly to run, increasing household energy expenses.

To address these issues, at the 42nd meeting of Pacific Islands Forum Leaders in 2011, the Regional Leaders supported PICTs on the expansion of the electrical appliance labeling and standard program.

2.4.1 The Pacific Appliance Labeling and Standards (PALS)

The Pacific Appliance Labeling and Standards (PALS) Programme began its implementation in April of 2012 and ended in June 2019 with funding and oversight from the Commonwealth of Australia, with regional management supported and implemented by the South Pacific Community (SPC). Vanuatu is one of the PICTs participating in PALS. The PALS Programme made an excellent success by playing a significant role in supporting and facilitating PICTs in enacting legislation and implementing Minimum Energy Performance Standards and Labelling (MEPSL) for their high energy-consuming household appliances. PALS program had desired to engage PICTs in various activities to achieve the program's outcomes. The four outcomes that PALS provided were:

- Confirm political commitment to MEPSL;
- Establish an enabling environment for MEPSL legislation;
- Support MEPS adoption and operation;
- Help build regional capacity for MEPSL.

The draft regulation referencing Australian and New Zealand standards for product energy testing, labeling, and MEPS have proposed covering its regulations. The PICTs established MEPSL by adopting Australia and New Zealand's standards MEPSL for refrigerators, freezers, air conditioners, and lighting products.

The PALS Programme made a vital role in supporting MEPSL adoption and implementation in PICTs, including Vanuatu. Several preparatory activities were undertaken and completed. For PICTs participating in the PALS programme, implementation of energy-efficiency policies and MEPS for electrical appliances products is built upon the foundation work supported by PALS.

PALS achievements in Vanuatu are summarized as follows:

- Development and approval of the Energy Efficiency of Electrical Appliances, Equipment and Lighting Products Act No.24 of 2016;
- Provided support for legislative framework and legal advice;
- Provided capacity training and technical assistance for stakeholders;
- Raised public and retailer awareness campaigns; and
- Developed the Pacific Appliance Database (an online appliance registration database).

The regulatory framework of MEPSL developed and implemented from PALS in Vanuatu is summarized as follows:

Table 2-4: Status of MEPSL in Vanuatu

Country	Status of regulations	Electrical Appliances			
		Refrigerators and freezers	Air conditioners	Lighting	Other appliances
Vanuatu	Enacted	Covered(1)	Covered(1)	Covered(1)	-

Note: (1) Included in current the Energy Efficiency of Electrical Appliances, Equipment and Lighting Products Act No. 24 of 2016, Republic of Vanuatu

2.4.2 The Pacific Efficient Lighting Strategy (PELS)

In early 2014, SPC and the en.lighten initiative agreed to collaborate to achieve a regional transition to efficient lighting within PICTs and to support policy-makers through the development and implementation of the Pacific Efficient Lighting Strategy (PELS) with financial support from the Australian Government. The development of PELS was endorsed by the Pacific Regional Energy and Transport Minister's meeting in April 2014. Vanuatu is one of the PICTs that has participated with PELS.

The aim of the Pacific Efficient Lighting Strategy (PELS) 2016-2020 is to help PICTs significantly reduce the energy needed in increasing lighting services, by designing and implementing policies to phase out inefficient forms of lighting and replace them with more energy-efficient technologies. PELS addresses lighting end-uses in residential, commercial, government buildings, and street and outdoor lighting. To ensure an effective and self-sustaining transition to efficient lighting in PICTs, a cohesive set of national and regional actions for on-gid and off-grid lighting has been designed for implementation in the region.

The PELS project approach relies on the integrated implementation of four policy components: Minimum energy performance standards (MEPS); Monitoring, verification, and enforcement (MVE); Supporting policies and mechanisms (SPM); Environmentally sound management (ESM);

The MEPS policy component aims at ensuring the efficiency and quality of lighting products purchased and used in PICTs. The objectives of this component will be accomplished through the implementation of:

- Ensure adoption of MEPS requirements for on-grid lighting products throughout PICTs;
- Ensure adoption of MEPS requirements for off-grid lighting products;
- Strengthen and harmonize MEPS requirements for lighting products.

PELS has set the target date for tracking implementation of the MEPS strategy component on Harmonization of MEPS requirement, and MEPS for off-grid lighting products adopted within the PICTs region in 2019. However, the timelines for adoption and enforcement of any new and updated MEPS requirements for lighting products in each PICTs will depend on each country's regulatory framework.

2.5 MEPSL Legal & Regulatory Framework

In 2016, the Government of the Republic of Vanuatu promulgated the Energy Efficiency of Electrical Appliances, Equipment and Lighting Products Act No. 24 of 2016. The objectives of the Act are to:

- Establish minimum energy performance standards for the electrical appliances, equipment, or lighting products in Vanuatu;
- Establish the standards for energy labeling of electrical appliances, equipment, or lighting product in Vanuatu;
- Regulate the supply of electrical products in Vanuatu;
- Establish a register of products;
- Prohibit the import into Vanuatu of products that are not energy efficient; and
- Provide for the registration of brands and models of products.

The Act was gazetted and effective on 29th March 2017. However, Vanuatu only started the implementation phase of the MEPSL program following the approval of the Electrical Appliance, Equipment and Lighting Products (Importation Control) Regulation Order No. 126 of 2017 on 29th September 2017 by the Ministry of Climate Change Adaptation, Geo-Hazards, Environment and Energy. On 15th December 2017, the original fees for certificate of registration, as specified in Schedule 8 of the Regulation Order No. 126 was amended with the Regulation Order No. 186 of 2017, and the certification fees for commercial purposes (sell or use in businesses) were reduced from VT4,000 to 6,000 to VT1,000 to 2,000 depending on product classifications and application forms. On 10th September 2019, Schedule 9 – Penalties were also amended by the Regulation Order No. 117 of 2019.

The Act and Regulations apply to both private (individuals) importers and the businesses (wholesalers and retailers) who are importing these products for their personal or business use. Prior to importation of the regulated products, importers must obtain a valid registration certificate from the Department of Energy (DOE) and register in the Vanuatu Electronic Single Window (VeSW) system.

Product Standards and Requirements under the Act are briefly summarized as follows:

- Regulated products must meet the minimum energy performance standards requirement of Australia, New Zealand, or identical, as set out in Column 2 of Schedule 1 under the Act;
- Brand and model of the product must be registered in the Vanuatu Electronic Single Window (VeSW) system, and the Regulator will issue a certificate confirming that the brand and model have been registered and satisfied with the standards requirement;
- Labeling of the regulated products must meet the energy labeling criteria requirements under Column 2 of Schedule 2 under the Act; and
- Description of the brand and model on the energy label much match the description on the product;

- The product must not affix or display a label relating to energy efficiency or energy consumption on a product unless that label meets the requirement under the Act;
- The energy label must be affixed to the front of the product, and visible at the point of sale;

2.5.1 Product Categories Subject to MEPS and Energy Performance Labeling

The Act and Regulations enforce that all refrigerators, freezers, air conditioners, and lighting products imported to Vanuatu have to meet minimum energy performance standards (MEPS). In addition, household refrigerators and freezers, and air conditioners are required to affix energy performance labels. The product classes subject to the MEPS requirements (as set out in Column 2 of Schedule 1 under the Act) and the mandatory energy performance labeling requirements (as set out in Column 2 of Schedule 2 under the Act) are shown in the table below. Energy performance testing standards for each product class referencing joint Australian/New Zealand Standards (AS/NZS) are also specified in the table.

Table 2-5: List of Product Classes Subject to Minimum Energy Performance Standards (Schedule 1) and Mandatory Energy Performance Labeling (Schedule 2)

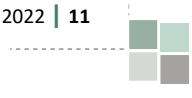
Product Class	Schedule 1 Column 2 Standards for Minimum Energy Performance Characteristics	Schedule 1 Column 3 Standards for Energy Testing	Schedule 2 Column 2 Standards for mandatory energy performance labeling
Household refrigerating appliances: covered refrigerators, refrigerators and freezers or freezers	AS/NZS 4474.2:2009	AS/NZS 4474.1: 2007 (incorporating amendments No.1 and 2)	AS/NZS 4474.2: 2009 (incorporating amendments No.1 and 2)
Air conditioners: including Single phase and 3-phase up to 65 kW rated total cooling capacity. Includes air source heat pumps	AS/NZS 3823.2:2013 Part 2: Energy labeling and MEPS requirements	AS/NZS 3823.1.1: 2012 -Part 1.1: for Non ducted air conditioners and heat pumps AS/NZS 3823.1.2: 2012 -Part 1.2: Test Method-ducted air conditioners and air to air heat pumps AS/NZS 3823.1.4: 2012 -Part 1.4: Test Method-multi-split system air conditioners and air to air heat pumps	AS/NZS 3823.2:2013 Part 2: Energy labeling and MEPS requirements

Product Class	Schedule 1 Column 2 Standards for Minimum Energy Performance Characteristics	Schedule 1 Column 3 Standards for Energy Testing	Schedule 2 Column 2 Standards for mandatory energy performance labeling
Incandescent lamps	AS/NZS 4934.2:2011 Part 2 MEPS requirements	AS/NZS 4934.1: 2014 - Part 1: Test methods - Energy performance	-
Linear Fluorescent lamps	AS/NZS 4782.2:2004 Part 2: MEPS AS/NZS 4782.3 (Int):2006 Part 3:	AS/NZS 4782.1: 2004 Part 1: general (IEC 60081:2000 MOD)	-
Compact Fluorescent lamps	AS/NZS 4847.2:2010 Part 2: MEPS requirements AS/NZS 4782.3 (Int):2006 Part 3	AS/NZS 4847.1: 2010 Part 1: Test methods	-
Fluorescent lamp ballasts	AS/NZS 4783.2:2002 Part 2 Energy labeling and MEPS requirements	AS/NZS 4783.1: 2001 Part 1: Method of measurement	-

In addition to the abovementioned product classes, Vanuatu is considering inclusion of clothes washers and televisions in the MEPSL regulation, and relevant testing, MEPS and labeling requirements are shown in Table 2-6.

Table 2-6: Additional Product Classes Subject to MEPS and Mandatory Energy Performance Labeling Under Consideration by Vanuatu

Product Class	Schedule 1 Column 2 Standards for Minimum Energy Performance Characteristics	Schedule 1 Column 3 Standards for Energy Testing	Schedule 2 Column 2 Standards for mandatory energy performance labeling
Clothes Washing Machines	-	AS/NZS 2040.1:2005 + A1 + A2 + A3: Part 1: Methods for measuring performance, energy and water consumption	AS/NZS 2040.2:2005 + A1: Part 2: Energy efficiency labelling requirements
Televisions	AS/NZS 62087.2.2:2011 + A1 + A2: Part 2.2: MEPS and energy rating label requirements	AS/NZS 62087.1:2010 Part 1: Methods of measurement	AS/NZS 62087.2.2:2011 + A1 + A2: Part 2.2: MEPS and energy rating label requirements



2.5.2 Registration Process for Imported Appliances

The Act and Regulations apply to both private (individuals) importers and businesses (wholesalers and retailers) who are importing these products for their personal or business use. Prior to importation of the regulated products, importers must register in the Vanuatu Electronic Single Window (VeSW) system to obtain a valid Minimum Energy Performance Standards and Energy Labelling (MEPSL) for appliance and lighting import certificate approved by the Department of Energy (DOE).

Roles of Importers are briefly summarized as follows:

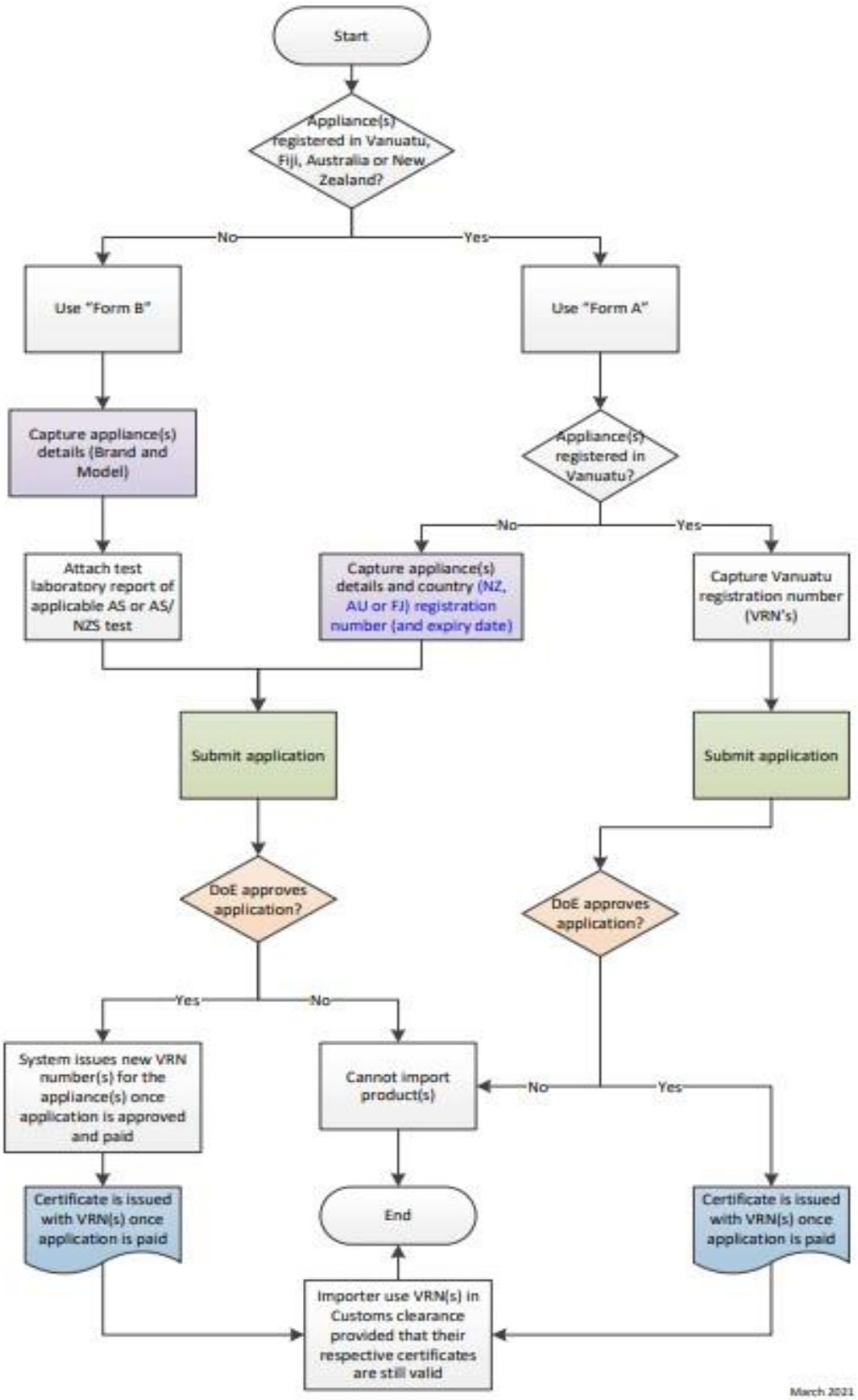
- To submit an application for MEPSL import certificates in the VeSW system. They are two options for applying for registration for imported appliances: under Form A or Form B[10]. Regulated products must meet the minimum energy performance standards requirement of Australia, New Zealand, or identical, as set out in Column 2 of Schedule 1 under the Act;
- Provide supporting documents such as a copy of a test report made by an approved relevant test authority[11]and product specifications from a recognized testing authority (Laboratory) to the regulator (if requested);
- Pay a registration fee to register the product (brand & model);
- Be liable for meeting any re-export and disposal cost of any prohibited imported products.

The process for the VeSW e-Registration application of Imported Certificated for electrical appliances is shown in Figure 2-3 on the following page.

[10] Form A-used by a trader (or person) when applying for a Certificate of Registration for the regulated electrical products that are Already Registered in Vanuatu, Australia, New Zealand, or Fiji.

Form B-used by a trader (or person) when applying for a Certificate of Registration for the electrical products that are NOT Registered in Vanuatu, Australia, New Zealand, or Fiji.

[11] Approved relevant test authority means a manufacturer or independent test laboratory approved by the Regulator for the purposes of providing a test report in accordance with standard specified under Schedule 1 or 2



Source: http://singlewindow.gov.vu

Figure 2-3: Process for the VeSW e-Registration Application of Import Certificates for Electrical Products

2.6 Manual of Standard Operating Procedures for DOE

Along with the approval of the Act and Regulation for MEPSL, a manual of standard operating procedures for officers of DOE in enforcing the MEPS for appliances and lighting products was prepared. The manual has the main objective to help DOE's officers to carry out all tasks related to the MEPSL program implementation in the most effective way. The manual provides comprehensive guidelines and covers the following topics:

- Section 1 provides introduction to the manual.
- Section 2 describes how MEPS and energy labelling are intended to work.
- Section 3 sets out the main points of the Act, including key dates.
- Section 4 sets out the main responsibilities of the Department of Energy with regard to enforcing compliance with MEPSL at the time of registration, at the point of import, after import and at the point of sale. It sets out the Standard Operating Procedures (SOP) to be followed by Department of Energy Officers when discharging their responsibilities with regard to MEPSL.
- Section 5 sets out the main responsibilities of the Customs Department and their Standard Operating Procedures with regard to enforcing compliance with MEPSL at the time of import and clearance of goods.
- Appendix A lists the regulated products and shows photos which will help in identifying them, and illustrates both standard and non-standard labels.
- Appendix B contains blanks of application forms, certificates and standard letters that the Department will send to stakeholders at various times.
- Appendix C lists the standards and codes relating to each type of regulated product, including the Harmonized System Codes used to identify products for customs purposes.
- Appendix D has a list of useful contacts.
- Appendix E is a copy of the Memorandum of Understanding (MOU) between the Department of Energy and the Customs Department related to the enforcement of the MEPSL legislation.
- Appendix F contains the instructions for interaction with the Pacific Appliance Database.

3 ASSESSMENT OF APPLIANCE MARKET

3.1 Market Assessment Methodology

This market assessment was conducted based on a review of the available secondary resources, either published documents or market data. The main sources of information included household surveys undertaken by IIEC in 2013 under the *Promotion of Energy Efficiency in the Pacific – Phase 2 (PEEP2)*, consumer awareness, and the use of energy rating labels in the Pacific Island Countries and Territories (PICTs) commissioned by the Secretariat of the Pacific Community (SPC) from 2016 to 2017, the final evaluation report of the Pacific Appliance Labelling and Standard Programme by SPC in 2019, and more recent findings from the Vanuatu Household census report in 2020, and the household income and expenditure surveys (HIES). The project team also compiled statistical data on electrical appliances imported to Vanuatu to understand the market size and to identify the country of origin, product flows, and market penetration.

It should be noted that no customs data on the number of units imported electrical appliances was found under the key stakeholder's databases such as the DOE and Customs department websites. Therefore, the proxy information on *products exported by country of origin to Vanuatu*, reported by the United Nations Commodity Trade Statistics Database (UN Comtrade)[12], was analyzed.

In addition to reviewing existing secondary data, small-scale household and retailer surveys were carried out to provide supplementary data. The household survey results were used to verify the current status of ownership and saturation (or diffusion) of different lighting products and appliances among households and suppliers in Vanuatu; while the retailer survey aims to gather data such as popular type, frequencies of devices supplied, market size, and growth, including energy efficiency performance of the electrical appliance and lighting products currently off the shelves. The household survey and the retailer survey questionnaires form are presented in Annex C and D.

However, the ongoing COVID-19 outbreak in Vanuatu impacted in-person household and retailer interviews. Therefore, the household and retailer interviews commenced after the COVID-19 restrictions in Vanuatu were revoked. Considering the limited field survey data collected, this detailed market assessment report was prepared based primarily on available secondary resources.

The steps for compiling relevant data for the market assessment include the following:

1) Compiling statistical data from the UN Comtrade database for export of the selected electrical appliances by all countries worldwide to Vanuatu from 2012 to 2021. Export statistics are then categorized by:
    - Product types classified by the Harmonized Commodity Description and Coding System (HS code)[13].
    - Countries of origin
    - Annual exports in monetary value and unit by product type and country of origin

[12] https://comtrade.un.org/data/

[13] Harmonized Commodity Description and Coding Systems (HS). The Harmonized System is an international nomenclature for the classification of products. It allows participating countries to classify traded goods on a common basis for customs purposes.

2) Determining market characteristics and market penetration by product type, including:
    - Number of registered models and brands of energy efficient appliances and lighting products
    - Estimated market size based on import/export statistics
    - Energy performance level and energy label
3) Estimating household stock and saturation rate of electrical appliances, based on:
    - Household ownership rate of electrical appliances
    - Number of electrified households

3.2 Market Characteristics of Electrical Appliances

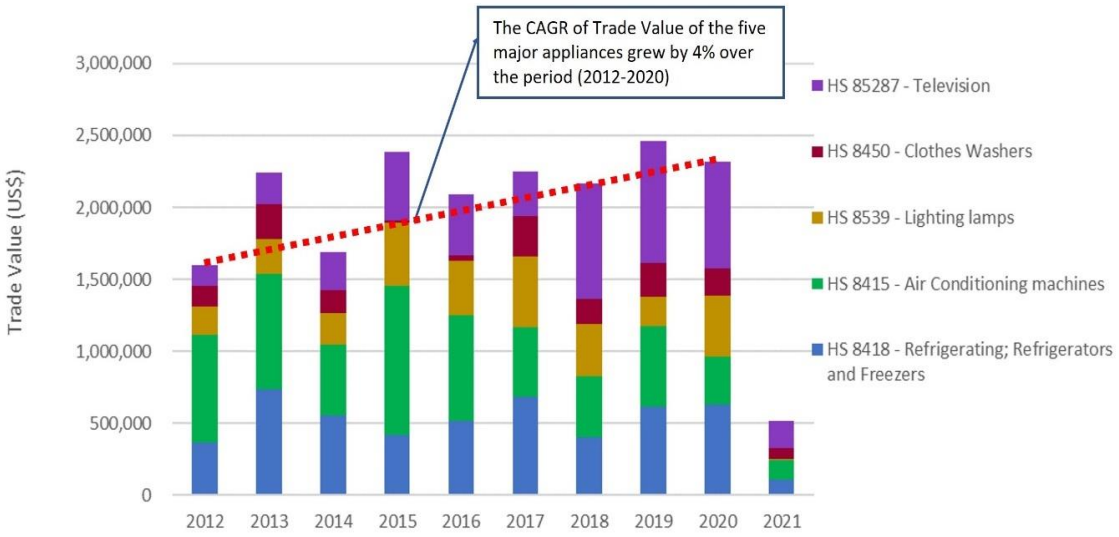
3.2.1 Electrical Appliances imported by Vanuatu

The import statistics presented in this section are based on UN Comtrade's statistical data on products exported to Vanuatu from 2012 to 2021. As described earlier, import statistics are not available from the Vanuatu Customs department, therefore, the export statistics from UN Comtrade are used as a proxy for analysis of the market characteristics. For the five selected appliances, approximate annual market size, market growth in the CAGR or Compounded Annual Growth Rate, and the countries of origin of electrical appliances are evaluated and discussed in this section.

Figure 3-1 provides the annual export to Vanuatu by value (US$) from 2012 to 2021 for the five product categories classified by the HS code. Before the COVID-19 pandemic, the CAGR of the five major appliances exported to Vanuatu was about 4% (2012-2020). During the COVID-19 pandemic in 2020 and 2021, the value of trade slightly decreased by 6% in 2020 and fell sharply by 78% in 2021. Fluctuations of annual trade values and units exported to Vanuatu might indicate bulk purchase behaviors by wholesalers, retailers, or private companies in Vanuatu.

Based on the trade values, the average annual market size of the five selected appliances was estimated at US$ 1.97 million between 2012 and 2021 (Figure 3-1). Compared with the baseline study reported by IIEC in 2012[14], Vanuatu's electrical appliance market value has shown significant growth over the past ten years, as the total value of appliances declared to Vanuatu customs in 2008 and 2009 amounted to 188 million Vatu (US$ 0.19 million) and 147 million Vatu (US$ 0.15 million), respectively.

[14] Country report for Vanuatu, Technical analysis of appliance markets to support the Pacific Appliance Labeling and Standards (PALS) Programme, (REEEP, 2012).



Source: United Nations Commodity Trade Statistics Database (UN Comtrade), 2022

Figure 3-1: Annual Trade Value of the Five Major Electrical Appliances to Vanuatu, 2012 - 2021

Table 3-1 provides units of electrical appliances exported to Vanuatu from 2012 to 2021.

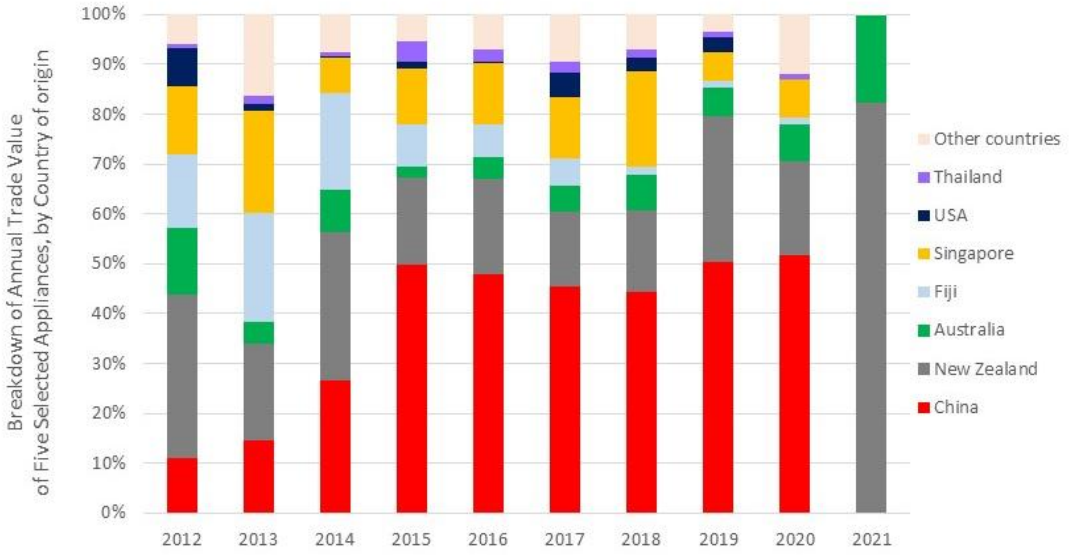
Table 3-1: Annual Exported Units of Electrical Appliances to Vanuatu from 2012 to 2021.

Year	HS 8418 - Refrigerating; Refrigerators and Freezers	HS 8415 - Air Conditioning machines	HS 8539 - Lighting lamps	HS 8450 - Clothes Washers	HS 85287 - Television
2012	2,175	1,710	153,171	551	325
2013	3,272	1,990	136,245	1,070	914
2014	2,045	1,209	143,135	582	2,290
2015	1,638	2,224	368,518	94	2,744
2016	2,037	1,792	243,559	43	1,589
2017	2,792	1,568	256,466	748	1,042
2018	1,561	1,479	306,630	467	6,859
2019	2,135	1,776	231,345	897	8,578
2020	2,314	751	56,566	567	1,977
2021	137	151	43	183	332

Source: United Nations Commodity Trade Statistics Database (UN Comtrade), 2022

Figure 3-2 shows the annual trade values of the five selected appliances breaking down by country of origin, from 2012 to 2021. Most electrical appliances were exported from China, followed by New Zealand, Singapore, Fiji, and Australia. China has become the major supplier of electrical appliances in Vanuatu, and the CAGR of electrical appliances exported by China from 2012-to 2020 was 24%. Note that the UN Comtrade statistics in 2021 show that Australia and New Zealand are the two major appliance exporters to Vanuatu. This may be due to the regulatory requirements on energy efficient

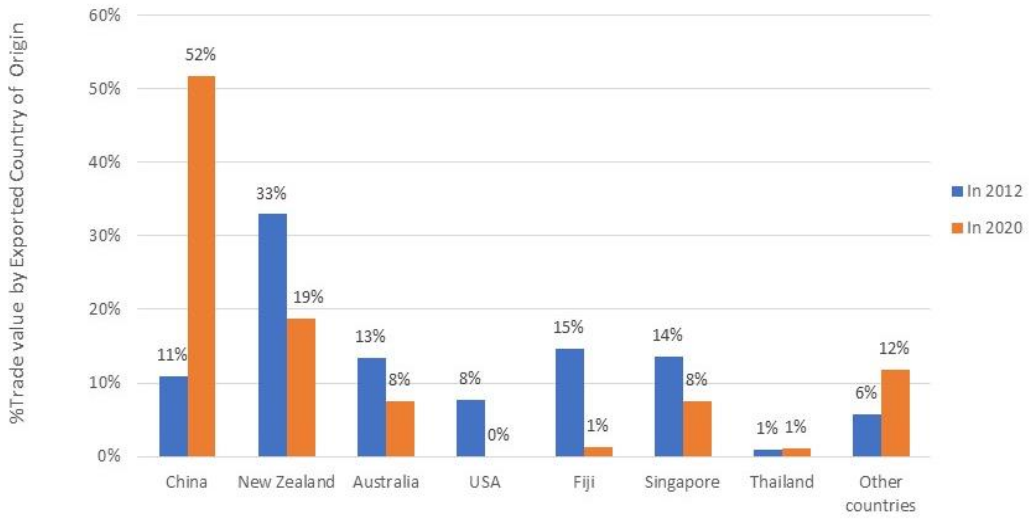
appliances in Vanuatu as well as the impacts of the COVID-19 pandemic on trade between China and Vanuatu.



Source: United Nations Commodity Trade Statistics Database (UN Comtrade), 2022

Figure 3-2: Breakdown of Annual Trade Value of Five Selected appliances by Country of origin, from 2012 to 2021

As shown in Figure 3-3, trade values of Chinese appliances exported to Vanuatu increased from 11% in 2012 to 52% in 2020. During the same period, the market shares of appliances exported by Fiji, Australia, and New Zealand significantly decreased and these were substituted by Chinese products. The market share of appliances exported by New Zealand decreased by almost 14%, from 33% in 2012 to 19% in 2020, and the market share of appliances exported by Australia decreased by around 5%, from 13% in 2012 to 8% in 2020.



Source: United Nations Commodity Trade Statistics Database (UN Comtrade), 2022

Figure 3-3: Trade Values of Five Electrical Appliances Export to Vanuatu in 2012 and 2020, by Country of Origin

Table 3-2 summarizes key findings on the average annual market sizes of the five electrical appliances between 2012 and 2021 based on UN Comtrade data as follows:

- **Refrigerators-Freezers** (all types, excluding HS 841869 spare parts and HS 841861 heat pumps other than air conditioning machines): On average, the annual market value is about US$ 502,305 per year, with 2,011 units exported to Vanuatu per year.
- **Air Conditioners** (all types, excluding air conditioners used for persons in motor vehicles): On average, the annual market value is about US$ 574,407 per year, with approximately 1,465 units exported to Vanuatu per year.
- **Lighting products** (all types of electric filament or discharge lamps): On average, the annual market value is about US$ 2,977,553 per year, with approximately 189,568 units of different types of lamps exported to Vanuatu per year.
- **Clothes washers** (Household washing machines including both wash and dry; excluding spare parts): On average, the annual market value is about US$ 154,432 per year, with approximately 520 units exported to Vanuatu per year.
- **Televisions** (Reception apparatus for televisions, whether incorporating or not incorporating radio-broadcast receivers or sound or video recording): On average, the annual market value is about US$ 442,592 per year, with approximately 2,665 units exported to Vanuatu per year.

Table 3-2: Average Annual Market Size for Five Electrical Appliances between 2012 and 2021

Appliance	Annual Market Value (US$)	Annual Market Size (Units)
Refrigerators and Freezers	502,305	2,011
Air conditioners	574,407	1,465
Clothes Washers	154,432	520
Televisions	442,592	2,665
Lighting products	2,977,553	189,568

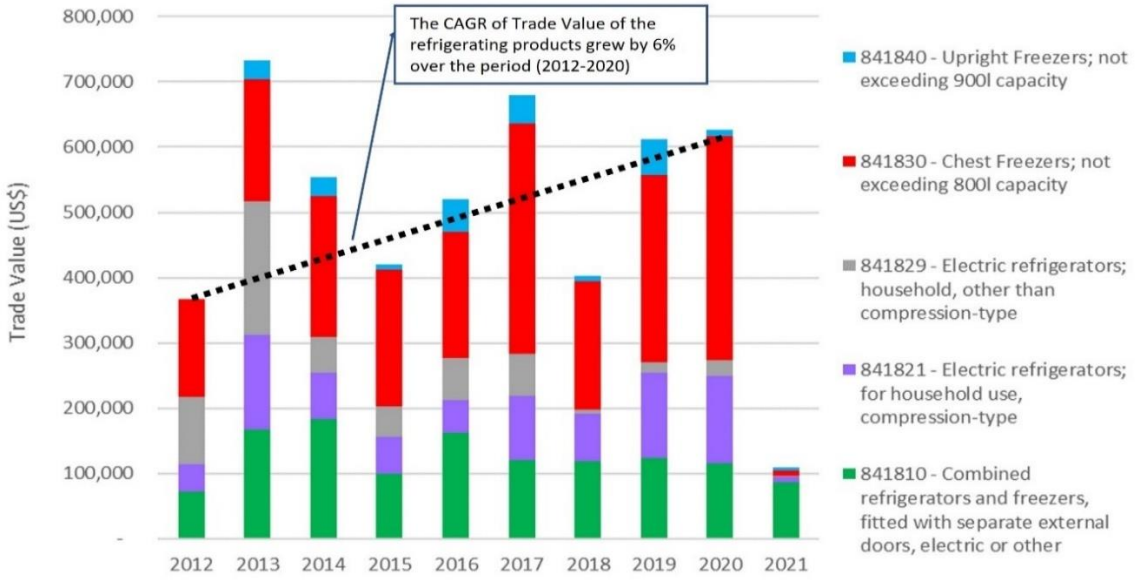
Source: United Nations Commodity Trade Statistics Database (UN Comtrade), 2022

Detailed analysis for each type of electrical appliance is described in the following sub-sections.

3.2.2 Refrigerators and Freezers (HS 8418)

Based on UN Comtrade data from 2012 to 2021, the annual trade values of refrigerating appliances exported to Vanuatu vary significantly year-on-year. The annual market value is about US$ 502,305 per year The differences in annual values could be due to bulk purchases by local wholesalers or retailers in a given year. The trade values of refrigerators and freezers jumped from US$ 366,748 in 2012 to reach US$ 732,170 in 2013. While the trade values of refrigerators and freezers exported to Vanuatu fluctuated between US$400,000 to almost US$700,000, the trade values exceeded US$ 600,000 in 2017, 2019, and 2020. (Figure 3-4)

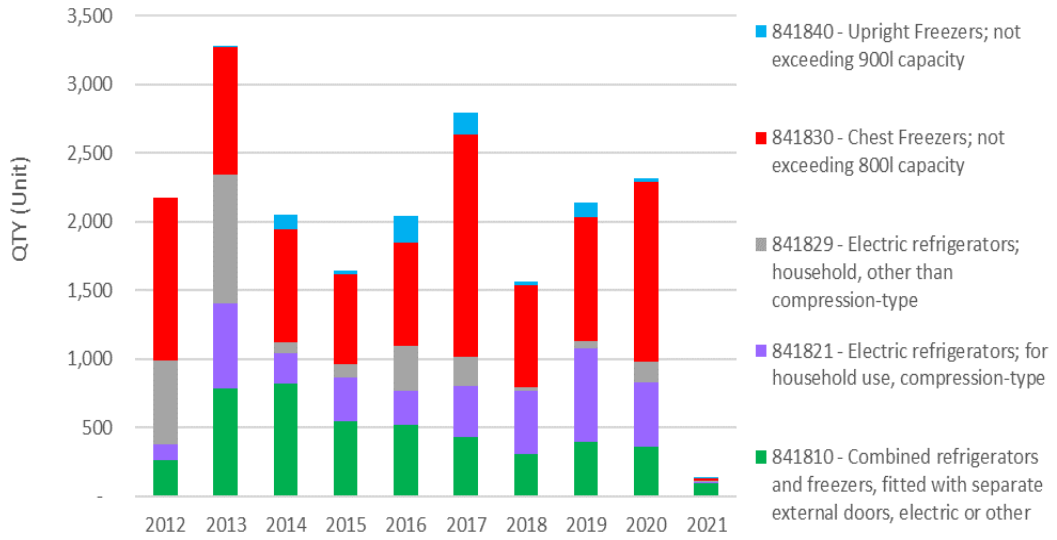
The CAGR of the overall trade values of refrigerator and freezer products from 2012 to 2020 is 6%. The trade value in 2021 fell 83% to about US$ 100,000 due to the COVID-19 impact. The CAGR of electric refrigerators for household use (HS-841821) grew by 14% from 2012 to 2020, followed by chest freezer-less than 800-liter capacity (HS 841830) at 10% CAGR, and combined refrigerators and freezers fitted with separated external doors (HS 84180) at 5% CAGR.



Source: United Nations Commodity Trade Statistics Database (UN Comtrade), 2022

Figure 3-4: Annual Trade Value (US$) of Refrigerators and Freezers from 2012 to 2021

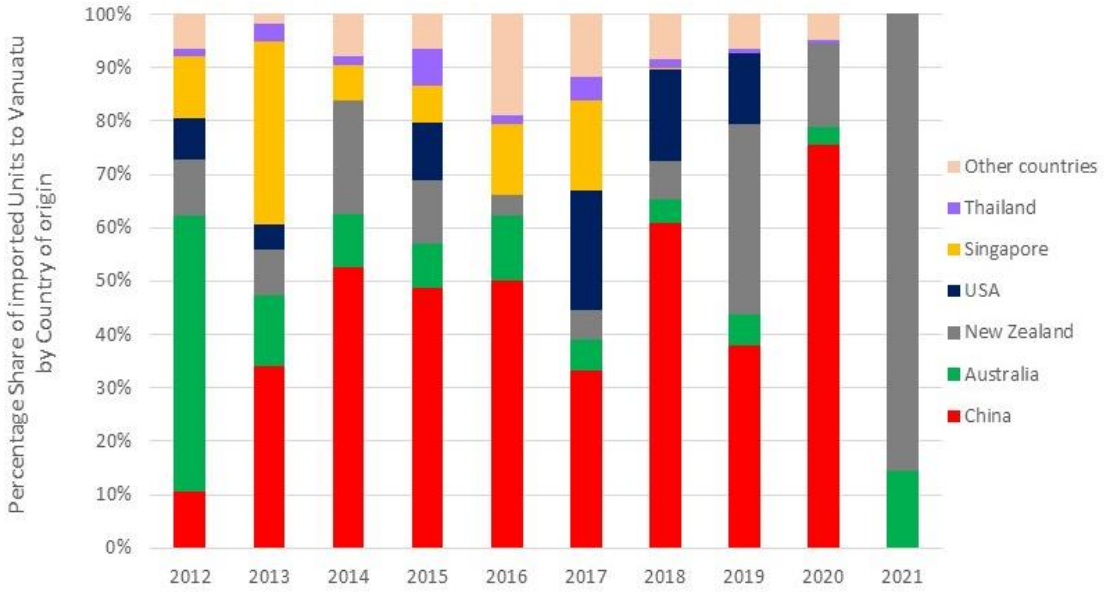
Figure 3-5 shows units of refrigerators and freezers exported to Vanuatu by type from 2012 to 2021. On average, 2,011 units of refrigerators and freezers are exported to Vanuatu per year. By type, chest freezers (HS 841830) with a capacity of less than 800 Liter are the most popular refrigerator/freezer products with an average annual of 895 units exported to Vanuatu, followed by 453 units of combined refrigerators and freezers with separate external doors (HS 841810). One-door refrigerators (HS 841821) are approximately 350 units per year, and the Upright freezers (HS 841840) are less popular with 65 units per year.



Source: United Nations Commodity Trade Statistics Database (UN Comtrade), 2022

Figure 3-5: Quantity of Refrigerators and Freezers exported to Vanuatu by Types, from 2012 to 2021

Figure 3-6 shows percentage breakdowns of refrigerators and freezers exported to Vanuatu by country of origin, from 2012 to 2021. Despite the annual fluctuations, the market shares of Chinese refrigerator/freezer products exported to Vanuatu grew continuously from 7% in 2012 to 74% in 2020. Most of the refrigerator/freezer products exported (or reexported) from Fiji, Singapore, and Australia, were superseded by direct exports from China. However, the relatively small export quantity of refrigerators and freezers exported in 2021 was from Australia and New Zealand. It is clear that the significant drop in refrigerator/freezer export to Vanuatu in 2021 was due to the COVID-19 pandemic, but the reason for having Australia and New Zealand as the two main countries of origin should be further investigated.



Source: United Nations Commodity Trade Statistics Database (UN Comtrade), 2022

Figure 3-6: Percentage Share of Refrigerators and Freezers exported to Vanuatu by Country of Origin, from 2012 to 2021

3.2.3 Air Conditioners (HS 4815)

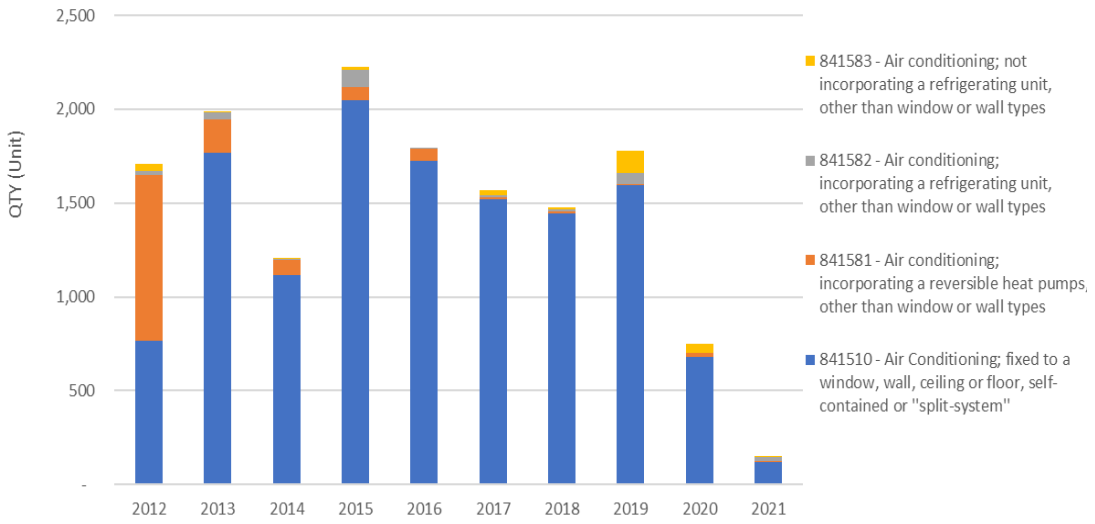
Based on UN Comtrade data from 2012 to 2020, the total trade values of air conditioners (all types, excluding HS 841520 air conditioners used for persons in motor vehicles) fluctuated between US$ 300,000 to US$ 1 million, with an overall declining trend of the total trade values. It is believed that these fluctuations were due to bulk purchases by wholesalers, retailers, and project developers (e.g., hotels) in a given year. The CAGR of the total trade value for all types of air conditioner products was -8% from 2012 to 2020. In 2021, the trade value was only about US$ 100,000, and this lowest trade value over the past ten years could be due to the impact of the COVID-19 pandemic on Vanuatu's economy, especially the private sector project development (e.g., the hotel sector). On average, the annual market value (all types) is about US$ 574,400 per year, and the average quantity of air conditioners exported to Vanuatu is approximately 1,465 units per year.

Source: United Nations Commodity Trade Statistics Database (UN Comtrade), 2022

Figure 3-7: Annual Trade Value (US$) of Air Conditioners, from 2012 to 2021

Although the total trade values show a declining trend, ''Self-contained air conditioning or split-system'' (HS 841510) air conditioners grew by 2% from 2012 to 2020 (Figure 3-7). The average quantity of household air conditioners (HS 84510 -Split-system) exported to Vanuatu is approximately 1,279 units per year (Figure 3-8). It is believed that the large purchases of reversible heat pumps (HS 841581-heat pump other than window or wall-type air conditioners) and other different types of air conditioners that incorporate a refrigerating unit (HS 841582) or do not incorporate a refrigerating unit (HS 841583) from 2012 to 2016 were for particular commercial purposes, and these commercial air conditioner products are not typical household air conditioner products.

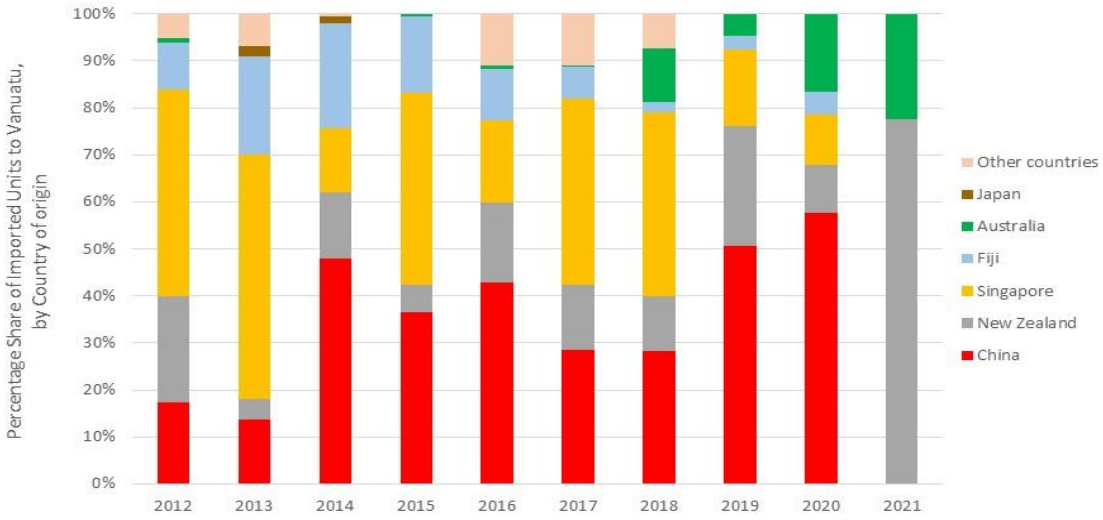
It should be noted that ‘’self-contained’’ or ‘’split-system’’ air conditioning machines under HS 841510 are generally referred to as "window-type" and "split-type" room air conditioners, and, by quantity, these types of air conditioners are the majority in Vanuatu. However, the UN Comtrade database combines window-type and split-type air conditioner data under HS 841510, therefore percentage shares of window-type and split-type could not be identified.



Source: United Nations Commodity Trade Statistics Database (UN Comtrade), 2022

Figure 3-8: Quantity of Air Conditioners exported to Vanuatu by Types, from 2012 to 2021

Figure 3-9 shows the annual percentage breakdown of air conditioner quantities exported to Vanuatu by country of origin from 2012 to 2021. Despite the annual fluctuations, the market shares of Chinese air conditioning products exported to Vanuatu grew continuously from 17% in 2012 to 58% in 2020. While air conditioning products exported (or reexported) from Fiji and Singapore appear to be superseded by direct exports from China. Interestingly, air conditioners exported by Australia and New Zealand combined have maintained about 20% to 30% in the total export quantity from 2018 to 2020. Similar to the refrigerator/freezer exports to Vanuatu, a small quantity of air conditioning products exported to Vanuatu in 2021 was mainly from Australia and New Zealand. It is clear that the significant drop in 2021 was due to the COVID-19 pandemic, but the reason for having Australia and New Zealand as the two main countries of origin should be further investigated.

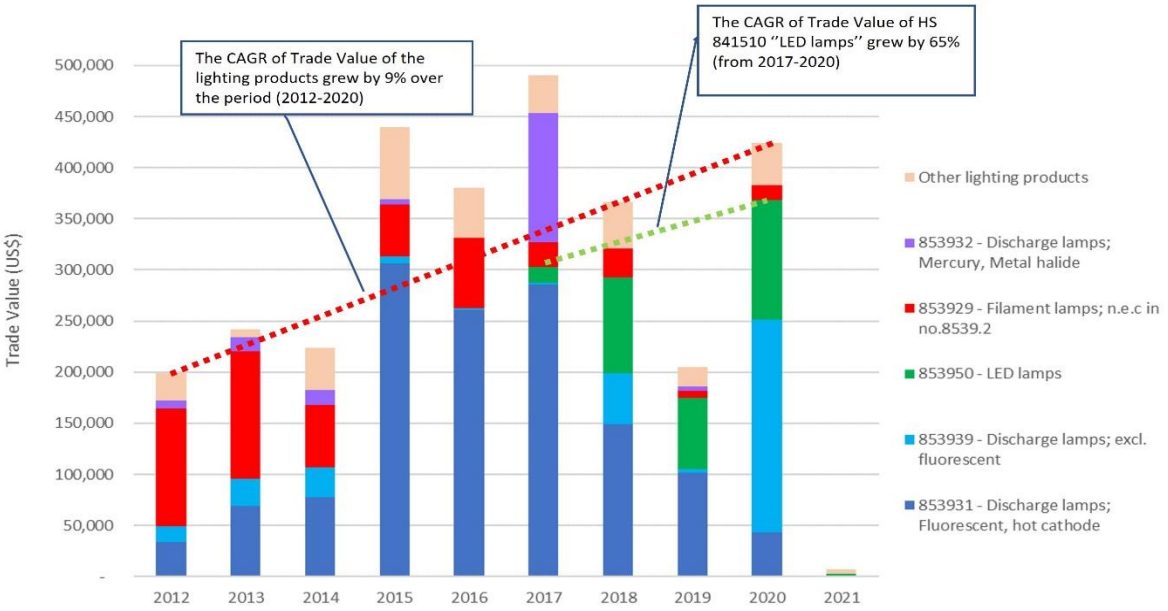


Source: United Nations Commodity Trade Statistics Database (UN Comtrade), 2022

Figure 3-9: Percentage Share of Air Conditioners exported to Vanuatu by Country of origin, from 2012 to 2021

3.2.4 Lighting Products (HS 8539)

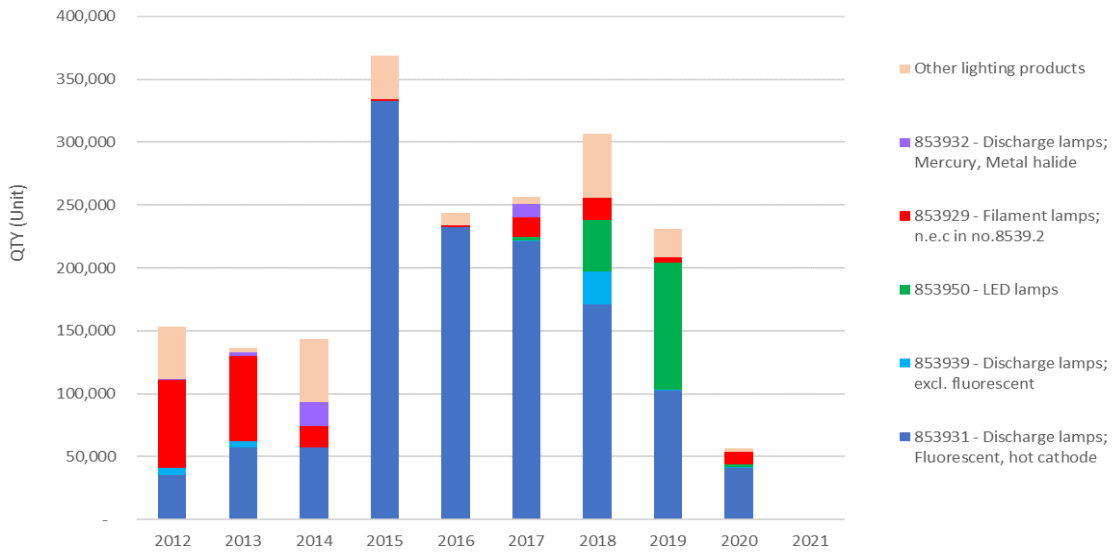
Based on UN Comtrade data from 2012 to 2021, the annual trade values of lighting products exported to Vanuatu are shown in Figure 3-10. The CAGR of the overall trade values of the lighting products is about 9% from 2012 to 2020. The total trade values of lighting products (all types) rose from US$ 0.19 million in 2012 to about half a million US$ in 2017. On average, the annual market value is about US$ 2,977,553, and, in terms of quantity, approximately 189,568 lamps are exported to Vanuatu every year (Figure 3-11). By type, trade values and quantities of discharge fluorescent lamps (HS 853931) have been dominant but started to decline since 2015, and adoption of LED lighting products has started to show in the export data since 2017. It is not clear whether this was due to an adoption of a specific HS code for LED lamps or a reflection of real market demand. However, the LED lamp market in Vanuatu appears to be growing fast with a 65% CAGR from 2017 to 2020.



Source: United Nations Commodity Trade Statistics Database (UN Comtrade), 2022

Figure 3-10: Annual Trade Value (US$) of Lighting Products, from 2012 to 2021

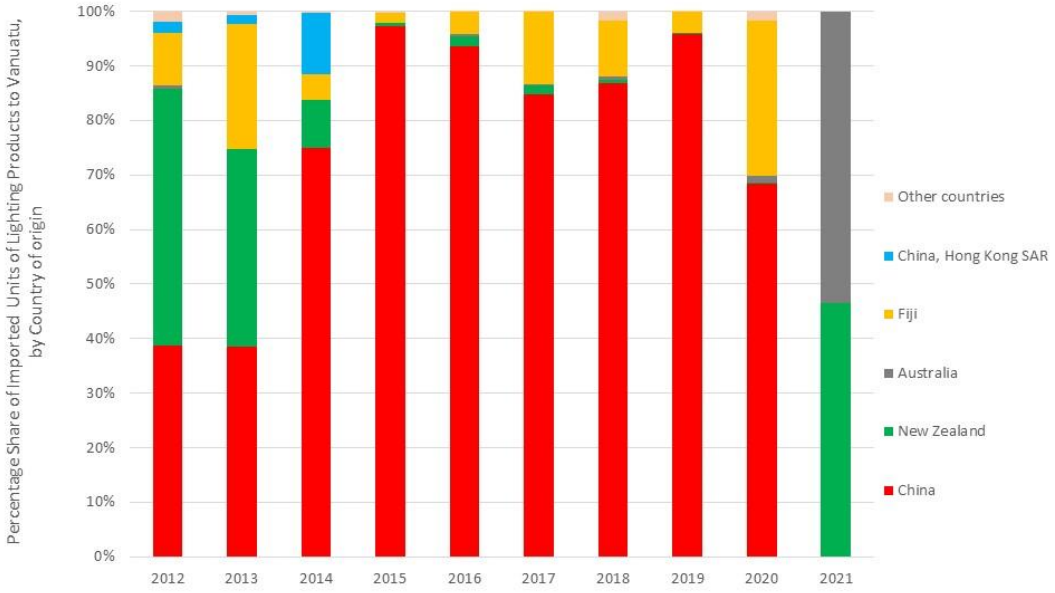
Figure 3-11 shows quantities of lighting products exported to Vanuatu by types from 2012 to 2021.



Source: United Nations Commodity Trade Statistics Database (UN Comtrade), 2022

Figure 3-11: Quantity of Lighting Products exported to Vanuatu by Types, from 2012 to 2021

The annual percentage breakdown of lighting products exported to Vanuatu by country of origin is shown in Figure 3-12. From 2014 to 2019, more than 70% of all lighting products exported to Vanuatu came from China. Like refrigerator/freezer and air conditioner exports to Vanuatu, a small number of lighting products exported to Vanuatu in 2021 was from Australia and New Zealand. It is clear that the significant drop in 2021 was due to the COVID-19 pandemic, but the reason for having Australia and New Zealand as the two main countries of origin should be further investigated.

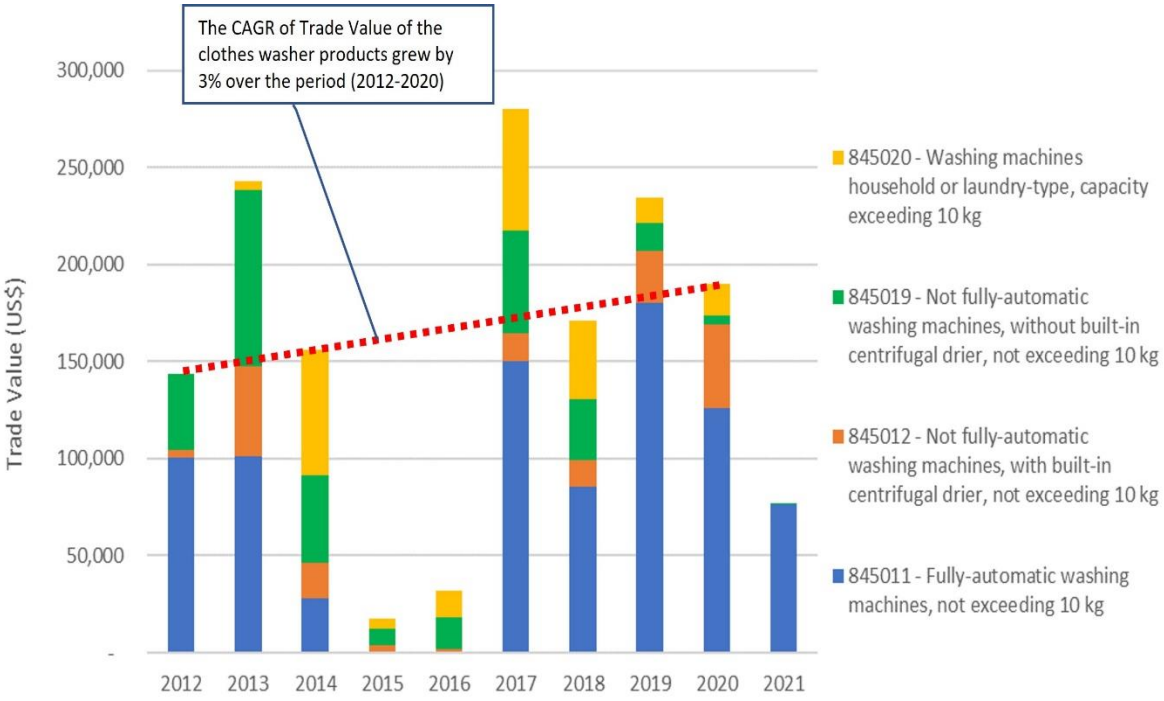


Source: United Nations Commodity Trade Statistics Database (UN Comtrade), 2022

Figure 3-12: Percentage Share of Lighting Products exported to Vanuatu by Country of origin, from 2012 to 2021

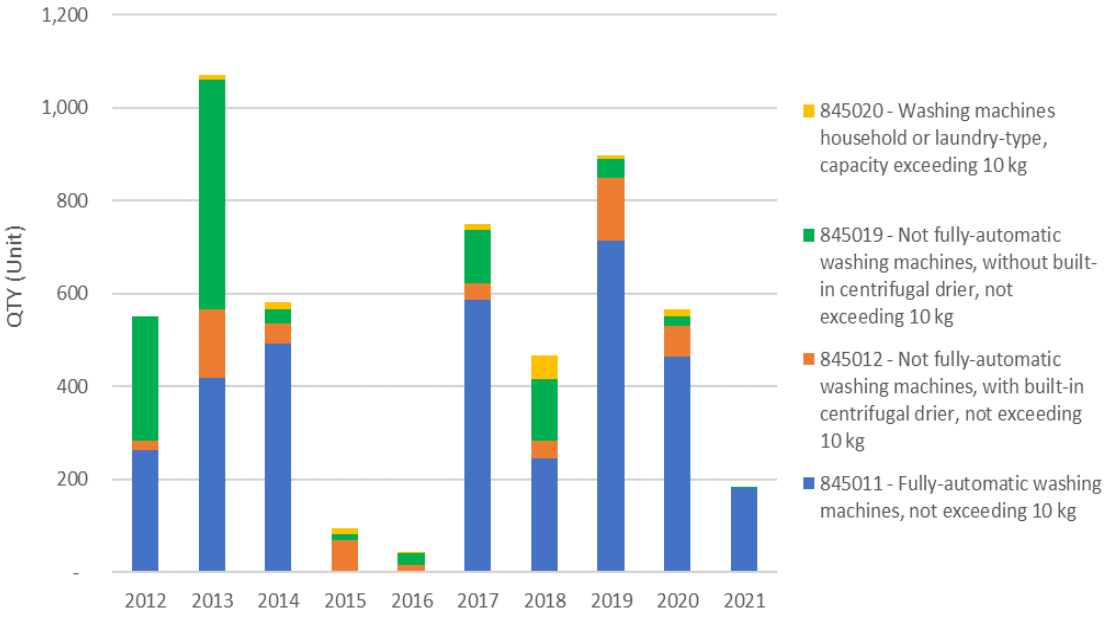
3.2.5 Clothes Washers (HS 8450)

Based on UN Comtrade data from 2012 to 2021, the annual trade value of clothes washers exported to Vanuatu has fluctuated annually with a 3% CAGR from 2012 to 2020. On average, the annual market value is about US$ 154,432 (see Figure 3-13), and the quantity of household clothes washing machines exported to Vanuatu is approximately 520 units per year (see Figure 3-14). By type, fully automatic washing machines (HS 845011) with a capacity not exceeding 10 kg were the most popular clothes washer type exported to Vanuatu from 2012 to 2021, although the export data for this specific clothes washer type disappears from the UN Comtrade database in 2015 and 2016. The non-fully automatic washers with built-in centrifugal driers and capacity not exceeding 10 kg type (HS 845012) have the second most popular clothes washer type exported to Vanuatu by both trade values and quantities, but its popularity has been declining over the past 10 years.



Source: United Nations Commodity Trade Statistics Database (UN Comtrade), 2022

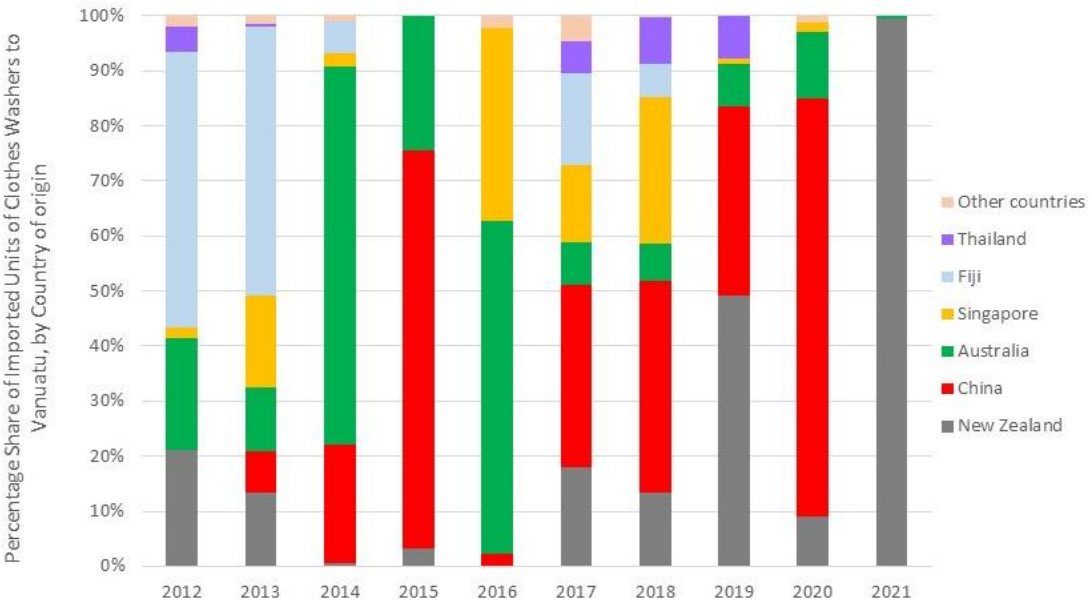
Figure 3-13: Annual Trade Value (US$) of Clothes Washers, from 2012 to 2021



Source: United Nations Commodity Trade Statistics Database (UN Comtrade), 2022

Figure 3-14: Quantity of Clothes Washers exported to Vanuatu by Types, from 2012 to 2021

Most of the clothes washers exported to Vanuatu were from New Zealand, Australia, and China. As shown in Figure 3-15, clothes washers exported by China have shown continuous growth since 2013. Similar to other appliances and lighting products, exports of clothes washers to Vanuatu in 2021 were from Australia and New Zealand.

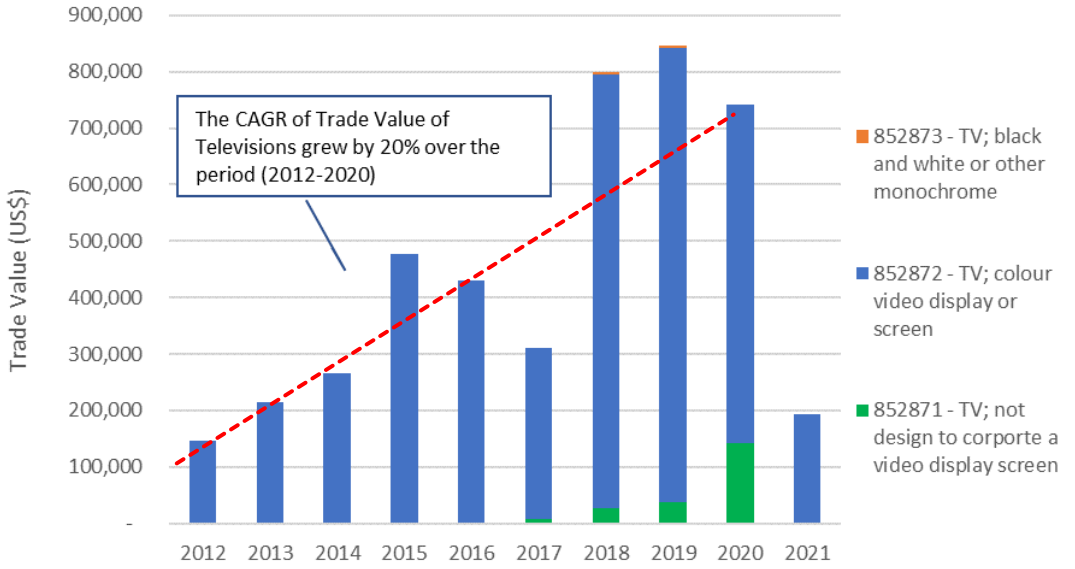


Source: United Nations Commodity Trade Statistics Database (UN Comtrade), 2022

Figure 3-15: Percentage Share of Clothes Washers exported to Vanuatu by Country of origin, from 2012 to 2021

3.2.5.1 Televisions (HS 85287)

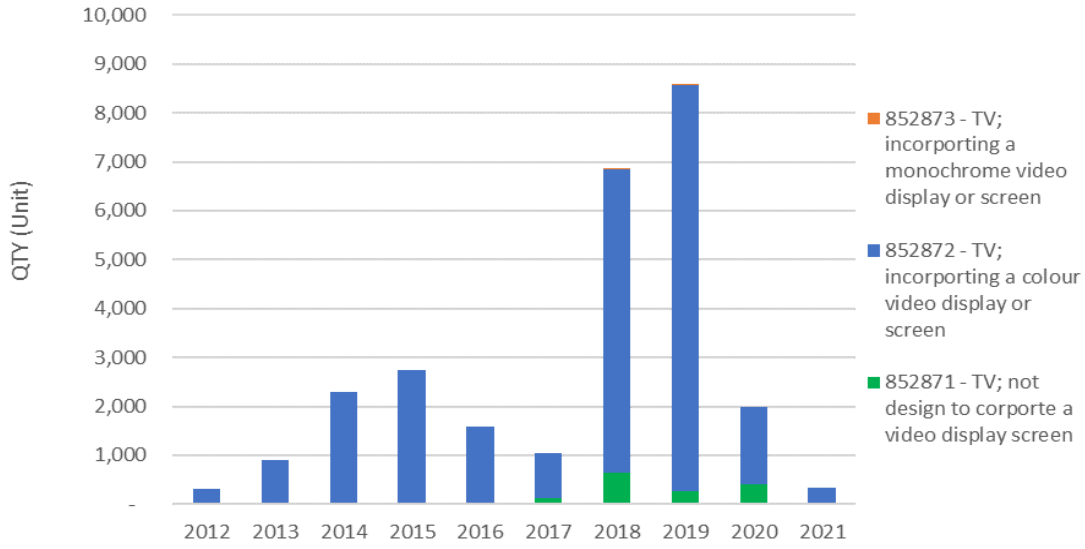
Based on UN Comtrade data from 2012 to 2021, the trade values of televisions (all types) rose from about US$ 150,000 in 2012 to almost US$ 850,000 in 2019 with a 20% CAGR from 2012 to 2020 (Figure 3-16). On average, the annual market value for all household televisions exported to Vanuatu from 2012 to 2021 is estimated at US$ 442,592, and the quantity value is 2,665 units per year.



Source: United Nations Commodity Trade Statistics Database (UN Comtrade), 2022

Figure 3-16: Annual Trade Value (US$) of Televisions, from 2012 to 2021

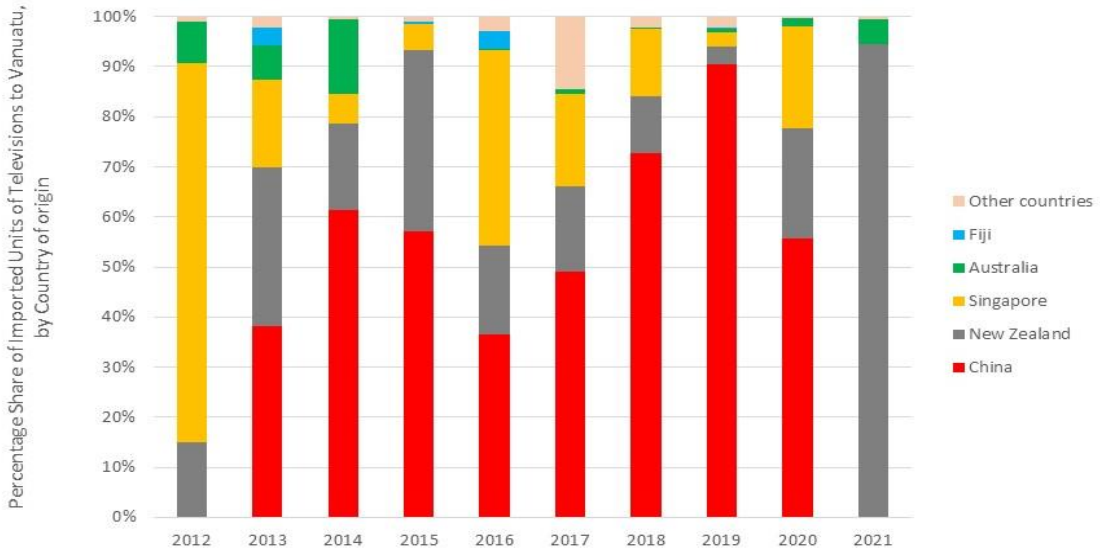
Televisions exported to Vanuatu peaked in 2018 and 2019 with 6,859 units and 8,578 units, respectively. The export statistics decreased 75% between 2019 and 2020 and further dropped in 2021 due to the COVID-19 impacts (See Figure 3-17).



Source: United Nations Commodity Trade Statistics Database (UN Comtrade), 2022

Figure 3-17: Quantity of Televisions exported to Vanuatu by Types, from 2012 to 2021

The annual percentage breakdowns of television products exported to Vanuatu by country of origin from 2012 to 2020 are shown in Figure 3-18. The percentage share of television products exported by China to Vanuatu grew from 8% in 2013 to 50% in 2020. Similar to other appliances and lighting products, exports of televisions to Vanuatu in 2021 were from Australia and New Zealand.



Source: United Nations Commodity Trade Statistics Database (UN Comtrade), 2022

Figure 3-18: Percentage Share of Televisions exported to Vanuatu, by Country of origin, from 2012 to 2021

3.3 Market Penetration and Saturation of Electrical Appliances

The analysis of market penetration and saturation of electrical appliances in Vanuatu households is based on various secondary resources, including but not limited to the VeSW system which provides information on certified models of energy efficient electrical appliances in Vanuatu, and previous census and household survey reports.

In this report, the penetration or ownership rate is defined as the percentage of households having appliances, or with at least one unit; while the saturation rate is the average number or percentage of appliances owned per household.

3.3.1 Households Penetration of Electrical Appliances in Vanuatu

The 2020 Vanuatu Population Census Report provides limited information on the ownership or saturation rate of various electrical household appliances. The data in the census report does not indicate the number of household appliances used, e.g., refrigerators, freezers, air conditioners, TVs, clothes washers, etc.

Data on household ownership of electrical appliances presented in this section is based on the two previous household surveys, conducted by IIEC in 2013[15] and Tebbutt Research in 2017[16]. Findings from the two surveys are compared and summarized in Table 3-3 and Table 3-4.

Table 3-3: Household Penetration Rate of Electrical Appliances in 2013 and 2017

Appliances	No. of Unit in home	Penetration Rate (%), by Type		Penetration Rate (%) 2017(1)
		2013	2017	
Refrigerators	One	43.0%	68.9%	80.1%
	Two	1.0%	8.3%	
	Three or more	-	2.9%	
Freezers	One	5%	47.6%	55.3%
	Two	-	6.8%	
	Three or more	-	1.0%	
Air Conditioners	One	0.7%	21.4%	31.1%
	Two	-	6.8%	
	Three or more	-	2.9%	
Clothes Washers	One	5.5%	50.5%	53.9%
	Two	-	3.4%	
	Three or more	-	-	
Televisions	One	81%	70.4%	79.6%
	Two	-	7.8%	
	Three or more	-	1.5%	

Note (1) Household penetration of electrical appliances means % of households with at least one unit of electrical appliance.

Table 3-4: Household Penetration Rate of Lighting Products in 2013 and 2017

Type of Lighting Product	Penetration Rate (%) 2015 (1)	Penetration Rate (%) 2017 (2)
Incandescent	11%	2.4%
Linear Fluorescent Tube (LFT)	40%	43.2%
Compact Fluorescent (CFL)	47%	46.6%
Others (e.g., LED and halogen)	2%	5.3%

Source: (1) PEEP2 household surveys, and Regional Status Report on Efficient Lighting in the Pacific Island Countries and Territories (SPC, 2015)

(2) Survey of consumer awareness and use of energy rating labels in PICTs: VANUATU COUNTRY REPORT, Tebbutt Research, 2017

[15] Urban household appliance & energy use survey: Port Vila and Luganvile, Vanuatu, 2013
In 2013, a survey of appliance and electricity use was carried out of 1,109 households in Port Vila and 329 in Luganville.

[16] Survey of consumer awareness and use of energy rating labels in PICTs: VANUATU COUNTRY REPORT, Tebbutt Research, 2017
In 2017, a total of 206 Vanuatu sampling household surveys were carried out in Port Vila and Luganville.

Based on the household survey findings in 2013 and 2017, the household penetration rate of refrigerator and freezer products increased by about 40-50%, air conditioners increased by 30%, and clothes washers increased by nearly 50%. Only television product was reported at the same level of almost 80%.

For lighting products, in 2017, almost 50% of households still used CFL (46.6%) and linear fluorescent lamps (43.2%) same as in 2015. Only 5.3% of households used LED lamps. It also indicates that the share of low-efficiency incandescent lamps declined from 11% in 2015 to 2.4% in 2017. (Table 3-4).

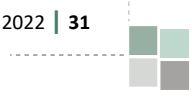
The percentage of household ownership of electrical appliances by product types is shown in Table 3-5

Table 3-5: Percentage of Electrical Appliance Classified by Product Types used in Households

Appliances	Types	Penetration rate (%), share by type [(1)]	%Share of registered models[(2)]
Refrigerators	Single door (Upright)	35.2%	Upright (75%), Side-by-Side (25%)
Combined refrigerators and freezers	Top-freezer (Upright & Chest) (Separate freezer above)	52.2%	Upright (77%), Chest (13%)
	Bottom-freezer (Upright) (Separate freezer below)	9.8%	
	Side-by-Side (Separate freezer at side)	2.8%	Side-by-Side (10%)
Freezers	Chest freezers	80%	71%
	Upright freezer	20%	29%
Air conditioners	Split system and Window Type	N/A	Spilt Unit (83%), Unitary-Window (8%), Multi-split (8%)
Clothes washers	Top-loading single tub	50%	N/A
	Top-loading dual tub	32%	
	Ringer-type	11%	
	Front-loading	7%	
Television	Flat screen	17.8%	N/A
	Cathode Ray Tube (CRT)	82.2%	N/A

Note [(1)] Percentage of ownership share by type based on the survey conducted by IIEC in 2013, There was no information on percentage share by product types of appliances for refrigerators and freezers, air conditioners, clothes washers, and TVs in the 2017 survey results.

[(2)] Vanuatu's registered models have been used to match similar models to the products registered in the Energy Rating database to identify product classes and types. Of 122 models of Refrigerators and Freezers were matched: (Combined refrigerators and freezers 97 models, Refrigerators 16 models, and Freezers 9 models), and 24 models of air conditioners.



3.3.2 Estimated Stocks & Saturation of Household Appliances

Information on the number of households connected to the electricity grid in urban and rural areas is derived from the latest 2020 household census report. The census report provides information on main-grid households electrified, including the number of off-grid households electrified through their generators and solar systems. Since primary sources of light from ''solar'' and ''own-generator'' are unlikely to be able to operate the types of appliances covered by MEPSL (refrigerators, freezers, air conditioners, clothes washers, TVs, and main voltage lighting), only the electrified household from the main grid is used in this market assessment.

The estimated number of electrified households is calculated based on the total number of private households and the percentage of households having access to the main electricity grid, as shown in Table 3-6.

Table 3-6: Estimated Number of Electrified Households.

Place of residence	Number of private households (2020)	% Households that have electricity as main source of lighting from main grid [(1)]	Estimated Number of Electrified Households[(2)]
VANUATU (Total)	**63,365**	**28.0%**	**17,742**
URBAN area	14,702	80.2%	11,791
PORT VILA	11,195	83.4%	9,337
LUGANVILLE	3,617	68.0%	2,460
RURAL area	48,663	12.1%	5,888

Source: [(1)] 2020 National Housing Census Report, C. Household Living Dwelling Conditions (VNSO)

[(2)] Estimated electrified households based on the total number of private households and % of households that have access to the main source of lighting from the main grid

Combining the number of electrified households and the ownership rate of appliances makes it possible to estimate household stock and the saturation rate of electrical appliances as presented in Annex B.

As described earlier, Table 3 8 shows the estimated appliance stocks and saturation rates or the average number of appliances owned per household. The saturation rate of CFLs was the highest (207% or the two lamps owned per household) among all lighting types, followed by linear fluorescent lamps (1.7 lamps per household). Apart from lighting, television ownership quantities or stocks were highest at 16,000 units and seen by the number of units owned per household (90% or 0.9 units per household), with 80% of households owning at least one. Household refrigerator-freezer stocks were second-highest at 16,654 units, the same as television, in which 80% of households owned at least one. The lowest amount of appliance stocks was air conditioners at 7,030 units; only about 31% of households used room air conditioning units, with a low average number of 0.3 units owned per household. Half of all homes had at least one freezer and clothes washer.

Table 3-7: Estimated Household Appliance Stocks and Saturation Rates

Appliances		Penetration Rate (2017)	%Share by type (2013) [1]	Estimated Stocks (Units)	Estimated Stocks by type (Units)	Estimated Saturation (%)	Average Annual Market Size between 2012 and 2021 (Units)
Refrigerators and Freezers	Combined refrigerators & freezers	80.1%	64.8%	28,004	10,792	61%	453
	Refrigerators		35.2%		5,862	33%	599
	Freezer	55.3%	n/a		11,350	64%	960
Air Conditioners	Split system	31.1%	83.0%	7,030	6,412	36%	1,465
	Window		8.0%		618	3%	
Clothes Washer		53.9%	n/a	10,130	n/a	57%	520
Televisions		79.6%	n/a	16,000	n/a	90%	2,665
Lighting Products[2]	Incandescent	100.0%	12%	79,839	9,581	54%	189,568
	Linear Fluorescent		39%		31,137	176%	
	CFL		46%		36,726	207%	
	LED & Other		3%		2,395	14%	

Note [1] Percentage of ownership share by types based on the survey conducted by IIEC in 2013

[2] For lighting products, based on the findings from the survey conducted in 2013, the lighting lamps in the household on average is 4.5 lamps per household. Of the 4.5 lamps per household, 46% were Compact Fluorescent, 39% were linear Fluorescent, 12% were Incandescent, and about 3% were LED and other types.

3.4 Consumer Awareness on MEPSL and Household Penetration of Appliances

3.4.1 Consumer Awareness and Use of Energy Rating Labels Survey in 2017

In 2017, a survey on consumer awareness and use of energy rating labels was conducted by Tebbutt Research in 2017[17]. Findings from the 2017 household survey indicated that almost 97% of respondents recognized the AS/NZS energy rating label on the electrical appliances. In the meantime, 67% also saw at least one other label rather than AS/NZS label shown on new refrigerators, freezers, air conditioners, televisions, or other appliances. European and Chinese labels were seen most

[17] Survey of consumer awareness and use of energy rating labels in PICTs: VANUATU COUNTRY REPORT, Tebbutt Research, 2017. A total of 206 Vanuatu households in Port Vila and Luganville were covered in the survey.

frequently, with 34% and 33.5% of respondents viewing. While some labels from Japan and Korea have also been seen.

Energy efficiency appears to be widely perceived. Most respondents understood and identified that more stars communicate higher efficiency or lower electricity consumption. However, there were still 25% who appeared to misunderstand; believe a higher star rating is not efficient.

Almost 97% said the operation cost of the electrical appliances was essential. But only 21.4% understood that the label could be used to estimate device running costs, while 20.9% said it could not be used. The estimation of annual power consumption on the label was less understood (45% understood, but 45% not sure). Most respondents (58%) were unsure or did not know how to use the number in the red box (on the label) to estimate costs.

Regarding user awareness communication, 68% had seen the label on an appliance in a home or work/office area. Advertising was the most common source of communication channel for consumer awareness; 71% had seen on TV advertisements, and 57% had seen it in appliance showrooms.

For future purchase planning, 35% claimed they would try to buy the most efficient or highest star rating products, and 32% said they would use the running cost (red box number) to determine and compare the purchase price and running cost. However, 30% said the label is not helpful for them. They are not likely to use the energy label next time purchasing because their limited budget allows them to buy only affordable products.

3.4.2 Small-Scale Household Survey in 2022

In addition to reviewing the previous survey on user awareness, the project team conducted supplementary data collection through a small-scale household survey which aims at gathering information on the electrical appliances (refrigerator, freezers, air conditioners, clothes washers, and televisions) and lighting product. Information collected included the use of appliances and lighting technologies, common wattages, brands, and the number of appliances and light points. This also aims to investigate whether the appliance technologies and usages remain the same as shown in previous studies. A questionnaire covered the residents' energy consumption & purchasing behaviors, attitudes, and knowledge of the energy label. Household survey activities focused only on the areas within and around Port Villa with a minimum of 40 household survey samples. Given its small sample size, this household survey cannot be used to represent the whole Vanuatu, but it will only provide basic information on types of appliances and the MEPSL program. Please note that this household survey result cannot represent the whole household appliance saturation because of the small sample size. Note that the usage of air conditioners is not shown in this small-scale survey as none of the random household samples were found to have one in their homes.

Comparisons of household survey findings in 2017 and 2022 are shown in the table below.

Table 3-8: Comparison of Awareness Survey Findings in 2017 and 2022

Key Findings	2017	2022
Recognition of AS/NZS Energy Rating Labels	67%	63%
Understanding and Use of Energy Labels		

Key Findings	2017	2022
Using Energy Label to estimate the running cost	21.4%	
Understanding of annual power consumption	45%	
Using running costs to compare products	32%	
Using the information shown on the label to compare the energy efficiency levels between the 2 products		87%
Star Rating Labels affecting purchasing decisions (among those who are aware of energy labels)		88%
Communication Channel		
TV Advertising	71%	36%
Appliance Retailer/Showroom	57%	44%
Social Media		40%
Future Purchase Planning		
Buying the most efficient or highest star rating products	35%	92%
Buying only affordable products	30%	83%
Energy labels make products more expensive		83%
Willing to pay more money for an appliance if guarantees energy savings		60%
Gender Perspectives on Making Purchase Decisions on the Appliance Products		
A household head/income earner is the same who makes the purchase decision of household electrical appliances		98%
Gender of household head/main income earner		65% male; 18% female; 18% both

The above findings show that there are no significant changes observed in household awareness and use of AS/NZS Energy Rating Labels. However, the 2022 survey has shown an improved perception of the importance of the energy labels in future purchase planning from 35% in 2017 to more than 90% in 2022. Those who did not pay attention to energy labels when they purchased, strongly confirmed that they would buy only affordable products (83%). As for the communication channels recalled by the survey respondents, television and appliance retailer/showroom have been indicated as the main source of information in both 2017 and 2022 surveys. However, social media has become a common

source of energy labelling information in the 2022 survey. The 2022 survey also found that the household heads/income earners are the ones who make the purchase decision for household electrical appliances and which appliances to buy, and 65% of the household heads/income earners are males.

Table 3-9 Table 3-4compares penetration of electrical appliances in Vanuatu household reported by the two previous household surveys in 2013 and 2017 and the recent household survey in 2022. Although the % household penetration rates are different, all the surveys show that televisions are the most popular electrical appliances among Vanuatu households with the penetration rate of about 70% to 80%. Refrigerators, freezers and clothes washers are the second, third and fourth most popular appliances, while air conditioners are the least popular appliance among the household appliances included in the surveys.

Table 3-9: Household Penetration Rate of Electrical Appliances in 2013, 2017 and 2022

Appliances	No. of Unit in home	Penetration Rate (%), by Type		
		2013	2017	2022
Refrigerators	One	43.0%	68.9%	53%
	Two	1.0%	8.3%	
	Three or more	-	2.9%	
Freezers	One	5%	47.6%	43%
	Two	-	6.8%	
	Three or more	-	1.0%	
Air Conditioners	One	0.7%	21.4%	n/a
	Two	-	6.8%	
	Three or more	-	2.9%	
Clothes Washers	One	5.5%	50.5%	25%
	Two	-	3.4%	
	Three or more	-	-	
Televisions	One	81%	70.4%	83%
	Two	-	7.8%	3%
	Three or more	-	1.5%	

Note: Household penetration of electrical appliances means % of households with at least one unit of electrical appliance.

The 2022 survey found that each Vanuatu household owns an average of 7.7 light points. Table 3-10 provides household penetration rates of main lighting technologies in Vanuatu households, and it is found that adoption of LED lighting technologies has outpaced other lighting technologies. The 2022 survey shows that 57% of household respondents use LED, compared with 5.3% in 2017, and many CFLs and linear fluorescent tubes have been replaced by LED technologies over the past five years.

Table 3-10: Household Penetration Rate of Lighting Products in 2013, 2017 and 2022

Type of Lighting Product	Penetration Rate (%) 2015 (1)	Penetration Rate (%) 2017 (2)	Penetration Rate (%) 2022
Incandescent	11%	2.4%	0%
Linear Fluorescent Tube (LFT)	40%	43.2%	22% FL Short Tube - (17%) FL Long Tube - (5%)
Compact Fluorescent (CFL)	47%	46.6%	17%
Others (e.g., LED and halogen)	2%	5.3%	57% LED bulb (43%) LED Tube (6%) LED Ceiling/Downlight (8%)

Source: (1) PEEP2 household surveys, and Regional Status Report on Efficient Lighting in the Pacific Island Countries and Territories (SPC, 2015)

(2) Survey of consumer awareness and use of energy rating labels in PICTs: VANUATU COUNTRY REPORT, Tebbutt Research, 2017

3.5 Retailer Awareness of MEPSL and Appliance Energy Efficiency

The retailer survey was conducted in parallel with the 2022 household survey, and all major appliance retail shops where local people in Port Vila prefer to purchase household appliances were included. The list of retailers surveyed is given in Annex D. The main objectives of the survey are to:

- Investigate whether retail shops were aware of the MEPSL program;
- Conduct preliminary market inspections of the compliance with the AS/NZS energy rating labelling requirements;
- Evaluate how retailers perceive and use energy labels for sales and marketing purposes; and whether the energy label generates positive consumer reactions in terms of understanding, attitude, and intention towards purchasing more energy-efficient appliances and lighting products.

The secondary objective of the survey is to gather data on popular types and sizes including the energy efficiency performance of the electrical appliance and lighting products currently supplied in the Vanuatu market.

3.5.1 Awareness of MEPSL and Energy Rating Labels

All retailer respondents are aware of the MEPSL program, and more than half of them regularly talk about the program with customers (see Figure 3-19). However, some retailers do not fully recall the

scope of the MEPSL program, for example the rated cooling capacities of air conditioning products covered by the MEPSL program and types of lighting products subject to the MEPS requirements.

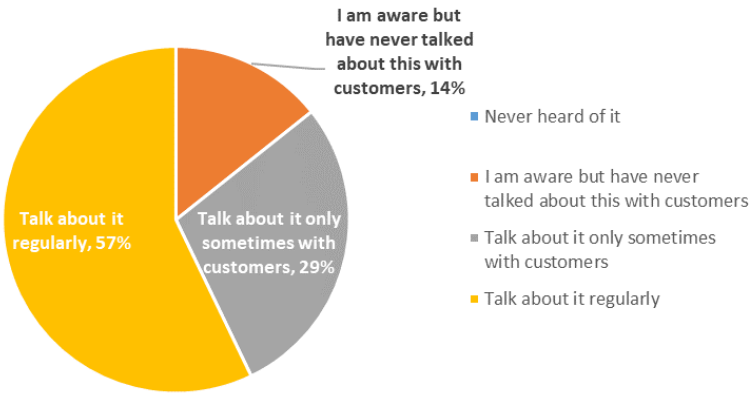


Figure 3-19: Retailers' Awareness of DOE's MEPSL Program

Most retailers (70% to 80% of the respondents) have positive views on information and benefits provided the energy rating labels. However, about 40% of the retailer respondents said that they have never visited the DOE's MEPSL (minimum energy performance standards and labelling) page[18] on the website and have not received any specific guidance on how to present/explain the energy performance standards and labels from DOE to customers. The respondents suggested a more proactive approach of communication and outreach and more stringent enforcement of the MEPSL program by DOE.

Less than half (43%) of the retailer respondents said that their customers ask for *energy labels* of the refrigerator and air conditioner products in the store. Among those who answered "no", said that most customers are more driven by purchasing cost and they are not aware of the importance of energy labels and how it affects their electricity bills. However, customers usually show more interest in energy efficiency products after the explanation.

3.5.2 Availability of EE Appliances

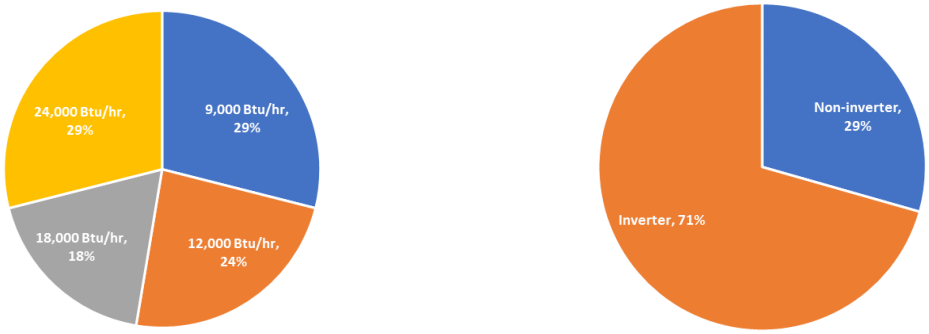
The retailer survey collected frequencies of appliance and lamp models supplied by each retailer. The overall frequencies were then used to determine the popularity of a specific model in comparison with others available on the shelfs. This popularity determination assumes that retailers would carry only models regularly sought by consumers and on-shelf availability determined its popularity.

3.5.2.1 Room Air Conditioners

The survey compiled 36 models of room air conditioners (RACs) available from large retailers in Port Vila. Based on the number of models, split-type RACs are the most common type of RACs in Vanuatu and the two most popular cooling capacities are 9,000 Btu/hr (about 2.64 kW) and 24,000 Btu/hr

[18] https://doe.gov.vu/index.php/energy-security/energy-efficiency-conservation/mepsl/general-information

(about 7.0 kW), and 12,000 Btu/hr units (3.51 kW) are the second most popular (see Figure 3-20). 71% of off-the-shelf models are inverter RACs. A few models are portable type and no window type RACs are carried by the surveyed retailers. 8 out of 36 models of RACs in the surveyed retail stores carry the AS/NZS Energy Rating labels with 2.0 to 4.5 stars.



Source: IIEC Retailer Surveys, 2022

Figure 3-20: Share of RAC Models by Cooling Capacity and Technology

As for the three most popular cooling capacities, 2.6kW, 3.5kW and 7.0kW, the table below shows the average Energy Efficiency Ratio (EER) of the best-selling models specified by the retailer respondents (6 models for 2.6 kW; 4 models for 3.5 kW; and 5 models for 7 kW).

Table 3-11: Average EER of Best-Selling RAC Models in Vanuatu in 2022

Cooling capacity (kW)	Average EER (W/W)
2.6 (9,000 Btu/hr)	4.05 (13.38 Btu/hr/W)
3.5 (12,000 Btu/hr)	3.52 (12.78 Btu/hr/W)
7.0 (24,000 Btu/hr)	3.45 (11.32 Btu/hr/W)

Source: IIEC Retailer Surveys, 2022

Typical RAC products available in Vanuatu and retail prices are shown in Figure 3-21 and Table 3-12.

Figure 3-21: RAC Products available in Retail Stores in Vanuatu

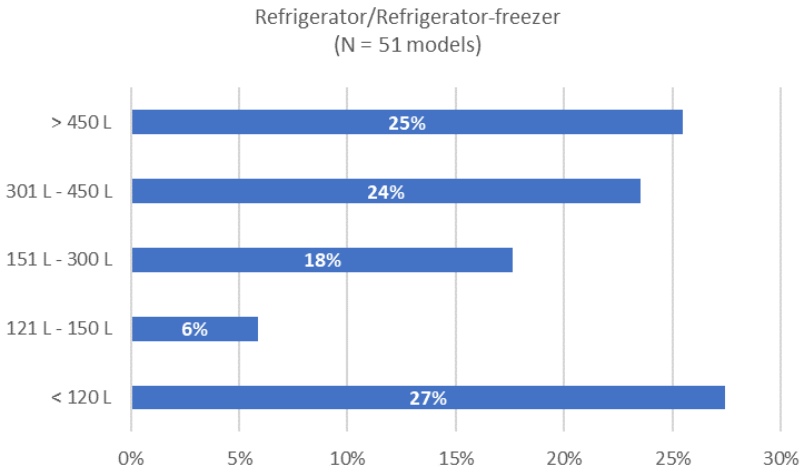
Table 3-12: RAC Retail Prices in Vanuatu

Cooling capacity (Btu/hr)	Selling Price
9,000	US$419 - US$830 (48,975 - 97,000 Vatu)
12,000	US$599 - US$822 (69,950 - 96,000 Vatu)
18,000	US$734 – US$1,090 (85,700 - 127,267 Vatu)
24,000	US$782 – US$1,370 (91,291 – 160,000 Vatu)

3.5.2.2 Refrigerator/Freezers

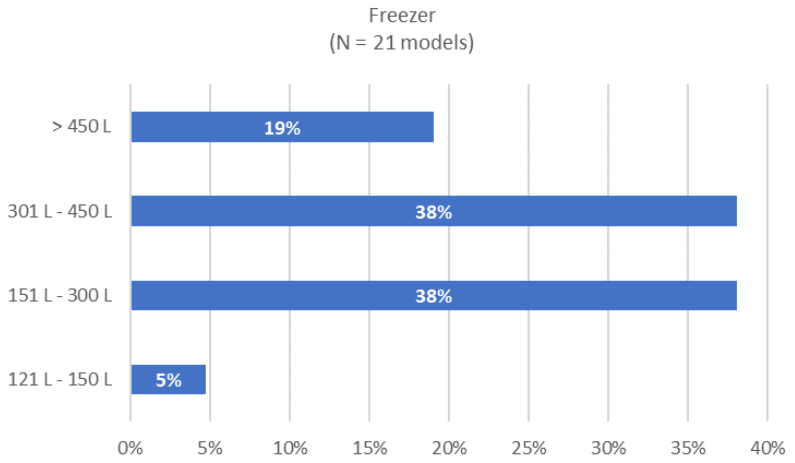
The retailer survey compiled 72 models of refrigerating appliance products available from various retailers in Port Vila (51 models of refrigerator/freezers and 21 models of freezers). Based on the number of models, there is a wide range of refrigerator and refrigerator-freezer sizes, varying from 46 liters to more than 700 liters, and there is no clear distinction of the most popular size of refrigerator/refrigerator-freezer available in the surveyed retail stores as sharing of small-, medium- and large-size models is somewhat comparable, i.e., 27% for less than 120 litres, 24% for medium size (301 – 450 litres) and 25% for large size (more than 450 litres).

As for freezers, available storage capacities range from 142 litres to 1,400 litres with popular sizes ranging from 151 to 450 litres (see Figure 3-22 and Figure 3-23).



Source: IIEC Retailer Surveys, 2022

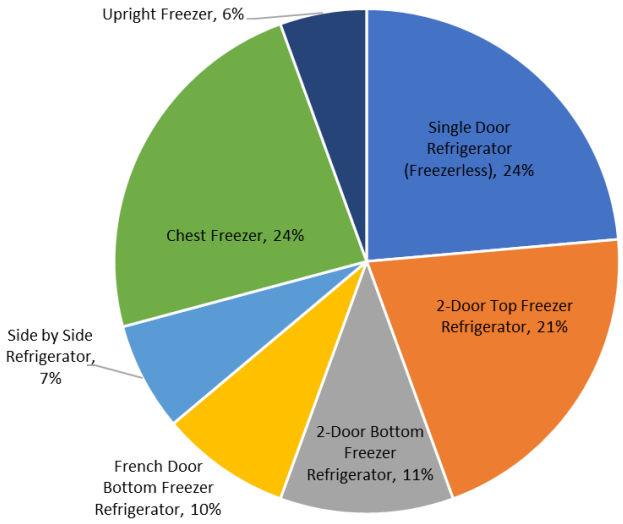
Figure 3-22: Storage Volumes of Refrigerators and Refrigerator-freezers sold in Retail Stores in Vanuatu, 2022



Source: IIEC Retailer Surveys, 2022

Figure 3-23: Storage Volumes of Freezers sold in Retail Stores in Vanuatu, 2022

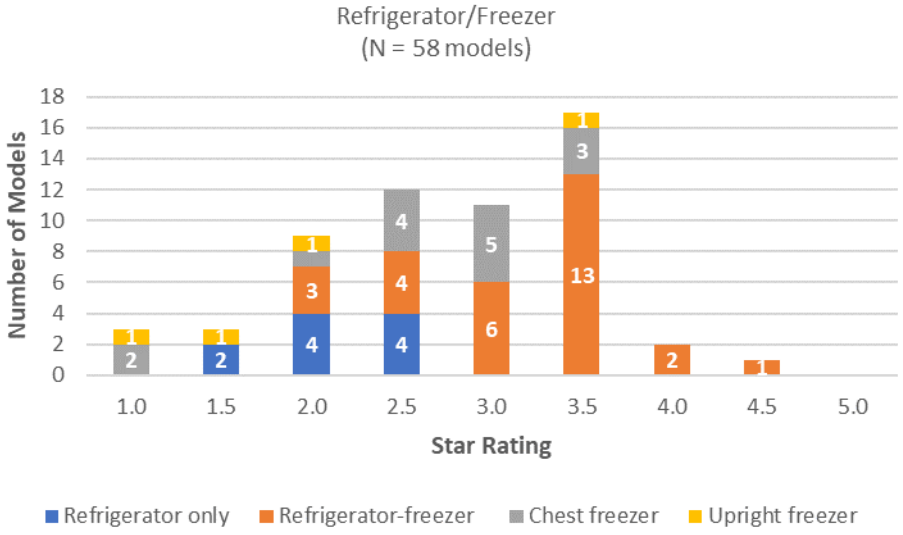
The survey result reveals that almost half (49%) of refrigerating appliance models are combined refrigerator-freezers with 2-door top freezers accounting for 21%, followed by 2-door bottom freezers (11%), French door (10%), and side-by-side (7%). Freezerless refrigerators (bar and/or mini fridges) account for 24%. Chest freezers account for 24% of the total refrigerating appliance models and upright freezers account for 6% (see Figure 3-24).



Source: IIEC Retailer Surveys, 2022

Figure 3-24: Types of Refrigerating Appliances sold in Retail Stores in Vanuatu, 2022

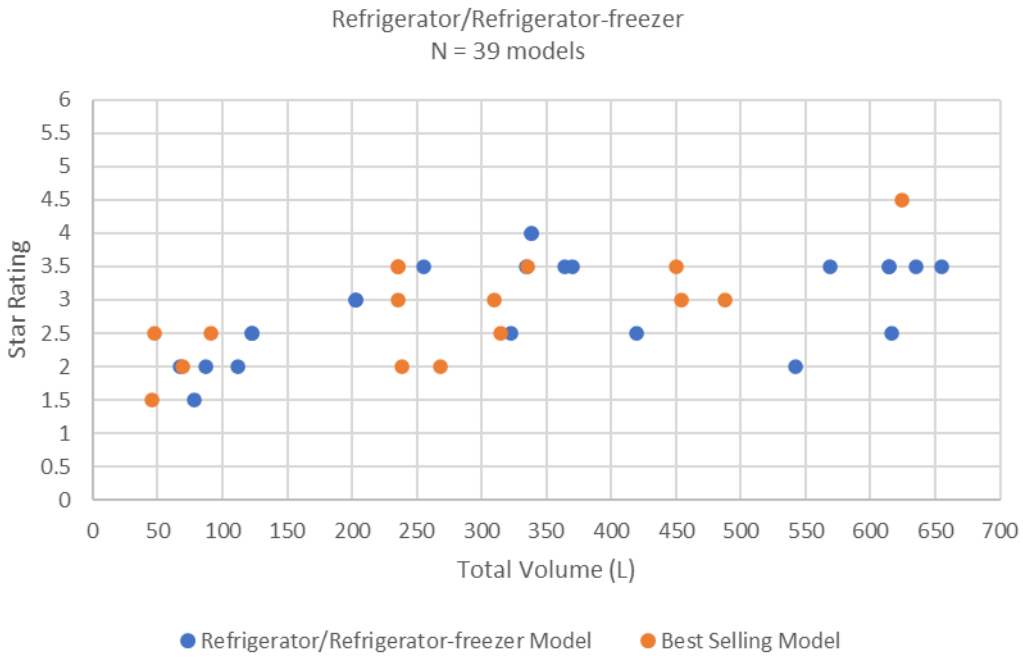
Most of refrigerator/freezer products carried by the retailer respondents (58 out of 72 models) have the AS/NZS Energy Rating labels with 1.0 to 4.5 stars, with the majority being 3.5 stars (Figure 3-25).



Source: IIEC Retailer Surveys, 2022

Figure 3-25: Energy Ratings of Refrigerator/Freezer sold in Retail Stores in Vanuatu, 2022

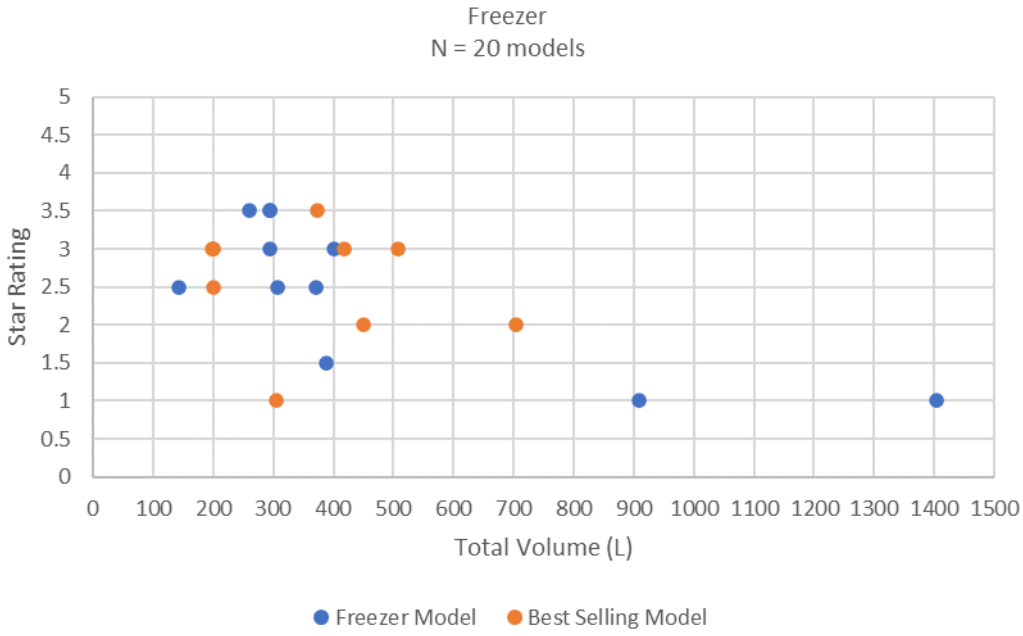
Evaluation of the sizes and star ratings of the best-selling models also does not find strong correlation between these two parameters. In short, the refrigerator/refrigerator-freezer market supply seems diverse with no clear market preferences in terms of product sizes and efficiencies.



Source: IIEC Retailer Surveys, 2022 (excluding models without AS/NZS Energy Rating Labels)

Figure 3-26: Sizes and Star Rating of Refrigerator-freezers Sold in Vanuatu in 2022

Similar to refrigerator-freezers, there is no strong correlation between the sizes and star ratings of best-selling models of freezers, and no clear market preferences in terms of freezer sizes and efficiencies is identified.



Source: IIEC Retailer Surveys, 2022 (excluding models without AS/NZS Energy Rating Labels)

Figure 3-27: Sizes and Star Rating of Freezers Sold in Vanuatu in 2022

Typical refrigerators/freezers products available in Vanuatu and retail prices are shown in Figure 3-28 and Table 3-13.

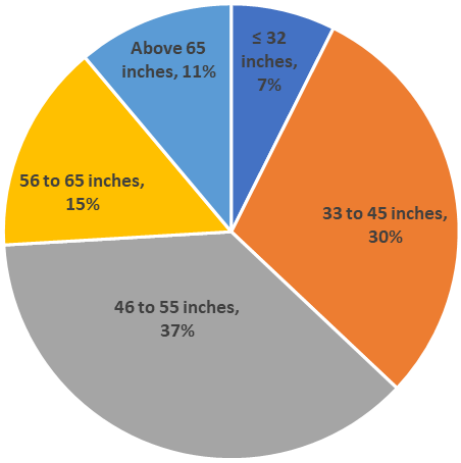
Figure 3-28: Typical Refrigerator/Freezer Products available in Retail Stores in Vanuatu

Table 3-13: Refrigerator/Freezer Retail Prices in Vanuatu

Storage Volume (Liters)	Selling Price
≤ 120	US$256 - US$527 (30,000 - 61,800 Vatu)
121 to 150	US$454 - US$487 (53,290 - 57,100 Vatu)
151 to 300	US$537 – US$935 (62,995 - 109,696 Vatu)
301 to 450	US$852 – US$1,959 (99,995 - 229,900 Vatu)
> 450	US$1,815 – US$4,645 (212,995 - 545,000 Vatu)

3.5.2.3 Televisions

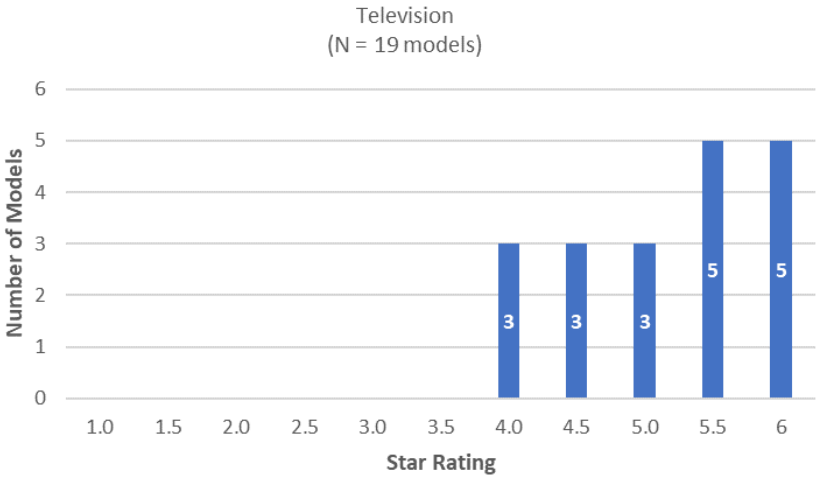
34 models of televisions are available from large retailers in Port Villa, and screen sizes range from below 32 inches to more than 65 inches (see Figure 3-29). More than half (67%) of the surveyed models have screen sizes of 33 to 55 inches, and all of the available models sold in retail stores are LED screen televisions.



Source: IIEC Retailer Surveys, 2022

Figure 3-29: Screen Sizes of Televisions in Vanuatu, 2022

All television models, displayed the AS/NZS energy star rating labels (19 models), were found their ratings higher than 4 stars (see Figure 3-30).



Source: IIEC Retailer Surveys, 2022

Figure 3-30: Energy Ratings of Televisions sold in Retail Stores in Vanuatu, 2022

Television available in Vanuatu and retail prices are shown in Figure 3-31 and Table 3-14.

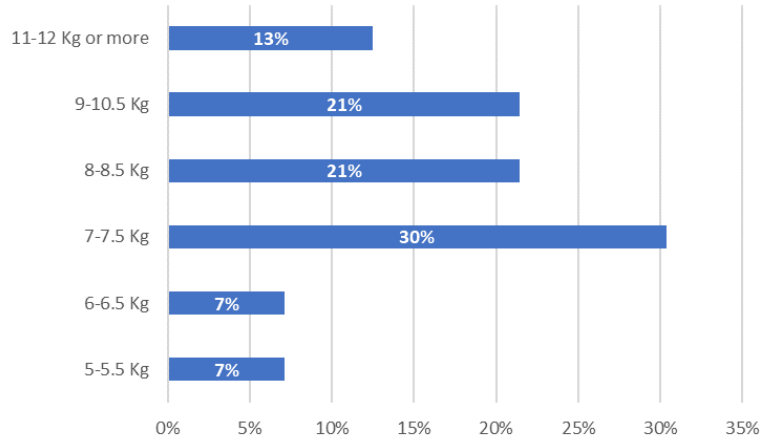
Figure 3-31: Energy Ratings of Televisions sold in Retail Stores in Vanuatu, 2022

Table 3-14: Television Retail Prices in Vanuatu

Screen Size (inches)	Selling Price
Below or equal to 32 inches	US$256 – US$312 (29,900 - 36,453 Vatu)
33 to 45 inches	US$427 – US$718 (49,900 - 83,900 Vatu)
46 to 55 inches	US$745 – US$1,152 (86,995 - 134,510 Vatu)
56 to 65 inches	US$781 – US$1,284 (91,244 - 149,995 Vatu)
Above 65 to 85 inches	US$1,627 – US$1,764 (189,995 - 205,995 Vatu)

3.5.2.4 Clothes Washers

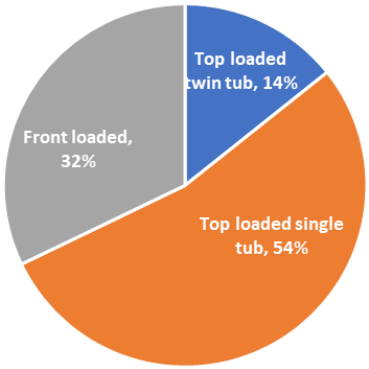
56 models of clothes washers are available in the surveyed retail stores with washing capacities ranging from 5-20 kg (see Figure 3-32). The survey found that 72% of the surveyed models have washing capacities between 7 to 10.5 kg, with 7 to 7.5 kg as the most popular washing capacities.



Source: IIEC Retailer Surveys, 2022

Figure 3-32: Clothes Washer Capacities sold in Retail Stores in Vanuatu, 2022

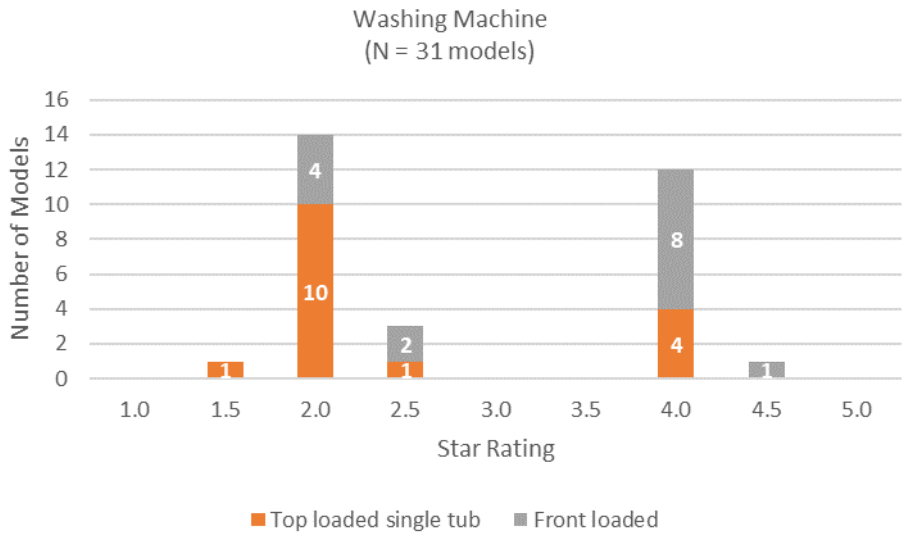
More than half (54%) of clothes washers sold in the surveyed stores are top loaded single tub type, followed by 32% front loaded type (see Figure 3-33).



Source: IIEC Retailer Surveys, 2022

Figure 3-33: Types of Clothes Washers sold in Retail Stores in Vanuatu, 2022

About half of the clothes washers available in the surveyed retail stores (31 models) are affixed with the AS/NZS Energy Rating labels ranging from 2 to 4 stars (see Figure 3-34). 9 models carry Thai and EU energy labels and the remaining model do not have any energy label affixed. Note that there are no energy labels affixed on top loaded twin tub type clothes washers.



Source: IIEC Retailer Surveys, 2022

Figure 3-34: Energy Ratings of Clothes Washers sold in Retail Stores in Vanuatu, 2022

Clothes washers available in Vanuatu and retail prices are shown in Figure 3-35 and Table 3-15.

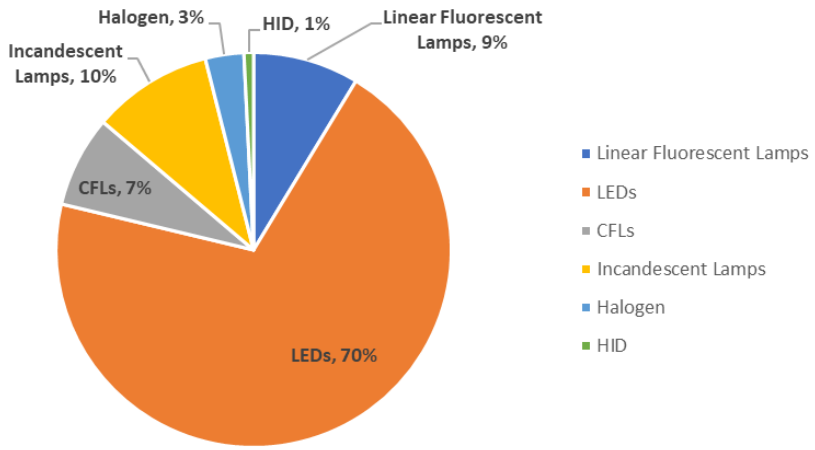
Figure 3-35: Typical Clothes Washers sold in Retail Stores in Vanuatu, 2022

Table 3-15: Clothes Washers Retail Prices in Vanuatu

Washing Capacity (kg)	Selling Price
5 - 5.5	US$428 - US$865 (49,995 - 101,000 Vatu)
6 - 6.5	US$625 – US$1,008 (72,995 - 117,730 Vatu)
7 – 7.5	US$316 - US$1,235 (36,995 - 144,500 Vatu)
8 – 8.5	US$482 - US$839 (56,340 - 97,995 Vatu)
9 – 10.5	US$423 – US$1,497 (49,500 - 175,000 Vatu)

3.5.2.5 Lighting Products

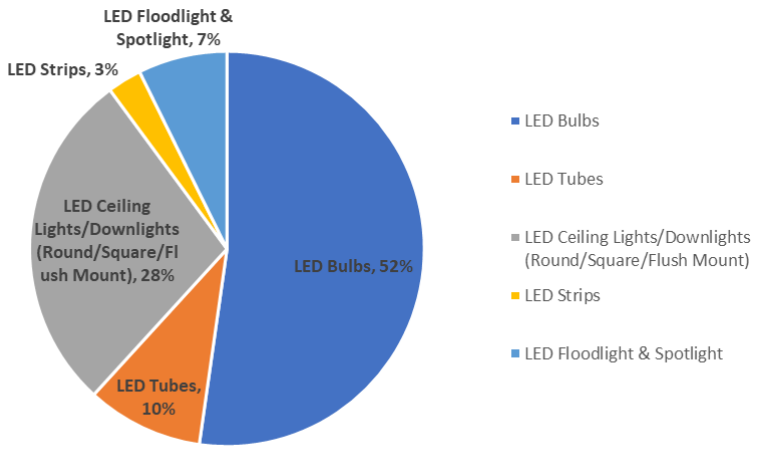
The survey shows that LED lamps account for about 70% of lighting products available in retail stores (178 out of 254 models). Other lighting technologies include incandescent lamps, linear fluorescent lamps (LFL) and CFLs (see Figure 3-36).



Source: IIEC Retailer Surveys, 2022

Figure 3-36: Types of Lighting Technologies sold in Retail Stores in Vanuatu, 2022

LED lamps are available from these retailers in different wattages and shapes for different applications. The survey found that the most popular LED lamps are LED bulbs with 3, 5, 9 and 12W.



Source: IIEC Retailer Surveys, 2022

Figure 3-37: Types of LED Lamps sold in Retail Stores in Vanuatu, 2022

Summarized in Table 3-16 are technologies, typical wattages, and price ranges of lighting products available in Vanuatu in 2022.

Table 3-16: Characteristics of Lighting Products available in Retail Stores in Vanuatu, 2022

Technology	Description	Range	
		Min	Max
Incandescent	Efficacy	5 lumen/watt	13 lumen/watt
	Power	5W	100W
	Price	US$0.8 (100 vatu)	US$4.7(560 Vatu)
	Base	Pin, Screw	
CFL	Efficacy	56 lumen/watt	82 lumen/watt
	Power	9W	85W
	Price	US$2.9 (350 Vatu)	US$7.2 (850 Vatu)
	Color	DL, WW, CW	
	Base	Pin, Screw	
Fluorescent	Efficacy	68 lumen/watt	111 lumen/watt
	Power	4	40
	Price	1.3 (160 Vatu)	32.3 (3,800 Vatu)
	Base	T4, T5, T8, T12	
LED Bulb	Power	2W	100W
	Price	US$1.3 (160 Vatu)	US$21.8 (2,560 Vatu)
	Color	DL, WW, CW	
	Base	Pin, Screw	
LED Tube	Power	8W	48W
	Price	US$2.5 (295 Vatu)	US$44.5 (5.230 Vatu)

Technology	Description	Range	
		Min	Max
LED Ceiling Light/Downlight	Power	3W	48W
	Price	US$21.8 (2,560 Vatu)	US$186.4 (21,885 Vatu)
LED Floodlight & Spotlight	Power	3W	150W
	Price	US$6.3 (740 Vatu)	US$178.8 (20,990 Vatu)
HID	Power	80W	250W
	Price	US$6.14 (720 Vatu)	US$28.2 (3,310 Vatu)

Source: Retail survey, IIEC (2022)

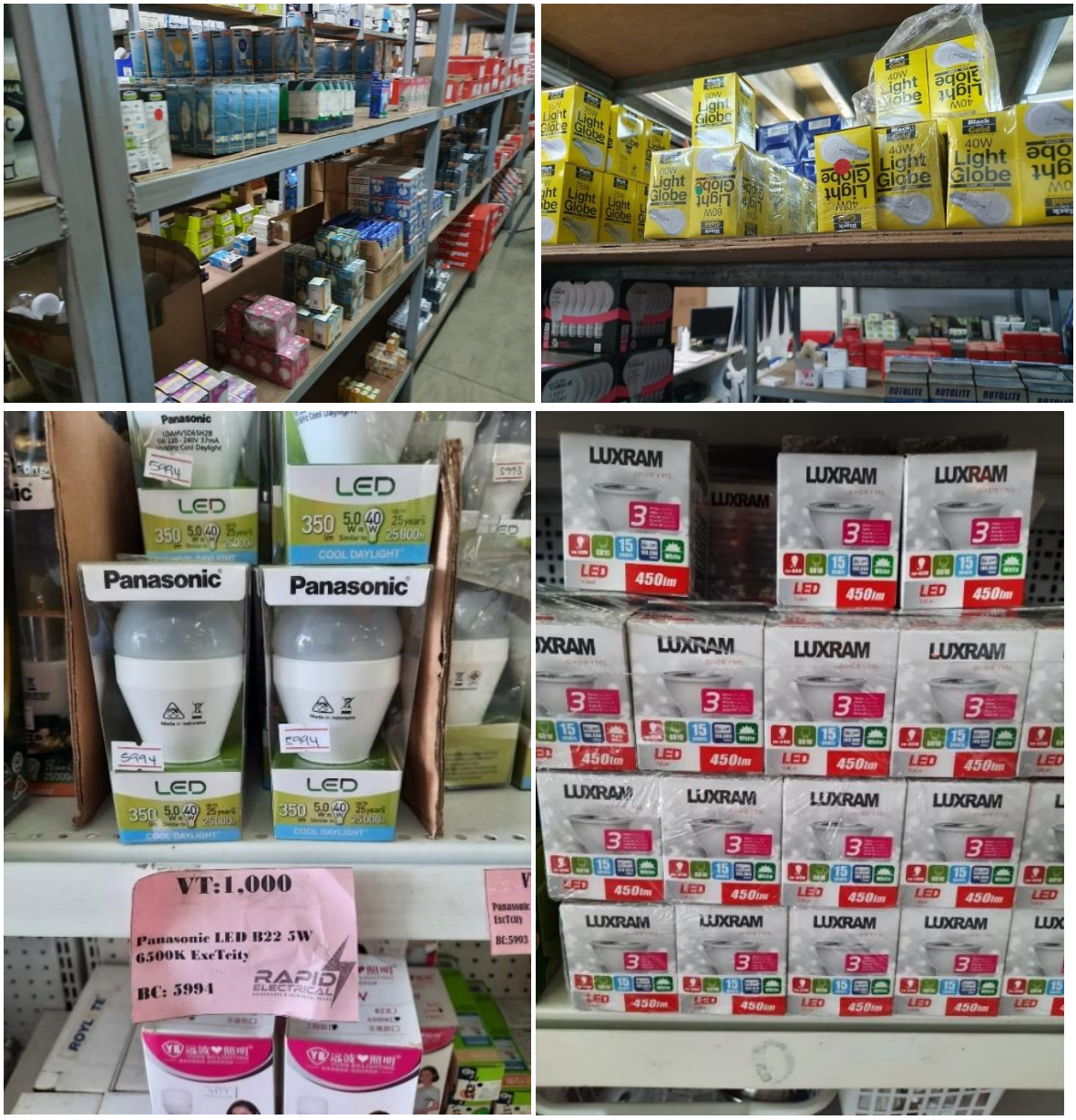


Figure 3-38: Typical Lighting Products sold in Retail Stores in Vanuatu, 2022

4 EVALUATION OF MEPSL IMPLEMENTATION

4.1 Adoption of Standard Operating Procedures

Review of the product registration database and feedback from DOE have revealed that some key elements of the standard operating procedures for product registration have been adopted by DOE over the past five years, and these include the followings.

- **Utilization of Form A and B Application:** Form A and B applications are included as Schedule 3 and 4 of the Regulation Order No. 126 of 2017, and both application forms have been utilized by the applicants to obtain certificates of registration. According to Section 4 of the Energy Efficiency of Electrical Appliances, Equipment and Lighting Products Act No. 24 of 2016, DOE must grant or refuse an application for registration within 14 days after receiving an application, and DOE reported that a paper-based application procedure was used from 2017 to 2021 and the lead time for review and approval of the application was about 10 to 14 days. Following the introduction of the VeSW e-Registration Application module in 2021, the review and approval lead time has been reduced to be within 5 days.

- **Keeping a register of compliant products:** DOE is responsible for keeping records of compliant products. Currently, the lists of approved energy efficient appliances are available on the DOE website[19] and the Vanuatu Single Window Portal[20], and both lists are identical. However, limited information on each approved appliance is shown to the public, and these include: 1) Vanuatu Reg. No.; 2) Standard No. (AS/NZ); 3) Brand; 4) Model No.; 5) Commodity Code; 6) Type Description (e.g. Split unit and Window-wall or Unitary); 7) Product Description (e.g. Air conditioner - Split Unit). Other information on certification of registration and product characteristics such as energy efficiency level/star rating, product size/rated capacity and expiry date of certification is not available from the DOE website. It should also be noted that the registration records shown in the DOE website are not identical to the registration records for Vanuatu shown in the Pacific Appliance Database (PAD)[21]. The Act No. 24 of 2016 specifies that DOE must publish a notice in the Gazette containing the names of registered persons with the brand and model of the product that meets the MEPS and energy labelling requirements, however DOE has not confirmed the schedule for gazetting the registration records.

- **Implementation of Monitoring, Enforcement and Verification activities:** Although the Act No. 24 of 2016 gives legal authority to the director of DOE to implement monitoring, enforcement and verification (MVE) activities, only limited scope of MVE activities, primarily

[19] https://doe.gov.vu/index.php/energy-security/energy-efficiency-conservation/mepsl/approved-energy-efficient-appliances

[20] https://singlewindow.gov.vu/portal/services/swApprovedAppliances/appliancesnoheader.jsf

[21] https://pad.spc.int/pad-registrations-public

monitoring and inspection at the entry point, has been implemented to date. According to DOE, authorized officers have been appointed but relevant market surveillance activities and collection of annual products imported and sold have not yet been implemented.

4.2 Registration & Certification Status of Energy Efficiency Electrical Appliances and Lighting Products in Vanuatu

As mentioned earlier, the database of approved energy efficient appliances in Vanuatu are accessible through the DOE website and the Vanuatu Single Window Portal. As of 24 March 2022, there are 445 refrigerator and freezer models, 189 air conditioner models, and 91 lighting models in the registration database. Clothes washers and televisions are currently not yet regulated under the Energy Efficiency of Electrical Appliances, Equipment and Lighting Products Act No.24 of 2016. Therefore, there is no data on certified clothes washers and televisions in the registration database.

Table 4-1 summarizes numbers of models and brands by relevant HS codes for refrigerators/freezers, air conditioners, and lighting products.

Table 4-1: Major Brands and Numbers of Registered Models in the Registration Database

Electrical Appliances	Type (HS code)	Total Registered Models[1]	Majority of Brands (based on % No. of REG models)	Countries of Manufacture[2]
Refrigerators and Freezers	Refrigerators and Freezers (HS 84180)	290 models, 58 brands	Samsung (12%), Fisher & Paykel (9%), Hisense (12%), Midea (7%), Haier (5%), Heller (4%), Panasonic (4%), Hitachi (3%), Keg (3%), Daewoo (3%), LG (3%)	China, New Zealand, South Korea, Thailand, Vietnam, and Turkey
	Refrigerators (HS 841821)	82 models, 32 brands	Midea (12%), Samsung (12%), Westinghouse (11%), Gree (5%), Haier (5%), XINGX (5%), Fisher & Paykel (4%), LG (4%), Panasonic (4%)	
	Electrical Chest Freezers (HS 841830)	50 models, 21 brands	Midea (14%), Westinghouse (14%), KEG (12%), Fisher & Paykel (8%), Heller (6%), Simmons (6%),	
	Other Chest Freezers (HS 84183090)	23 models, 8 brands	West Cold (43%), Heller (17%), Anbotek (9%) AUCMA (9%), Sun Pacific (9%)	

Electrical Appliances	Type (HS code)	Total Registered Models[1]	Majority of Brands (based on % No. of REG models)	Countries of Manufacture[2]
Air Conditioners	Split unit (HS 84151020)	169 models, 24 brands	Fujitsu (17%), Carrier (9%), Midea (9%), TCL (9%), Chigo (8%), Panasonic (8%), Samsung (5%), Gree (4%), LG (4%), Daikin (4%)	China, Australia, Thailand, South Korea
	Window-wall or Unitary (HS 84151010)	3 models, 3 brands	Midea, Omega, TECO	
	Ducted type (HS 84151030)	5 models, 3 brands	CCC, Gree, Hitachi	
	Multi-split (HS 84151040)	12 models, 3 brands	Fujitsu, Mitsubishi, TCL	
Lighting Product	Linear Fluorescent lamp (HS 85393130)	54 models, 11 brands	BRITEX (46%), Philips (26%), SYLVANIA (6%), Cromptom (6%), Henswell (4%), Mazda (4%)	China, New Zealand, Netherlands, Germany
	Compact Fluorescent Lamp (HS 85393110)	6 models, 6 brands	BAIFU, Ceiling Luminaire, Deck Light, LDXPZ, Mazda, Mirror-LHT	
	Incandescent Lamp (HS 85392110)	13 models, 4 brands	Lucci (46%), ECOLIFE (38%), Crompton (8%), Bolevo (8%)	
	Fluorescent Lamp Ballast (HS 85042120)	18 models, 4 brands	ECOLITE (28%), ED LITE-Daikon (17%), BALLAST (12%)	
Clothes Washers [3]	(not regulated)	N/A	Midea, Fuzzy, Heller, TCL, Sharp, IFB Elite, LG, Toshiba, Whirlpool, Haier, SUNPAC	N/A
Televisions [3]	(not regulated)	N/A	JVC, Samsung, LG, Sharp	N/A

Note: [1] Registered brands of electrical appliances in the registration database.

[2] Information on the country of manufacture of registered appliances and lighting products is not available from the DOE website. Therefore, the country of manufacture information shown in the table is obtained from the similar models and brands registered in the Energy Rating Database (https://reg.energyrating.gov.au/).

[3] Brands of clothes washers and television are based on products available through the appliances shops' websites and Facebook, such as Rapid Electrics, South Pacific Electrics, Vate Electrics, and WilcoPort Vila Hardware.

Note that the registration database provides only the Vanuatu registration number, brand, model, HS code, and product description. Based on discussion with DOE, the numbers of the approved certificates have been categorized by year. As a result, each record of the certified models is not organized to enable mapping and sorting with registration date and expiry date. Therefore, it is possible that some of the certified models could have already expired (each certification lasts for 3 years).

In addition, the registration database does not provide information on energy label rating, and energy consumption for each certified model. Therefore, IIEC compared the certified models in the

registration database with the products registered in the AS/NZS Energy Rating database to determine the energy efficiency performance of these certified models.

Following an extensive review, of the total of 445 Vanuatu registered models under the registration database, 122 models have been found corresponding with AS/NZS Energy Rating models (27%): of which 33% are combined refrigerators and freezers (97 models), 20% refrigerators (16 models), and 12% freezers (9 models) matched. However, the reason for remaining unmatched models is unknown (see Table 4-2).

Table 4-2: Summary of the Similarity Matching Models with the Products Registered in the Energy Rating Database

Appliances	Commodity Code	Appliance Type	Total Number of Vanuatu Registration Models	Number of Matched Models with Energy Rating Database
Refrigerator, Freezer	841810	Refrigerator, Freezer	290	97
Refrigerator	841821	Refrigerator	82	16
Freezer	841830	Chest Freezer	73	9
Air Conditioners	84151020	Split Unit	169	20
	84151010	Window-wall or Unitary	3	2
	84151030	Ducted	5	0
	84151040	Multi-split	12	2
		Total	**445**	**122**

Analysis of energy efficiency performance and energy labels of the certified products in Vanuatu presented in this section are limited to those refrigerator/freezer and air conditioner models that can be matched with the models on the Energy Rating database.

4.2.1 Certified Refrigerators and Freezers

Table 4-3 indicates the size of the refrigerator and freezer on average volumes and the comparative energy consumption (CEC) in kWh/yr.

Table 4-3: Average Volumes of Refrigerators-Freezers and Chest Freezers, (N = 122 models)

Appliances	Type	Range of Total Volumes (Litres)	Average Volumes (Litres)	Comparative Energy Consumption (CEC), kWh/yr		
				Min	Max	Avg.
Combined Refrigerators and Freezers	Upright	50-720	350	190	665	353
	Side-by-Side	550-700	650	535	692	579
	Chest	200-550	220	220	586	335
Refrigerators	Upright	50-550	330	195	525	287
	Side-by-Side	550-650	600	543	570	557

Appliances	Type	Range of Total Volumes (Litres)	Average Volumes (Litres)	Comparative Energy Consumption (CEC), kWh/yr		
				Min	Max	Avg.
Freezers	Chest freezer	250-600	420	303	433	368

The AS/NZS energy rating labels on the products range from 1.0 to 4.5 stars, with the majority being 3.0 stars (Figure 4-1). The scatter plot of the level of comparative energy consumption (CEC) per size of refrigerators and freezers by product types is shown in Figure 4-2.

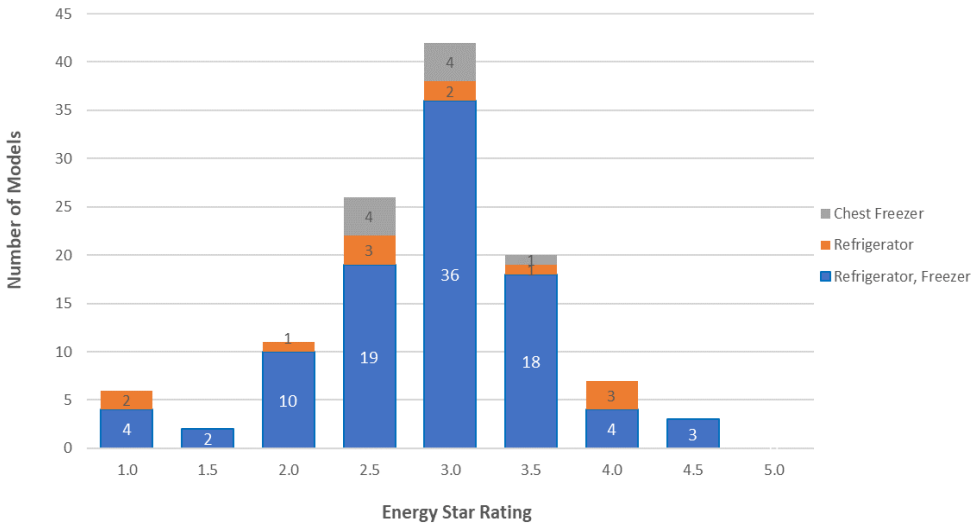


Figure 4-1: The Energy Star Rating of Refrigerator and Freezer Products registered in Vanuatu

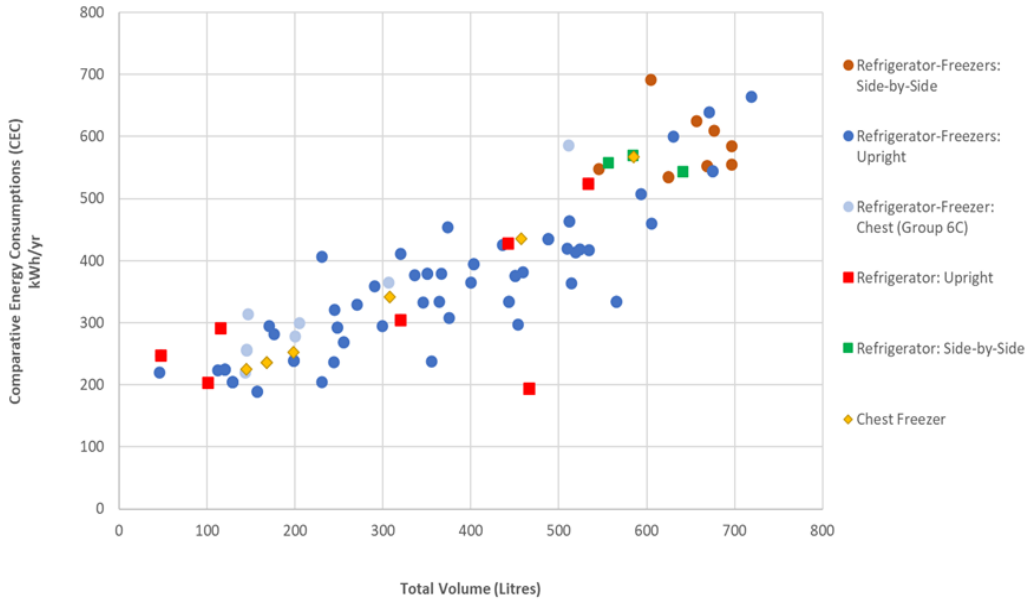


Figure 4-2: Level of Comparative Energy Consumption (CEC) of Refrigerators and Freezers by Size and Product Types

4.2.2 Certified Air Conditioners

Of 24 matched models found carrying AS/NZS Energy Rating models, most imported air conditioners are single split systems (20 models). There are a few Window types (2 models) and Multi-split (VRF) found (2 models).

A summary of the annual energy efficiency ratio (AEER) and the annual coefficient of performance (ACOP) is shown in Table 4-4. However, only 8 of 24 models have indicated carrying on star level 2010_cool; energy star rating (2010) ranged between 2.0 to 6.0 stars. The scatter plot of the annual energy efficiency ratio of single-split system air conditioners is shown in Figure 4-3.

Table 4-4: Average the Annual Energy Efficiency Ratio (AEER) and Annual Coefficient of Performance (ACOP) for Single Split Air Conditioners

Appliances	Type	Rated Cooling Capacity (kW)	Rated AEER			Rated ACOP		
			Min	Max	Avg	Min	Max	Avg
Air conditioners	Single Split System – Class 3	2.0-3.5 kW	3.74	5.23	4.45	4.00	5.16	4.56
	Single Split System – Class 4	5.0-9.4 kW	3.32	3.77	3.57	3.28	4.27	3.81

Note: data based on single split-class 3 (11 models), Single split system – Class 4 (9 models)

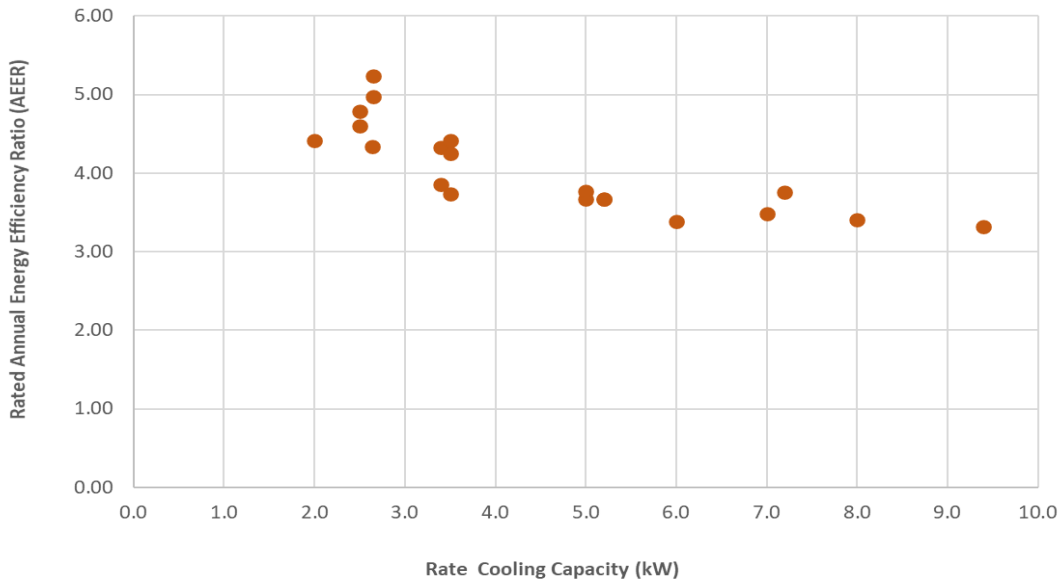


Figure 4-3: Annual Energy Efficiency Ratio (AEER) of Air Conditioners-Single Split System

However, no registered lighting products in the registration database have matched with the Energy Rating database for lighting products. This could be the difference in lighting product registered models during the registration process, especially clarification of imported lighting models with bulk purchasing of lighting products.

4.3 Effectiveness and Impact of MEPSL Implementation

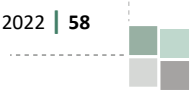
In terms of overall implementation, the MEPSL program was effective in establishment of a registration scheme for certified energy efficient appliances covered by the MEPSL program, and this could be considered as the most important achievement of the MEPSL program to date. The retailer survey conducted under this assignment reveals that most retailers are aware of the MEPSL program and welcome more stringent implementation of MVE activities to level the playing field for all stakeholders in the appliance market in Vanuatu. The retailers also expect a more proactive communication and outreach activities by DOE to enhance effectiveness of the program. Findings from the small-scale household survey do not show significant improvement in household recognition of the AS/NZS Energy Rating labels, however, for those who recognize, most have indicated better understanding in information provided by the Energy Rating labels and intend to use the information on the labels in future purchases. Household respondents also indicated a greater use of social media to research and compare information on electrical appliances.

Although the MEPSL program has made a good progress in product registration and certification, implementation of MVE activities, e.g., basic compliance inspections at warehouses and/or showrooms, has not been reported by DOE. The lack of after-market-entry monitoring could allow for importation and sale of non-compliant products with no consequences, and this could discourage importers and retailers to skip the registration process and eventually undermine the integrity of the whole MEPSL program. Findings from the retailer survey have already shown that there are to a certain extent non-compliant products available on the shelfs in Port Vila. Examples of these non-compliant products are briefly summarized below:

- **Non-Compliance with Energy Labeling Requirements:** Only 8 out of 36 models (22%) of RACs in the surveyed retail stores carry the AS/NZS Energy Rating labels. Compliance with the energy labelling requirements for refrigerators/freezers is better as 80% of refrigerator/freezer models in the surveyed retail stores have the Energy Rating labels. Although these models without AS/NZS Energy Rating labels have valid certifications and these non-compliances with the energy labelling requirements may be unintentional (which can be considered as minor offences), it is vital for the MEPSL program to demonstrate its stringency and notify retailers about their obligations.
- **Availability of Tungsten Filament Incandescent Lamps in Retailers:** According to the Energy Efficiency of Electrical Appliances, Equipment and Lighting Products Act No. 24 of 2016, Tungsten filament lamps are not allowed to be imported and sold in Vanuatu. It is not clear if these tungsten filament lamps belong to the old stock before the implementation of the MEPSL program or these were intentionally imported and declared under a different HS code.

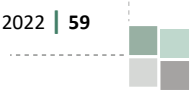
In addition to the above non-compliance issues, DOE has not yet exercised its legal power in requiring importers and retailers to provide data on numbers of registered products imported and sold annually. Regular compilation of these import and sale data will enable DOE to estimate energy savings and economic impacts of the MEPSL program, and identify any possible means to improve and expand the scope of the program.

Regarding the scope of the MEPSL program, the existing scope, covering household refrigerating appliances (refrigerators, refrigerator-freezers and freezers), air conditioners, incandescent lamps, linear fluorescent lamps, compact fluorescent lamps (CFLs) and fluorescent lamp ballasts, is found to



be relevant considering the high household penetration rates of these appliances and lighting products. DOE has indicated its intention to include television and clothes washers in the MEPSL program and it is found that televisions are considered very relevant due to a high household penetration rate of about 80% to 90%, and there are ongoing MEPS and labeling requirements for televisions under the AS/NZS Energy Rating program. Clothes washers are considered less relevant primarily due to a lower household penetration rate and utilization compared to televisions.

Over the past five years, penetration of LED lighting technologies among Vanuatu households has increased from about 5% to about 60%. Many conventional lighting technologies, e.g., linear fluorescent lamps and CFLs, have already been replaced by LED lamps. It should be noted that the AS/NZS Energy Rating program is considering introduction of MEPS for LED lamps and the regulation is expected to come into effect in 2022-2023. Considering this, the MEPSL program should seriously consider inclusion of LED lamps in its scope.



5 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The MEPSL program has been considered effective in establishment of a registration scheme for certified energy efficient appliances covered by the MEPSL program. It is evident from the household and retailer surveys that the MEPSL program has enhanced awareness and knowledge of retailers and households in Vanuatu in energy efficient appliances. The household survey reveals that Vanuatu households have increasingly relied on social media in accessing information on energy efficient appliances and lighting products. The retailer survey also found non-compliant products in appliance stores in Port Vila. Although the severity of non-compliance cannot be determined through the survey findings, it is clear that DOE is required to exercise its legal power as specified in the Energy Efficiency of Electrical Appliances, Equipment and Lighting Products Act No. 24 of 2016 and the Electrical Appliance, Equipment and Lighting Products (Importation Control) Regulation Order No. 126 of 2017, and these include but not limited to compliance inspections at warehouses and/or showroom and mandatory reports for annual imports and sales of registered products. Most retailers believe more stringent implementation of MVE activities to level the playing field for all stakeholders in the appliance market in Vanuatu.

The existing scope of the MEPSL program, covering household refrigerating appliances (refrigerators, refrigerator-freezers and freezers), air conditioners, incandescent lamps, linear fluorescent lamps, compact fluorescent lamps (CFLs) and fluorescent lamp ballasts, is found to be relevant considering the high household penetration rates of these appliances and lighting products. Over the past five years, penetration of LED lighting technologies among Vanuatu households has increased from about 5% to about 60%. Moreover, the AS/NZS Energy Rating program is considering introduction of MEPS for LED lamps and the regulation is expected to come into effect in 2022-2023. Considering this, the MEPSL program should seriously consider inclusion of LED lamps in its scope. Televisions are also considered very relevant due to a high household penetration rate of about 80% to 90%, and there are ongoing MEPS and labeling requirements for televisions under the AS/NZS Energy Rating program

5.2 Recommendations

The following recommendations are proposed to improve the effectiveness and impacts of the MEPSL program in Vanuatu with the responsible entity(ies) identified in brackets.

1) **Enhance accessibility to information on MEPSL operating procedures [DOE]:** The Manual of Standard Operating Procedures prepared by the PALS programme is very comprehensive and provide detailed information on roles and responsibilities of different stakeholders involved in the MEPSL program in Vanuatu (e.g., DOE, retailers, Customs officials). However, the Manual is only available in a form of Microsoft Word document, and the Manual has not been updated since the introduction of the MEPSL program. Therefore, it is strongly recommended for DOE to update and re-digitize this Standard Operating Procedure Manual as an online document which will enable better access for all stakeholders involved to the MEPSL program. With an online version, DOE can enhance the Manual contents by integrating interactive Frequently Asked Questions (FAQs) features,

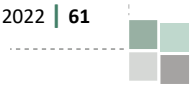
updated HS Code for each product classification, and short video clips demonstrating how to use various forms and templates required by the program.

2) **Review and update registration procedures and database [DOE and Customs Department]:** The Regulation Order No. 126 of 2017 provides application forms and templates for certification of registration. These documents have not been updated over the past five years, and it is strongly recommended for DOE and the Customs Department to review these forms and templates in conjunction with the registration procedures so that the registration process can be optimized and necessary details of registered products are properly recorded. It is also recommended for DOE to review the applicability of the Pacific Appliance Database and perform updates as necessary.

3) **Review and update the scope of MEPSL [DOE]:** Over the past decade, efficiency and reliability of LED lighting technologies have been significantly improved, while the costs have also drastically reduced. These developments have fundamentally changed the use of lighting technologies worldwide. In Vanuatu, the household penetration rate of LED lamps increased from about 5% in 2017 to about 60% in 2022, and the adoption of LED lamps is expected to increase in coming years. Considering this, it is strongly recommended for DOE to begin monitoring the MEPS and labeling requirements for LED lamps being developed by the AS/NZS Energy Rating program. Following the approval of the MEPS and labeling requirements for LED lamps by the AS/NZS Energy Rating program, DOE can include LED lamps in the scope of MEPSL. Depending on the capacity and available resources, DOE may consider inclusion of televisions in the scope MEPSL.

4) **Develop and implement capacity building and communication/outreach programs on MEPSL for stakeholders [DOE/Customs Department/Retailers]:** During the development phase of the MEPSL program for Vanuatu, the training strategies for officials and stakeholders were developed. DOE should revisit this training strategies document and develop more sustainable capacity building and communication/outreach programs which provide at least annual training and periodic updates for DOE, Customs officials, importers, retailers and consumers to maintain momentum and interest of all stakeholders. Knowledge products developed by the capacity building and communication/outreach programs shall be integrated into the online repository of MEPSL resources maintained by DOE.

5) **Develop and implement a market surveillance program for MEPSL [DOE]:** MVE activities have not yet been implemented by DOE, and it is recommended for DOE to start developing a market surveillance program focusing on initial compliance checks such as checking that the products offered for sale have been registered and checking that the products offered for sale correctly labeled. The product inspection forms in the Manual of Standard Operating Procedures can be used as the templates for these initial compliance checks. Results of the market surveillance program will greatly benefits DOE's capacity in monitoring effectiveness of the registration and certification procedures, and also provide important feedback for DOE to optimize design and implement of the MEPSL program.



6 ANNEXES

Annex A	UN Comtrade Export Statistics to Vanuatu for Five Appliances
Annex B	Estimation of Appliance Stocks
Annex C	Household Survey
Annex D	Retailer Survey

6.1 Annex A – UN Comtrade Export Statistics to Vanuatu for Five Electrical Appliances

6.1.1 Refrigerator and Freezers (HS 8418)

HS Code	Export Statistics	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Total HS 8418	**Value (US$)**	**366,748**	**732,170**	**553,240**	**420,513**	**519,466**	**679,604**	**401,926**	**612,747**	**626,923**	**109,710**
	QTY (Units)	**2,175**	**3,272**	**2,045**	**1,638**	**2,037**	**2792**	**1,561**	**2,135**	**2,314**	137
HS 841810	Value (US$)	72,675	166,937	183,182	98,841	162,498	120,056	118,709	123,477	115,776	86,183
	QTY (Units)	262	783	823	541	521	430	309	398	361	97
HS 841821	Value (US$)	41,602	144,935	70,800	56,837	50,323	99,230	72,747	130,286	133,533	8,822
	QTY (Units)	110	622	217	320	247	371	460	676	468	7
HS 841829	Value (US$)	102,175	204,615	54,499	46,289	63,717	63,849	6,386	16,386	24,746	645
	QTY (Units)	615	932	79	95	321	216	21	57	148	3
HS 841830	Value (US$)	150,296	187,509	215,803	210,500	194,209	352,798	196,999	286,544	343,301	8,997
	QTY (Units)	1,188	930	827	659	753	1,616	744	898	1,311	20
HS 841840	Value (US$)	-	28,174	28,956	8,046	48,719	43,671	7,085	56,054	9,567	5,063
	QTY (Units)	-	5	99	23	195	159	27	106	26	10
Percentage Breakdown by Country of origin (based on exported value), from 2012 to 2021											
Country of origin	China	6.7%	15.4%	22.9%	25.9%	36.9%	31.5%	34.9%	33.4%	67.3%	-
	New Zealand	20.3%	13.4%	24.6%	14.6%	13.6%	8.0%	12.4%	33.7%	14.0%	80.4%
	Australia	9.2%	6.3%	10.1%	8.3%	12.2%	5.4%	15.5%	9.1%	6.5%	19.6%
	Singapore	11.0%	25.2%	4.9%	8.5%	10.1%	9.2%	0.3%	-	0.4%	-
	Fiji	32.1%	29.3%	22.9%	11.0%	4.6%	5.4%	0.7%	0.4%	1.3%	-
	USA	6.0%	3.0%	-	7.3%	0%	16.5%	14.5%	11.9%	-	-
	Thailand	1.7%	2.8%	1.3%	6.7%	1.6%	5.2%	2.3%	0.8%	0.7%	-
	Others	13.0%	1.4%	9.3%	5.2%	14.9%	12.7%	3.4%	3.3%	2.1%	-

Note: 841810 - Refrigerators and freezers; combined refrigerator-freezers, fitted with separate external doors, electric or other;
841821 - Refrigerators; for household use, compression-type, electric, or other;
841829 - Refrigerators; household, electric or not, other than compression-type;
841830 - Freezers; of the chest type, not exceeding 800l capacity.
841840 - Freezers; of the upright type, not exceeding 900l capacity.

6.1.2 Air Conditioners (HS 8415)

HS Code	Export Statistics	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Total HS 8415	**Value (US$)**	**745,984**	**806,241**	**488,717**	**1,030,455**	**732,783**	**487,788**	**424,423**	**558,926**	**336,425**	**132,325**
	QTY (Units)	**1,710**	**1,990**	**1,209**	**2,224**	**1,792**	**1,568**	**1,479**	**1,776**	**751**	**151**
HS 841510	Value (US$)	262,463	692,386	420,527	525,056	517,818	444,357	412,486	494,569	304,368	107,854
	QTY (Units)	767	1,768	1,116	2,049	1,727	1,520	1,447	1,595	681	120
HS 841581	Value (US$)	237,690	100,524	47,883	144,241	192,182	17,093	2,280	1,822	18,934	1,863
	QTY (Units)	882	177	82	67	61	12	6	4	20	6
HS 841582	Value (US$)	118,832	11,495	1,712	285,519	22,306	8,579	8,816	40,203	-	21,685
	QTY (Units)	20	39	3	94	4	7	12	61	-	22
HS 841583	Value (US$)	126,999	1,836	18,595	75,639	477	17,759	841	22,332	13,123	923
	QTY (Units)	41	6	8	14	-	29	14	116	50	3
Percentage Breakdown by Country of origin (based on exported value), from 2012-2021											
Country of origin	China	5%	16%	34%	54%	48%	33%	18%	39%	47%	-
	New Zealand	35%	9%	31%	9%	25%	19%	23%	39%	16%	71%
	Australia	17%	-	-	-	1%	-	10%	6%	25%	29%
	Singapore	10%	23%	11%	19%	11%	30%	37%	13%	12%	-
	Fiji	7%	12%	19%	11%	8%	6%	-	2%	-	-
	USA	14%	-	1%	-	-	-	-	-	-	-
	Thailand	-	-	-	7%	5%	-	-	-	-	-
	Others	-	5%	1%	-	-	-	1%	-	-	-

Note: 841510 - Air Conditioning machines; comprising a motor-driven fan and elements for changing the temperature and humidity, of a kind designed to be fixed to a window, wall, ceiling, or floor, self-contained or ''split-system'';

841581 - Air conditioning machines; containing a motor-driven fan, other than window or wall types, incorporating a refrigerating unit and a valve for reversal of the cooling/heat cycle (reversible heat pumps);

841582 - Air conditioning machines; containing a motor-driven fan, other than window or wall types, incorporating a refrigerating unit;

841583 - Air conditioning machines; containing a motor-driven fan, other than window or wall types, not incorporating a refrigerating unit;

845020 - Washing machines household or laundry-type, of a dry linen capacity exceeding 10 kg.

6.1.3 Lighting Products (HS 8539)

HS Code	Export Statistics	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Total	**Value (US$)**	**198,684**	**242,310**	**224,137**	**439,267**	**380,140**	**490,687**	**366,182**	**204,940**	**424,271**	**6,935**
HS 8539	**QTY (Units)**	**153,171**	**136,245**	**143,135**	**368,518**	**243,559**	**256,466**	**306,630**	**231,345**	**56,566**	**43**
HS 853910	Value (US$)	34,190	68,708	77,532	306,514	261,149	285,632	149,083	101,388	43,492	-
Fluorescent lamps	QTY (Units)	35,567	57,276	56,943	333,095	232,703	221,413	171,059	102,726	40,762	-
HS 853939	Value (US$)	15,397	27,076	29,104	7,093	1,009	1,722	49,539	3,465	207,828	-
Discharge excl. FL	QTY (Units)	5,572	5,271	108	2	-	192	25,954	307	887	-
HS 853950	Value (US$)	-	-	-	-	15,746	93,954	69,764	116,814	3,179	-
LED lamps	QTY (Units)	-	-	-	-	-	3,162	40,875	100,869	2,339	-
HS 853929	Value (US$)	114,692	124,984	61,128	50,202	69,158	23,774	28,221	6,951	14,376	100
Filament lamps	QTY (Units)	69,734	67,763	16,946	854	1,055	15,398	17,941	4,787	9,737	12
HS 853932	Value (US$)	7,703	13,596	15,150	5,558	210	126,512	68	4,388	30	-
Mercury Metal halide	QTY (Units)	995	2,800	19,098	559	34	10,825	8	106	12	-
Other lamps	Value (US$)	26,702	7,946	41,223	69,900	48,614	37,301	45,317	18,984	41,731	3,656
(HS 853921, 853922, 853910, 853941)	QTY (Units)	41,303	3,135	50,040	34,008	9,767	5,476	50,793	22,550	2,829	31
Percentage Breakdown by Country of origin (based on exported value), from 2012-2021											
Country of origin	China	21%	23%	34%	83%	81%	84%	80%	80%	32%	-
	New Zealand	59%	44%	22%	1%	4%	7%	5%	6%	10%	92%
	Australia	1%	1%	5%	-	3%	1%	2%	2%	4%	8%
	Fiji	11%	29%	26%	7%	10%	8%	9%	5%	5%	-
	Hong Kong	2%	2%	8%	-	-	-	-	-	-	-
	Others	6%	1%	4%	9%	1%	-	4%	7%	50%	-

Note: 853921 - Lamps; filament (excluding ultra-violet or infra-red), tungsten halogen, 853922 - Lamps; filament (excluding ultra-violet or infra-red), of power, not exceeding 200W and for a voltage exceeding 100 volts, other than tungsten halogen; 853910 - Lamps; sealed beam lamp units; 853941 - Lamps; arc-lamps.

6.1.4 Clothes Washers (HS 8450)

HS Code	Export Statistics	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Total HS 8450	**Value (US$)**	**143,363**	**243,172**	**155,942**	**17,328**	**31,895**	**280,428**	**171,188**	**234,096**	**189,822**	**77,083**
	QTY (Units)	**551**	**1,070**	**582**	**94**	**43**	**748**	**467**	**897**	**567**	**183**
HS 845011	Value (US$)	100,857	101,226	28,204	-	-	149,954	85,453	180,286	126,123	76,433
	QTY (Units)	263	417	492			587	246	713	465	182
HS 845012	Value (US$)	3,783	46,344	18,355	3,740	2,198	14,921	13,608	26,732	42,763	-
	QTY (Units)	19	150	42	68	16	36	38	136	66	-
HS 845019	Value (US$)	38,723	90,565	45,030	8,859	16,001	52,498	31,662	14,389	4,682	650
	QTY (Units)	269	494	33	13	26	113	131	40	20	1
HS 845020	Value (US$)	-	5,037	64,353	4,729	13,696	63,055	40,465	12,689	16,254	-
	QTY (Units)	-	9	15	13	1	12	52	8	16	-
Percentage Breakdown by Country of origin (based on exported value), from 2012-2021											
Country of origin	China	-	5%	10%	22%	19%	26%	21%	16%	60%	-
	New Zealand	29%	21%	10%	-	-	36%	26%	60%	13%	99%
	Australia	34%	13%	44%	66%	32%	19%	16%	14%	14%	1%
	Fiji	27%	38%	32%	11%	11%	4%	2%		--	-
	Thailand	6%	6%	-	1%	0%	5%	15%	9%	11%	-
	Singapore	1%	15%	2%	-	6%	6%	20%	1%	1%	-
	Others	3%	2%	2%	-	31%	4%	-	-	2%	-

Note: 845011 - Washing machines household or laundry-type, fully automatic, (of a dry linen capacity not exceeding 10 kg);
845012 - Washing machines household or laundry-type, with built-in centrifugal drier, (not fully automatic), of a dry capacity not exceeding 10 kg)
845019 - Washing machines household or laundry-type, not fully automatic, without built-in centrifugal drier, of a dry capacity not exceeding 10 kg);
845020 - Washing machines household or laundry-type, of a dry linen capacity exceeding 10 kg.

6.1.5 Televisions (HS 85287)

HS Code	Export Statistics	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Total HS 85287	**Value (US$)**	**145,979**	**215,142**	**266,560**	**478,143**	**429,429**	**309,693**	**799,071**	**847,100**	**742,314**	**192,486**
	QTY (Units)	**325**	**914**	**2,290**	**2,744**	**1,589**	**1,042**	**6,859**	**8,578**	**1,977**	**332**
HS 852871	Value (US$)	-	-	-	-	-	8,667	27,298	37,131	142,115	-
	QTY (Units)	-		--	-	-	128	646	270	407	-
HS 852872	Value (US$)	145,979	215,142	266,560	478,143	429,429	301,026	768,370	805,809	600,199	192,486
	QTY (Units)	325	914	2,290	2,744	1,589	914	6,212	8,306	1,570	332
HS 852873	Value (US$)	-	-	-	-	-	-	3,403	4,160	-	-
	QTY (Units)	-	-	-	-	-	-	1	2	-	-
Percentage Breakdown by Country of origin (based on exported value), from 2012-2021											
Country of origin	China	-	8%	25%	33%	33%	52%	51%	72%	50%	-
	New Zealand	22%	51%	56%	56%	31%	19%	18%	17%	30%	85%
	Australia	4%	9%	2%	-	1%	6%	2%	2%	1%	15%
	Singapore	70%	24%	15%	8%	28%	15%	26%	7%	18%	-
	Fiji	4%	6%	-	1%	3%	3%	-	-	-	-
	Others	1%	4%	2%	2%	3%	5%	2%	1%	-	1%

Note: 852871 - Reception apparatus for television, whether or not incorporating radio-broadcast receivers or sound or video recording or reproducing apparatus; not designed to incorporate a video display screen;

852872 - Reception apparatus for television, whether or not incorporating radio-broadcast receivers or sound or video recording or reproducing apparatus; incorporating a colour video display or screen;

852873 - Reception apparatus for television, whether or not incorporating radio-broadcast receivers or sound or video recording or reproducing apparatus; incorporating a monochrome video display or screen.

6.2 Annex B – Estimation of Appliance Stocks

Estimated Electrified Household	Appliances		Penetration Rate (%) 2017			%Share by type[2]	Stocks (2017)	% Estimated Saturation [1]
			One unit	Two unit	Three or more			
17,742	Refrigerators and Freezers	Combined refrigerators & freezers)	68.9%	8.3%	2.9%	64.8%	10,792	61%
		Refrigerators				35.2%	5,862	33%
		Freezer	47.6%	6.8%	1.0%		11,350	64%
	Air Conditioners	Split system	21.4%	6.8%	2.9%	83%	6,412	36%
		Window				8%	618	3%
	Clothes Washer		50.5%	3.4%	-	-	10,130	57%
	Televisions		70.4%	7.8%	1.5%	-	16,000	90%
	Lighting Products [3]	Incandescent	13.6%			4.5x12%	9,581	54%
		Linear Fluorescent	69.4%			4.5x39%	31,138	176%
		CFL	77.7%			4.5x46%	36,726	207%
		LED & Other	14.6%			4.5x3%	2,395	14%

Note [1] Estimated Saturation of household is calculated based on the estimated electrified household multiplied by % Appliance penetration rate in 2017 and % Share by type.

[2] Percentage of ownership share by types based on the survey conducted by IIEC in 2013

[3] For lighting products, % share by type is based on the findings from the survey conducted in 2013, the lighting lamps in the household on average is 4.5 lamps per household. Of the 4.5 lamps per household, 46% were Compact Fluorescent, 39% were linear Fluorescent, 12% were Incandescent, and about 3% were LED and other types. Calculation of lighting stocks is estimated by using %share by type, multiplied with the total number of electrified household.

6.3 Annex C – Household Survey

6.3.1 Household Survey Findings

Nearly all surveyed households usually pay their electricity bills by cash (see Figure 6-1). More than half of them spend 2-4% of their monthly income on electricity. The average percentage of monthly income spent on electricity bills varies with the tariff block of electricity consumption i.e., the higher the electricity tariff block, the higher percentage of monthly salary spent on electricity bills (see Figure 6-2).

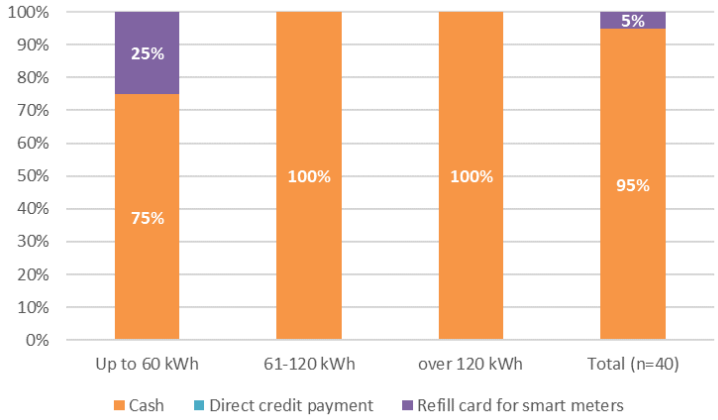


Figure 6-1: Electricity Bill Payment Method

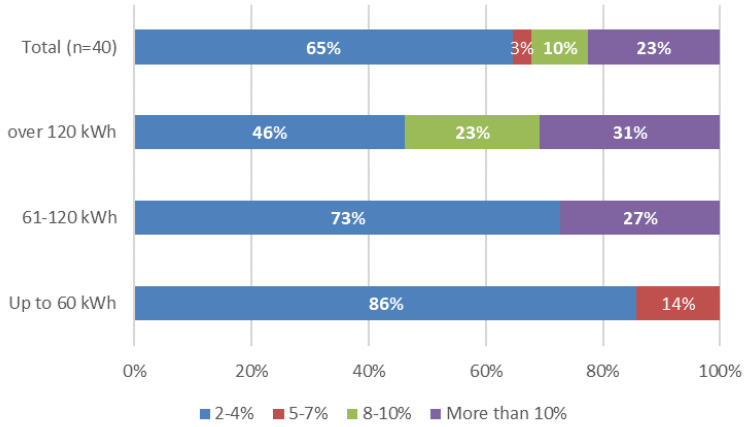


Figure 6-2: Average Percentage of Monthly Income Spent on Electricity

On average, 65% of participating households, the main income earners are males, with about 18% of women carrying their families financially and 18% belonging to men and women in dual-earner families (see Figure 6-3). The incomes of households are mostly headed by adults with secondary education, aged between 30-39 years old (see Figure 6-4).

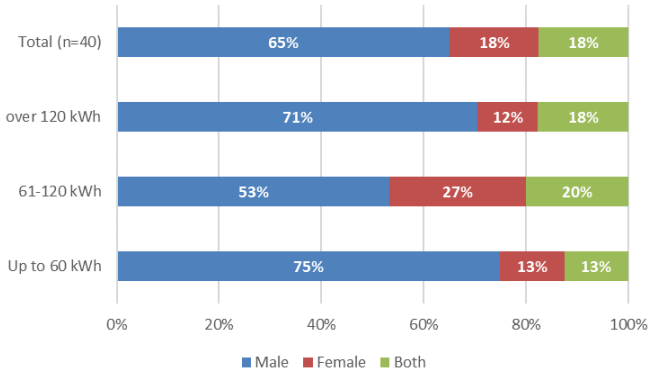


Figure 6-3: Gender of Household Head/Main Income Earner

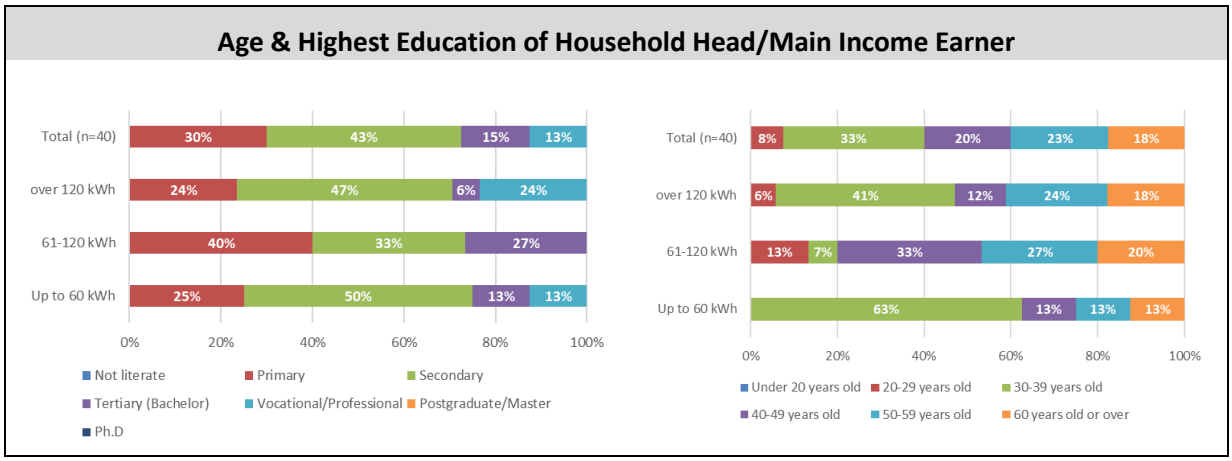


Figure 6-4: Age & Highest Education of Household Head/Main Income Earner

Most households (82%) reported that they acquire their appliances from a modern trade store (see Figure 6-5) due to price and product warranty. While some households (18%) buy appliances from traditional stores because of their pricing flexibility (see Figure 6-6). Major appliances that are purchased at traditional stores are lighting products.

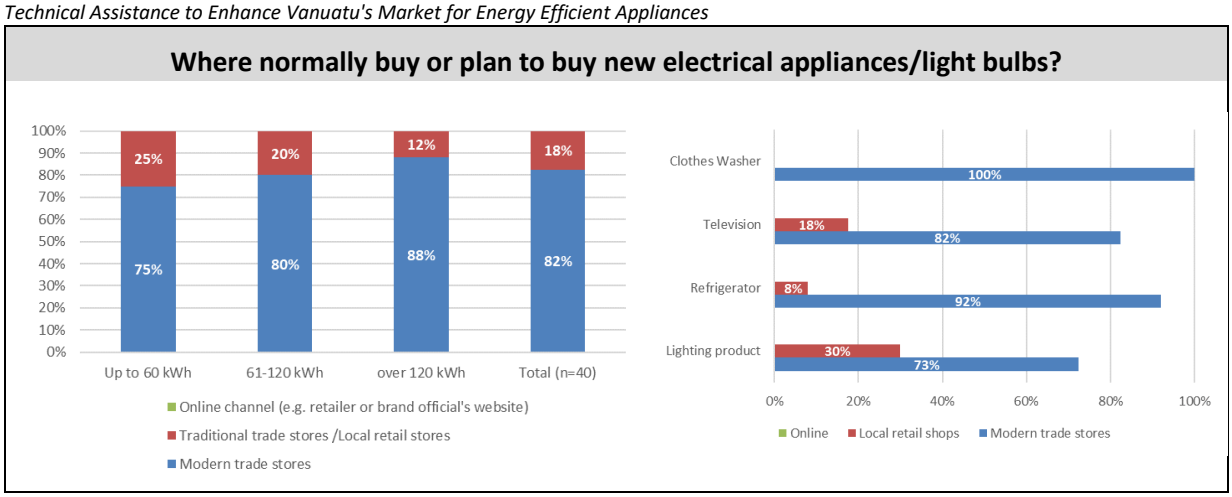


Figure 6-5: Where Normally to Buy New Electrical Appliances/Light Bulbs

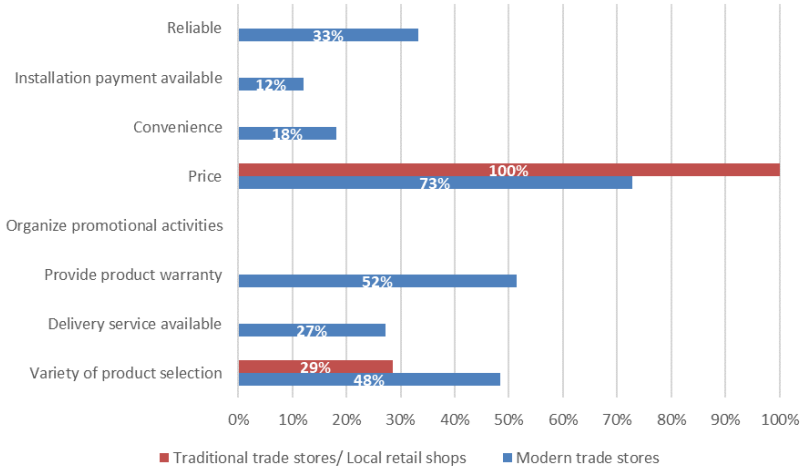


Figure 6-6: New Appliance Purchasing Reasons by Channel

Word of mouth and *in-store media* e.g., brochures and advertising on product shelves are the most informative and communication tools that influence their buying decisions on electrical appliances/light bulbs (see Figure 6-7).

What kind of media advertisement makes an impact on your household's purchase decision on electrical appliances/Light bulbs?

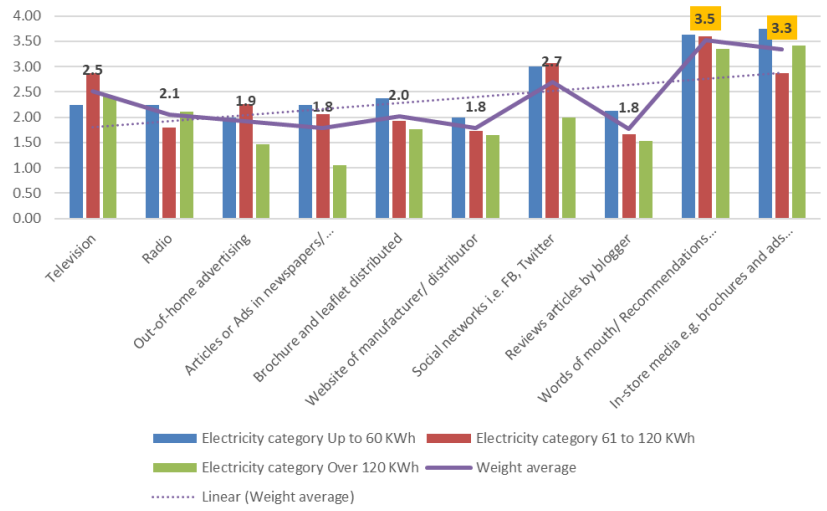


Figure 6-7: Influence of Media Advertisement on Household's Purchase Decisions on Electrical Appliances/Light bulbs

The most important factors influencing a household's choice of purchase of new electrical appliances include *price*, *brand, recommendation from family/friends,* and *retail salespeople*. Choice of payment methods and financing such as using bank's credit cards, 0% interest installment and availability of trade-in service (e.g., trade old AC in when purchasing a new one) do not affect much on their purchase decision (see Figure 6-8).

What are your drivers of choice when buying new electrical appliances?

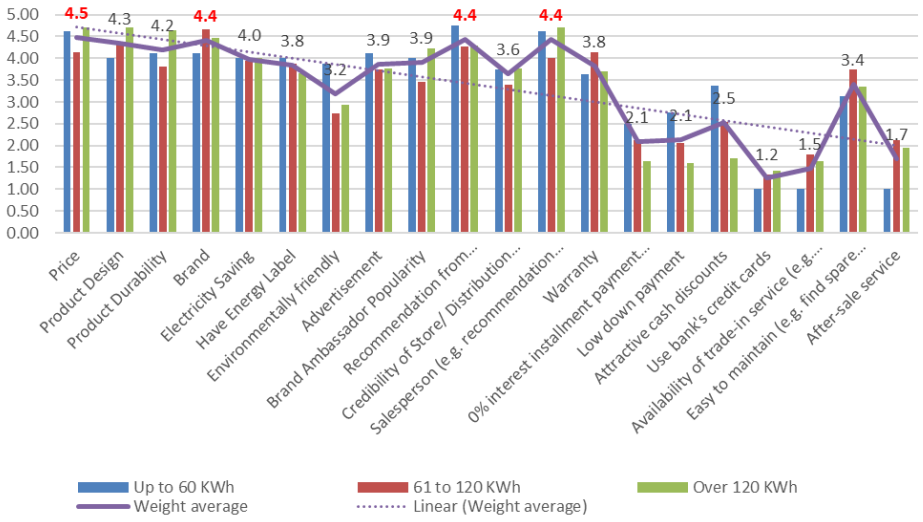


Figure 6-8: Drivers of Choice when Buying New Electrical Appliances

Payments for appliance purchases were mostly made by cash and only 5-8% of the surveyed households used hire purchase and installment payment methods (see Figure 6-9). 85% of households prefer to use cash when purchasing new appliances, only 10% chose the installment option and 5% for hire purchase (see Figure 6-10).

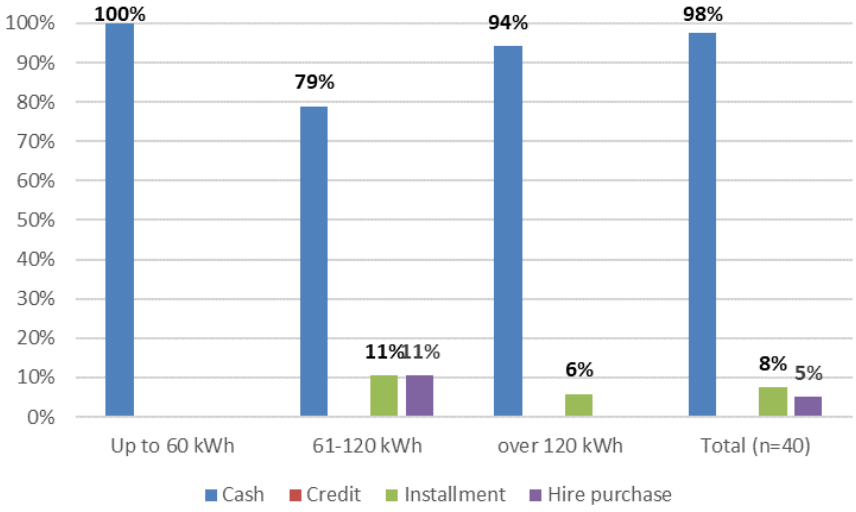


Figure 6-9: Payment Method Used When Purchasing Appliances

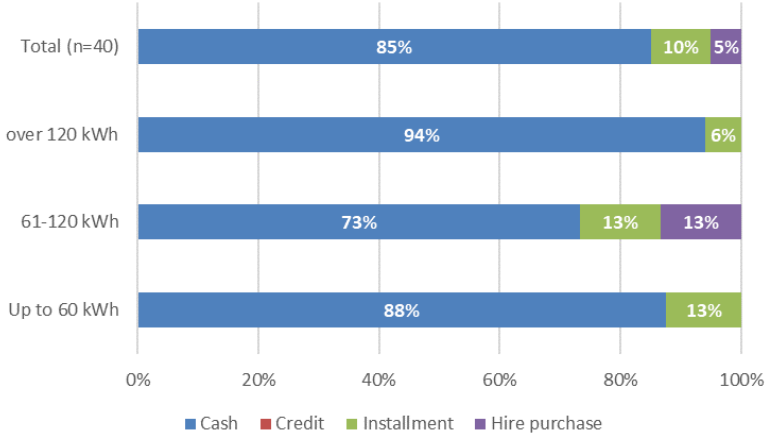


Figure 6-10: Preference of Payment Method When Purchasing New Appliances

More than half (60%) of respondents said they are willing to pay more for an appliance if guarantee on energy savings are provided. Higher tariff block of electricity consumption households seems to be correlated with higher willingness to pay for guaranteed savings (see Figure 6-11). Around half of households accept to pay up to 5% more for guaranteed savings (see Figure 6-12).

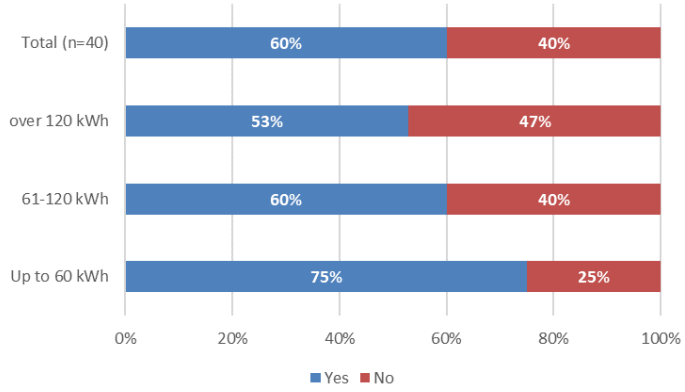


Figure 6-11: Whether to Pay More Money for an Appliance if Guarantees Energy Savings

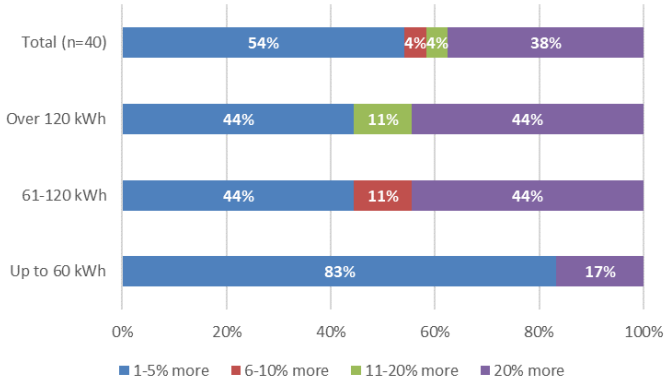


Figure 6-12: Percentage of Willingness to Pay More for Guaranteed Savings

Awareness of Energy Label

The household respondents were asked whether they are aware of the Energy Label (AS/NZS Label), 63% of respondents answered "Yes".

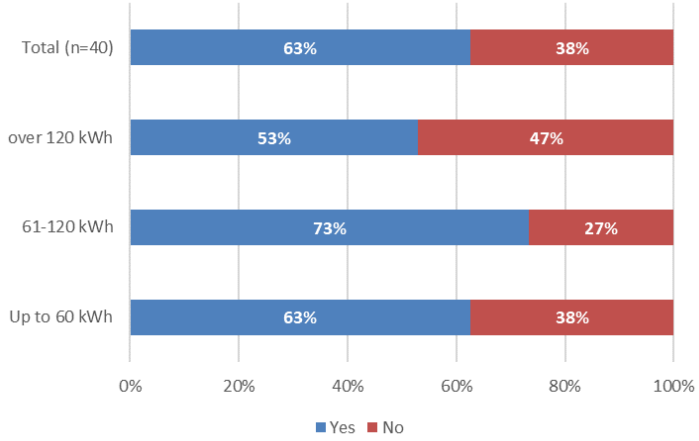


Figure 6-13: Awareness of AS/NZS Energy Label

On average, the majority of the respondents saw the energy labels from retail store/showroom (44%) and social media (40%). Most households under tariff block of up to 60 kWh saw labels through retail sotres, households under 61-120 kWh tariff block saw them mostly through social media; while households consuming electricity over 120 kWh recognized enerby labels from televisions and retail stores (see Figure 6-14).

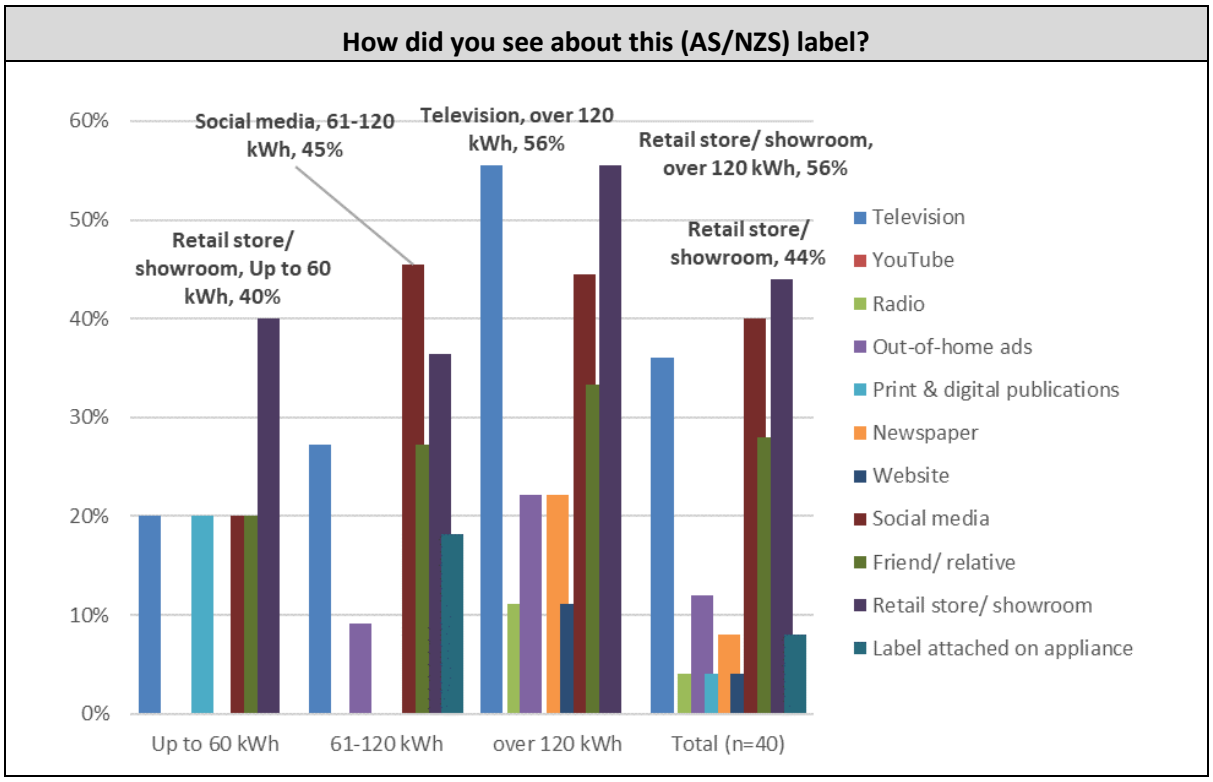


Figure 6-14: Source of Recognition of AS/NZS Label

Among those who are aware of energy labels, almost all of them (88%) pay attention to the energy labels when they buy an electrical appliance (see Figure 6-15).

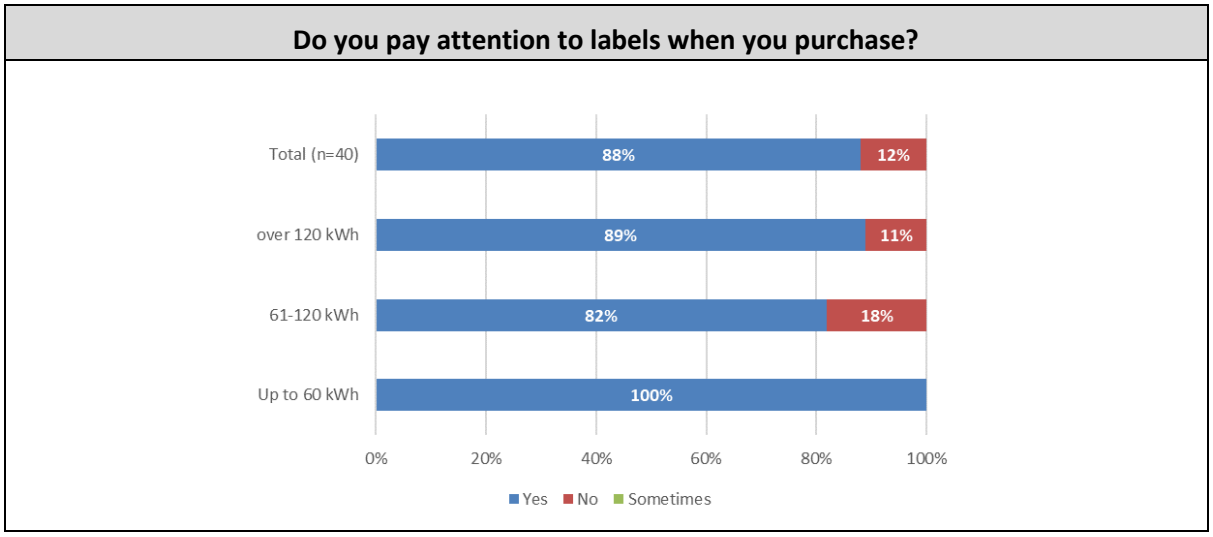


Figure 6-15: Whether Energy Labels Affecting Purchasing Decisions

The findings reveal that in general the energy label is positively perceived by household respondents. When being asked how they perceive the value of the energy Label, 96% of respondents agreed that energy label helps them in the purchase of energy- efficient products and they are likely to pay more money for a labeled product (92% Strongly agree, and 4% Somewhat agree). Most respondents agree that the energy label helps to guarantee the quality of appliance (92% Strongly agree, and 4% Somewhat agree). However, 83% of respondents feel that affixing energy label to the product can make the price more expensive (79% Strongly agree, and 4% Somewhat agree) (see Figure 6-16).

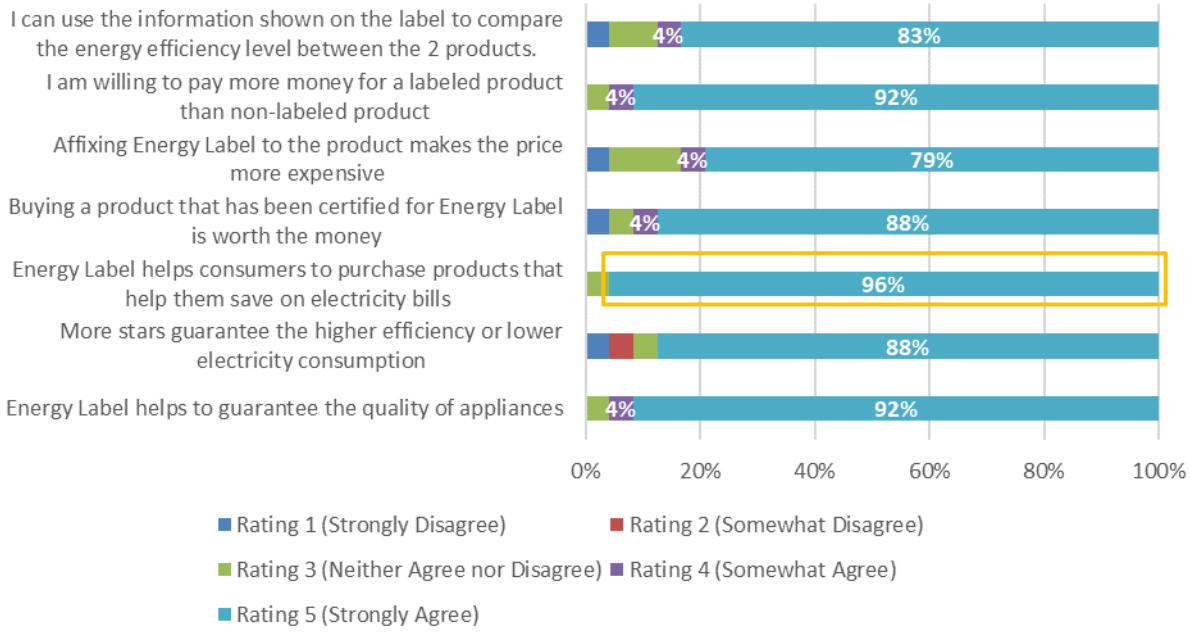


Figure 6-16: Understanding and Use of Energy Labels

Household respondents were asked to rate on a 5-point scale for those who answered that they did not pay attention to energy labels when they purchased. The majority of respondents (83%) expressed that they can only buy what they can afford. 67% of them feel that energy label makes products more expensive and 63% say that more powerful (or larger capacity) appliances can be bought at the same price (37% Strongly agree; and 26% Somewhat agree). More than half of respondents (67%) do not care about the electricity charges (50% Strongly disagree, and 17% Somewhat disagree) (see Figure 24).

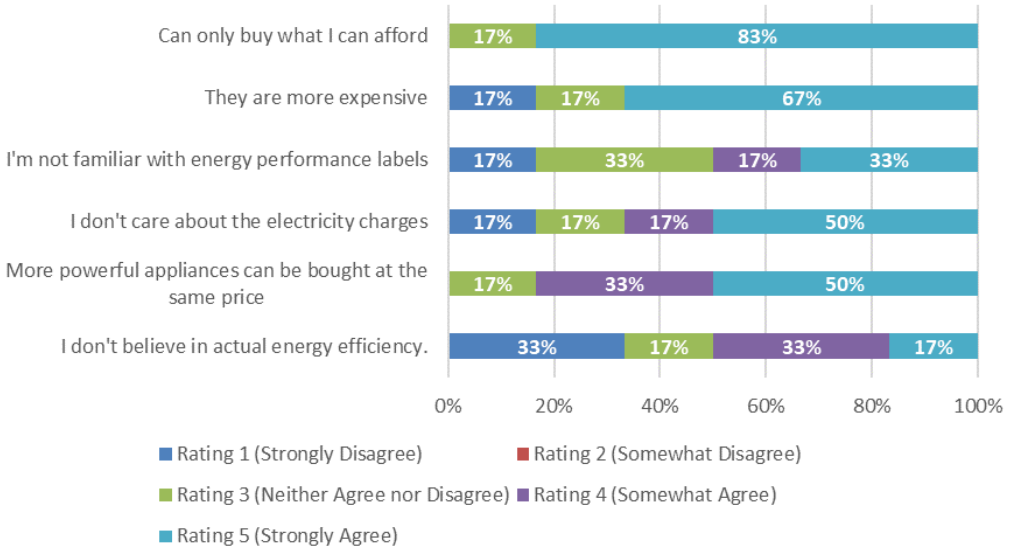


Figure 6-17: Reasons for Not Paying Attention to Energy Label

Penetration Rate and Usage of Lighting & Home Appliances

Lighting

Among the surveyed households, LED bulbs (43%), CFL bulbs (17%) and fluorescent short tube lamps – T12 (17%) combined account for the largest share at 77%. None of the households own an incandescent light (see Figure 57). The most common types of light bulbs used in homes are 5 to 10, and 36 watts for LED bulbs; 18 and 36 watts for fluorescent tubes; and vary from 5-7 watts, 10, 15, 20, 24, 45, and 60 watts for CFL bulbs.

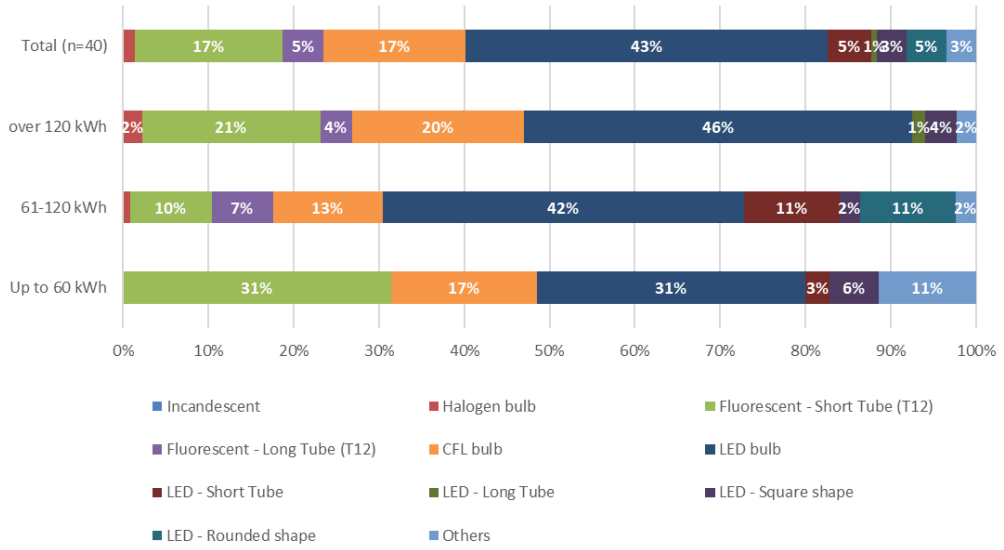


Figure 6-18: Penetration Rate of Lighting

For fluorescent tube lamps, each household owns an average of 3 units, with a penetration rate of approximately 40-62%, as shown in Figure 6-19Figure 6-19.

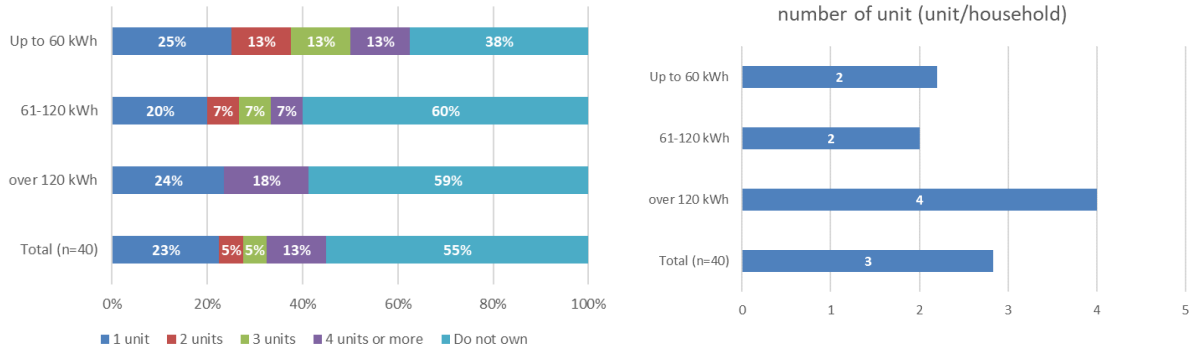


Figure 6-19: Penetration Rate of Fluorescent Tube Lamps

For LED lamps, each household owns an average of 4 units, with a high penetration rate varying between 62-80%, as shown in Figure 6-20.

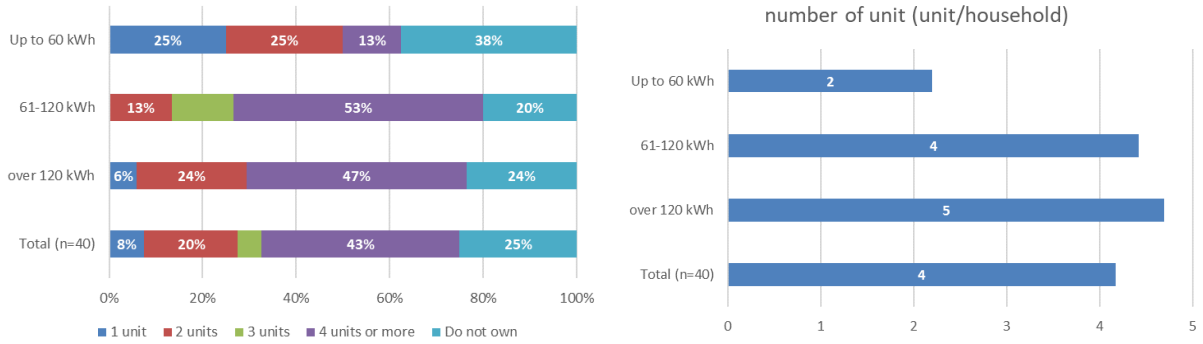


Figure 6-20: Penetration Rate of LED Lamps

For CFLs, each household owns an average of 3 units, with penetration rate varying between 27-65%, as shown in Figure 6-21Figure 6-21.

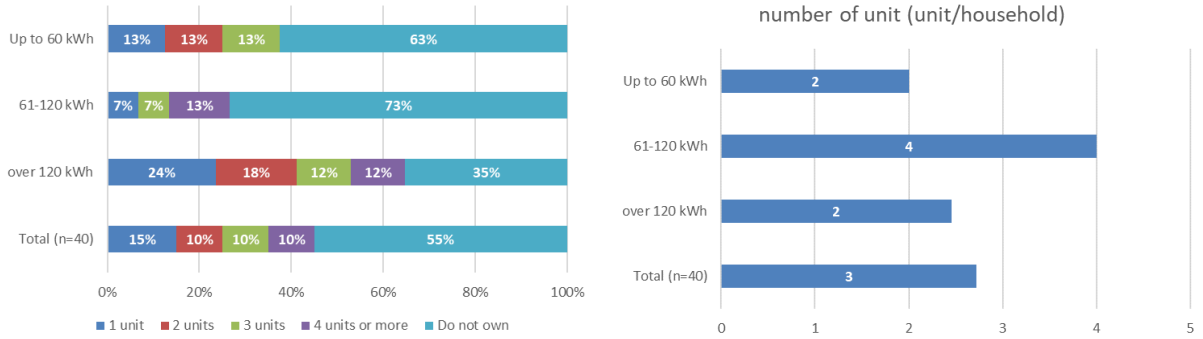


Figure 6-21: Penetration Rate of CFLs

Refrigerators/Refrigerator-freezers

The penetration rate for refrigerators is around 53% of the total of surveyed households, as shown in Figure 6-22. For those owning refrigerators, the ownership rate is one refrigerator per household (Figure 6-23).

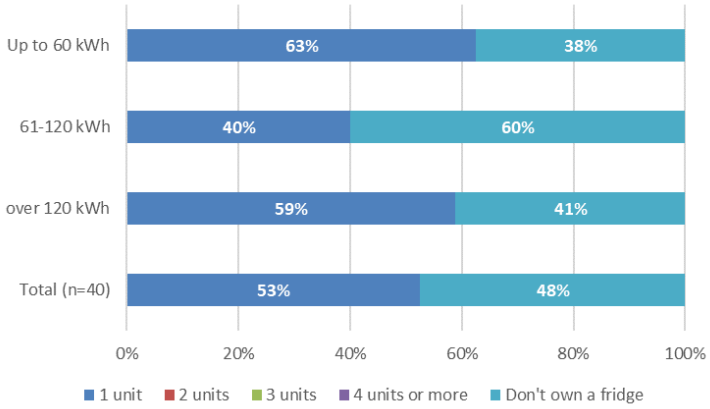


Figure 6-22: Penetration Rate of Refrigerators

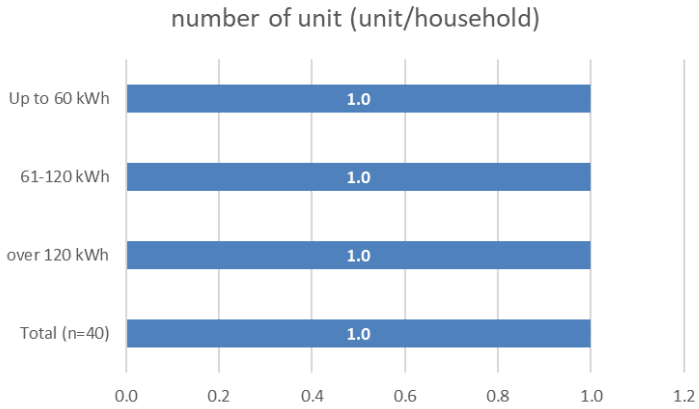


Figure 6-23: Number of Refrigerators per Household

Bottom freezer fridge is the most popular type among the surveyed households owning a refrigerator and/or refrigerator-freezer (see Figure 6-24).

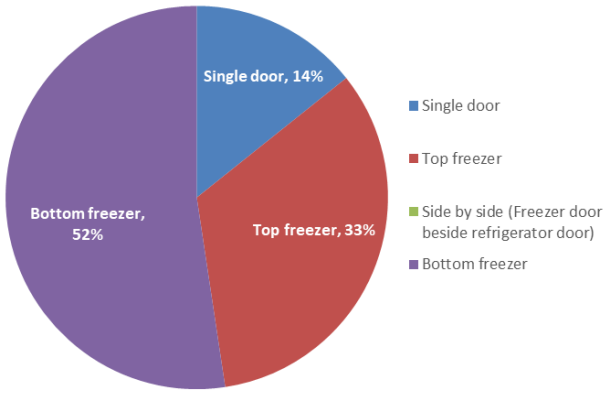


Figure 6-24: Penetration Rate of Refrigerator Type

Most of the refrigerators were newly purchased from local suppliers, with automatic defrost models (90%) being dominant and includes several brands such as, Fortex, Midea, Samsung, Panasonic, Fisher & Paykel, and KEG (see Figure 6-25).

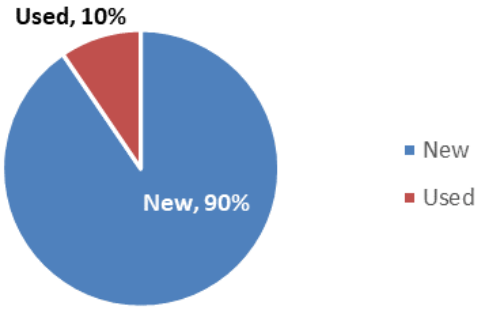


Figure 6-25: Buying New VS Used Refrigerators

Concerning years of purchase for the refrigerator, most of them have been used for around 2-5 years in all households (24-33%), as shown in Figure 6-26. Only 19% of households have a plan to buy a new one (see Figure 6-27).

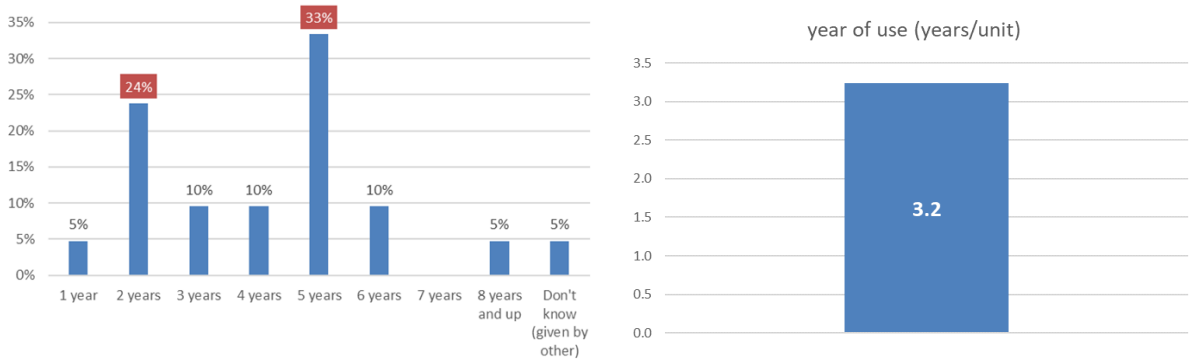


Figure 6-26: Years of Use of Primary Refrigerator Unit

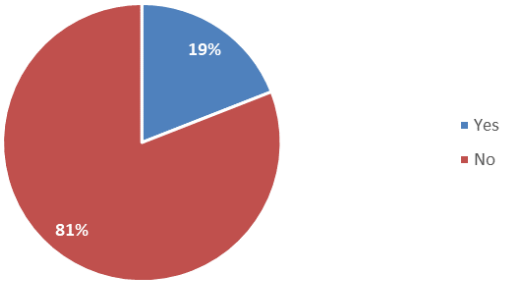


Figure 6-27: Plan to Replace

Besides, as shown in Figure 6-28, the most common storage volume of the refrigerator unit ranges from 151 to 300 Litres.

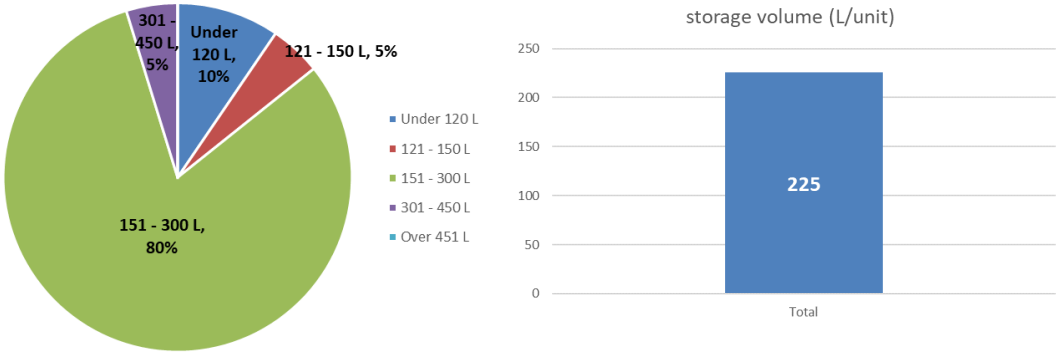


Figure 6-28: Storage Volume of Refrigerator Unit

The penetration rate of energy-efficient models of the primary unit is shown in Figure 6-29. For all surveyed households, around 67% of the models have energy labels, in which most of them carry the European Union (EU) energy labels.

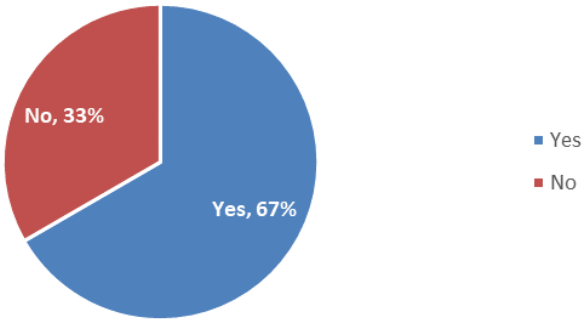


Figure 6-29: Penetration Rate of Refrigerator Unit with Energy Label

Freezers

The penetration rate for freezers is around 43% of the total of surveyed households, as shown in Figure 6-30. For those owning freezers, the ownership rate is one freezer per household (Figure 6-31).

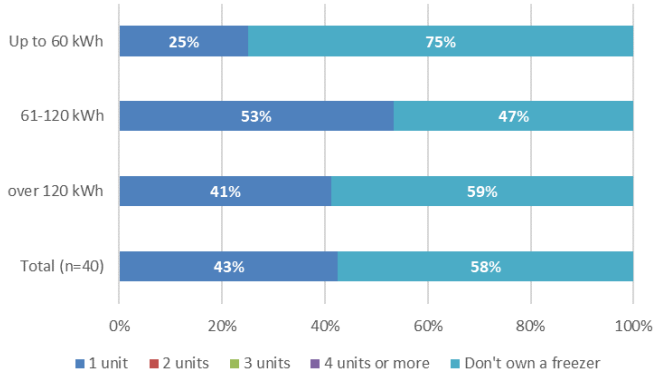


Figure 6-30: Penetration Rate of Freezers

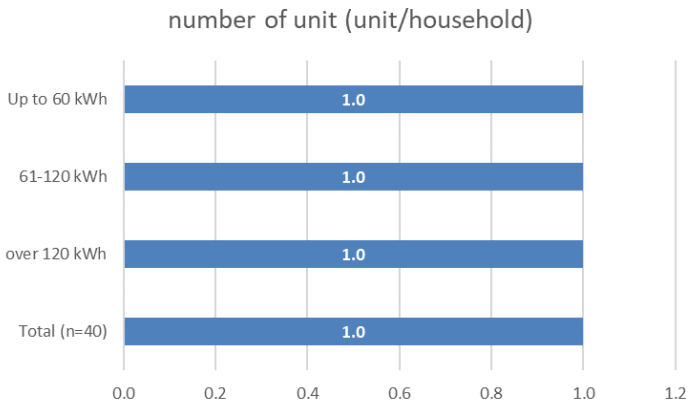


Figure 6-31: Number of Freezers per Household

Chest freezer is the most common used type among freezer-owning households (see Figure 6-32).

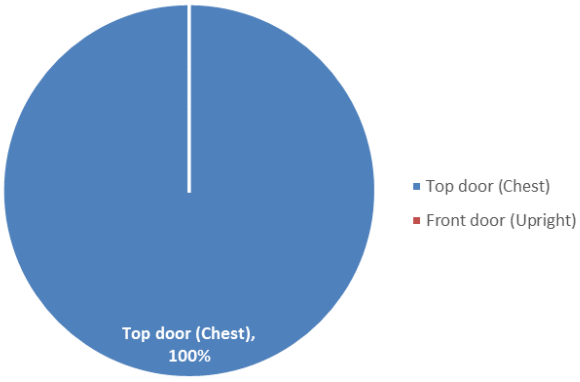


Figure 6-32: Penetration Rate of Freezer Type

As stated above, all surveyed freezers were chest type. 94% of them were newly purchased from local suppliers, with automatic defrost function (88%). Brands include Midea, Fortex, Haier, Fisher & Paykel, Natec, Comfee, Hellev and Westinghouse (see Figure 6-33).

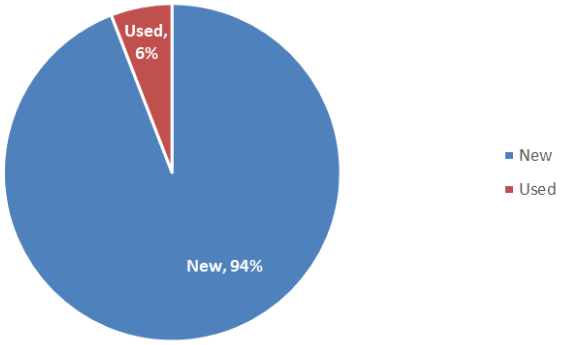


Figure 6-33: Buying New VS Used Freezers

According to years of usage for the freezers, most of them have been used from 1-6 years, as shown in Figure 6-34. None of them have a plan to replace with a new one (see Figure 6-35).

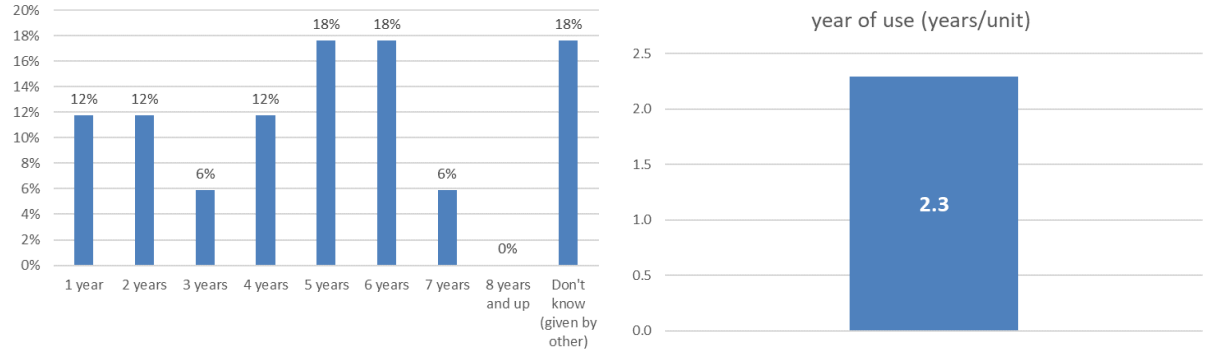


Figure 6-34: Years of Use of Primary Freezer Unit

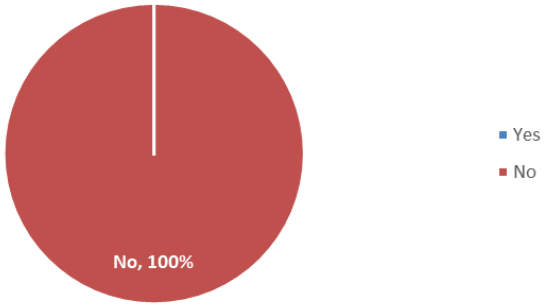


Figure 6-35: Plan to Replace

As shown in Figure 6-36, same as for refrigerator unit, the most common storage volume of the freezer unit ranges from 151 to 300 Litres.

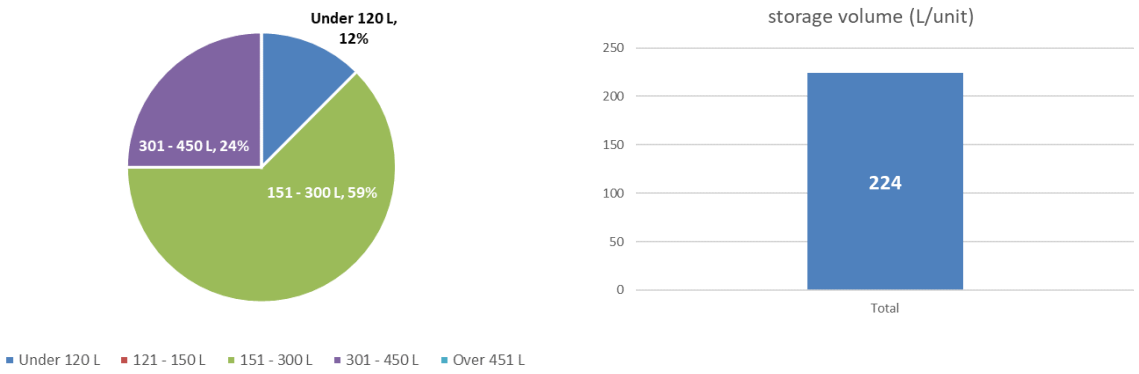


Figure 6-36: Storage Volume of Freezer Unit

The penetration rate of energy-efficient models of the freezer unit is shown in Figure 6-37. For all surveyed households, around half of the models have energy labels, in which they carry various energy labels such as AS/NZS, China, and EU.

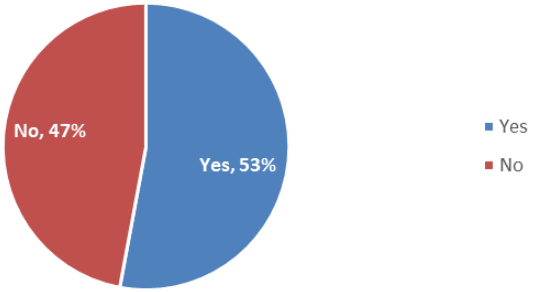


Figure 6-37: Penetration Rate of Freezer Unit with Energy Label

Televisions

The average rate of penetration for flat TV sets in all surveyed households is around 85%. The ownership under 61-120 kWh tariff block have a high penetration rate, with 93% of households owning a TV, as shown in Figure 6-38. Of those households owning flat TV sets in all tariff blocks, each household owns an average of 1 TV set, as shown in Figure 6-39.

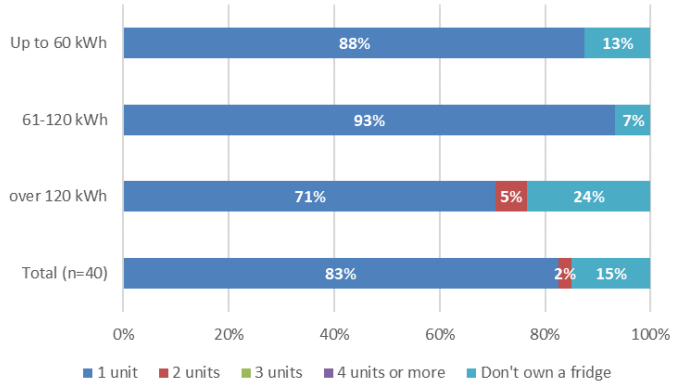


Figure 6-38: Penetration Rate of TV Sets

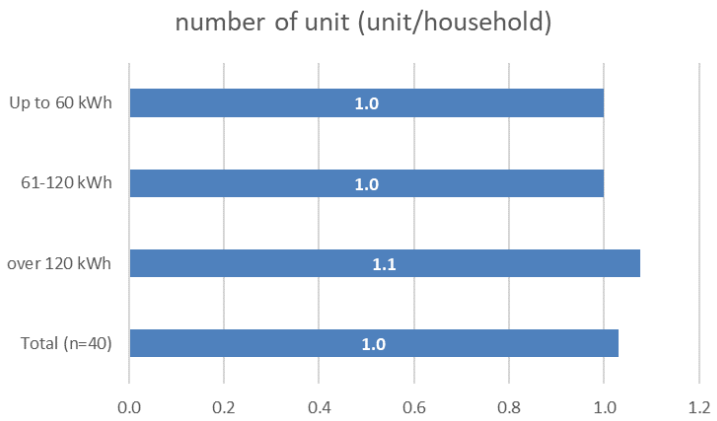


Figure 6-39: Number of TVs per Household

Around 86% of all surveyed TVs were newly purchased. Brands vary from Korean, Japanese and China such as Samsung, Panasonic, Sharp, LG, Sony, Hisense, JVC, Aiwa, HDMI and TCL (see Figure 6-40).

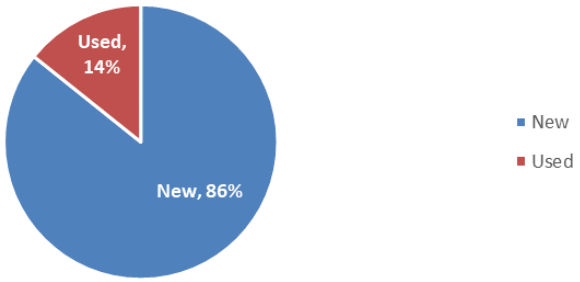


Figure 6-40: Buying New VS Used Televisions

Daily usage hours of television on weekdays during school days is about 3.4 and 4.3 hours during school holidays. While, on weekends , the usage is on average of 3.1 hours on Saturdays and 2.5 hours on Sundays, as shown in Figure 6-41. Around 88% of respondents said that they leave TVs plugged in all the time (Figure 6-42).

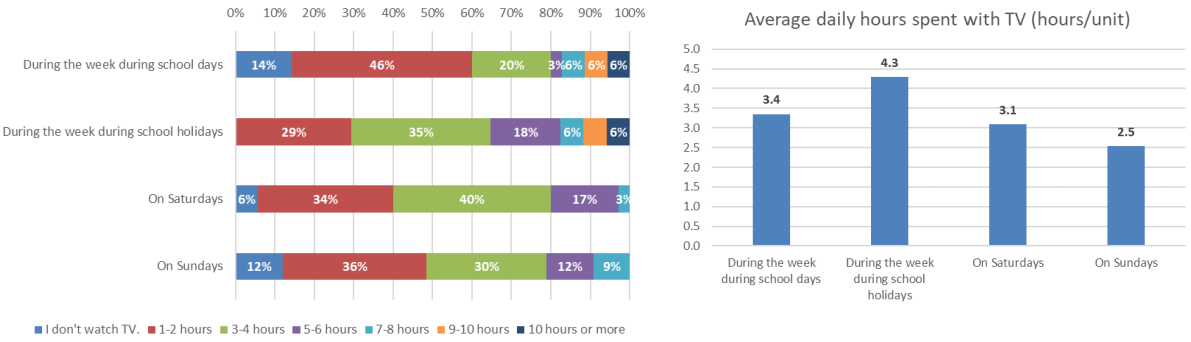


Figure 6-41: Daily Usage Hours of TV Unit

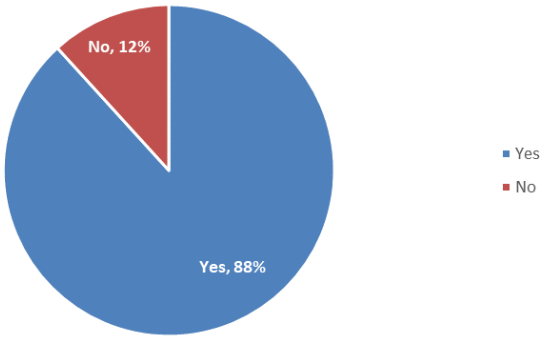


Figure 6-42: Whether to Leave TV Plugged in All the Time

As for years of use for the TV unit, one third of all models have been used for 3-4 years, with an average usage of 2.3 years, as shown in Figure 6-43. 18% of respondents said they plan to buy a new one.

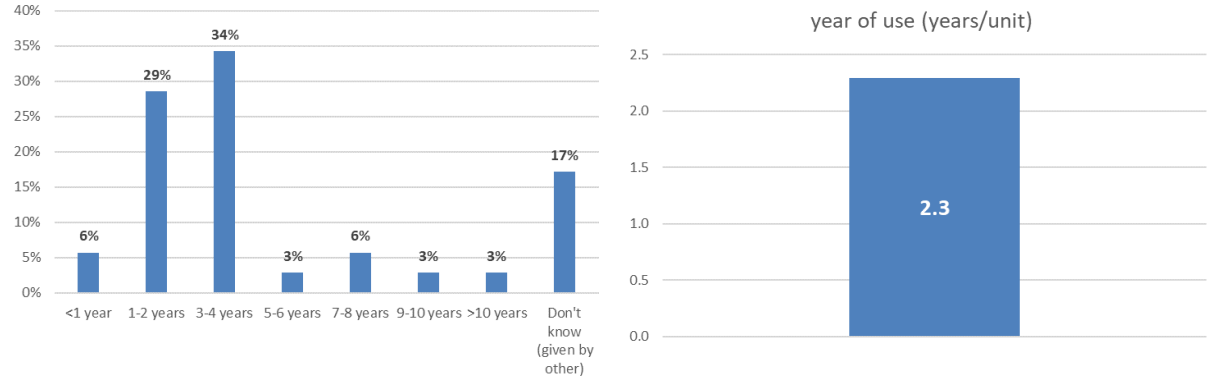


Figure 6-43: Years of Use of TV Unit

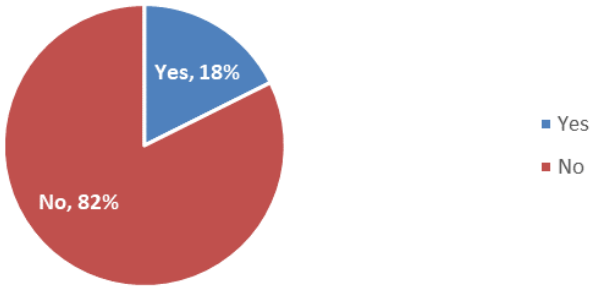


Figure 6-44: Plan to Replace

The most popular screen size of the TV unit ranges from lower than 20 to 32 inches (76%) (see Figure 6-45).

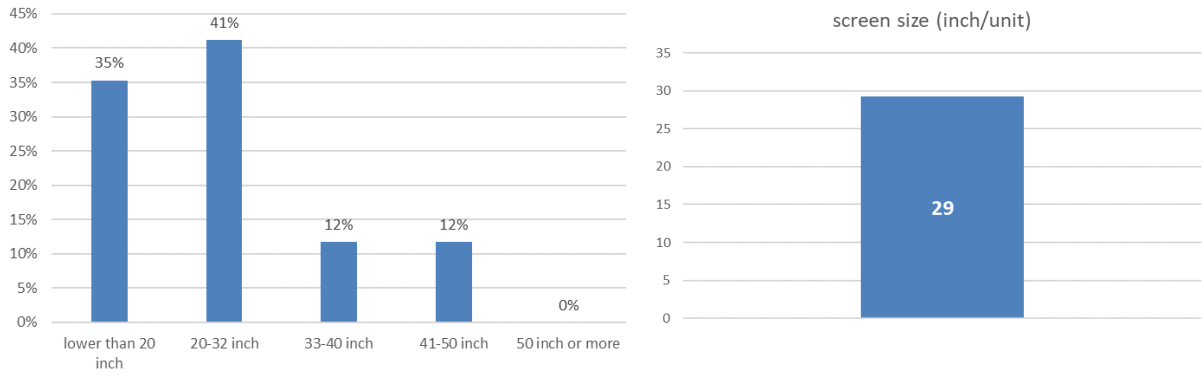


Figure 6-45: Screen Size of TV Unit

The penetration rate of energy-efficient models of TV units is shown in Figure 6-46. The share of models with energy label is 21%.

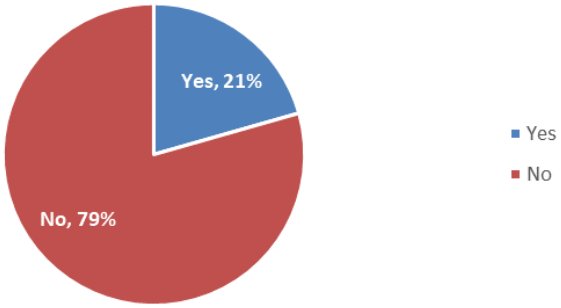


Figure 6-46: Penetration Rate of TV Unit with Energy Label

Clothes Washers

Top-loaded twin tub and top loaded single tub washing machines are the most common types among the surveyed households owning washing machines, with a combined share of 100% (see Figure 6-47).

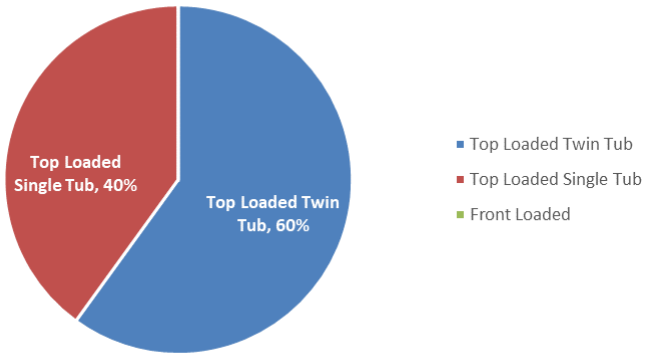


Figure 6-47: Penetration Rate of Clothes Washer Type

The household penetration rate for clothes washers accounts for 25% of the total of surveyed households, as shown in Figure 6-48. Among those households owning clothes washers, the average ownership rate is 1 unit per household, as shown in Figure 6-49.

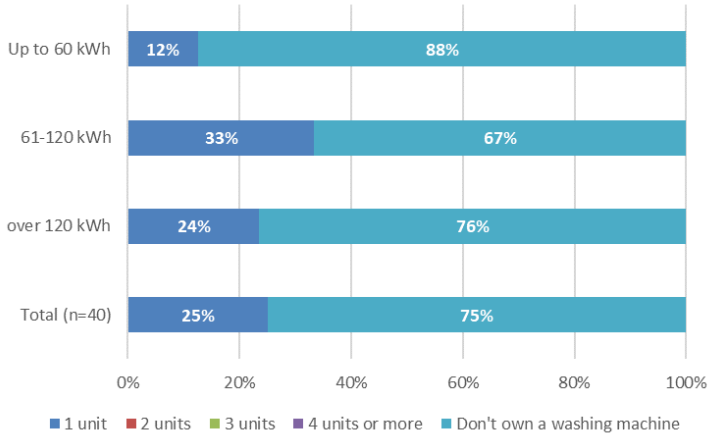


Figure 6-48: Penetration Rate of Clothes Washer

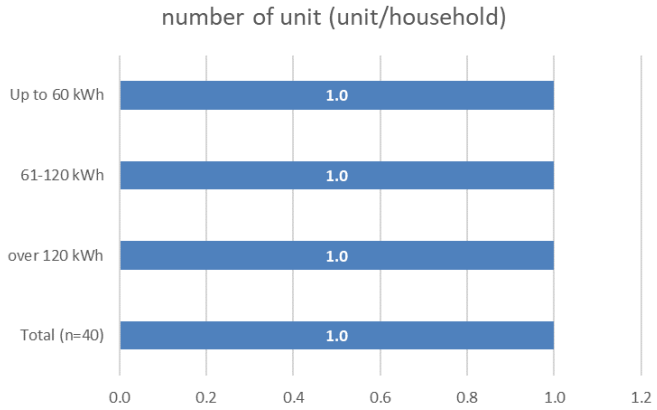


Figure 6-49: Number of Clothes Washer per Household

All surveyed clothes washer units were newly purchased. Brands include Samsung, Whirpool, TCL and Sun Pacific (see Figure 6-50).

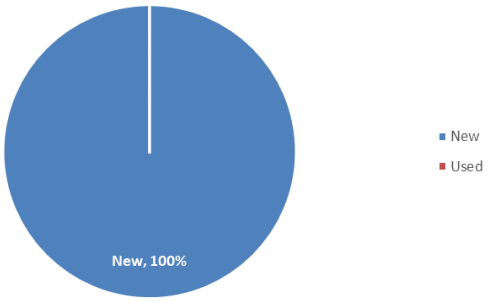


Figure 6-50: Buying New VS Used Clothes Washers

Each clothes washer is used around 2.7 hours per week on average (Figure 6-51).

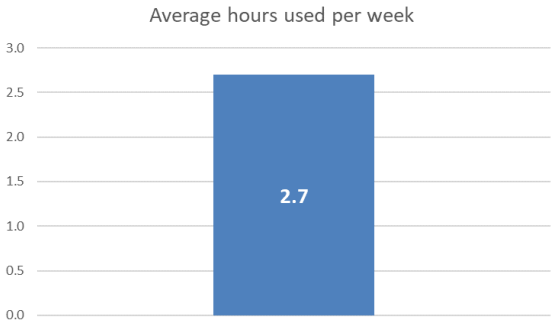


Figure 6-51: Time Used of Clothes Washers

As for years of use for the clothes washer, those purchased in 2018-2020 account for around half of all surveyed washing machines, as shown in Figure 6-52. Most of respondents have no plans to purchase a new unit in the near future (Figure 6-53).

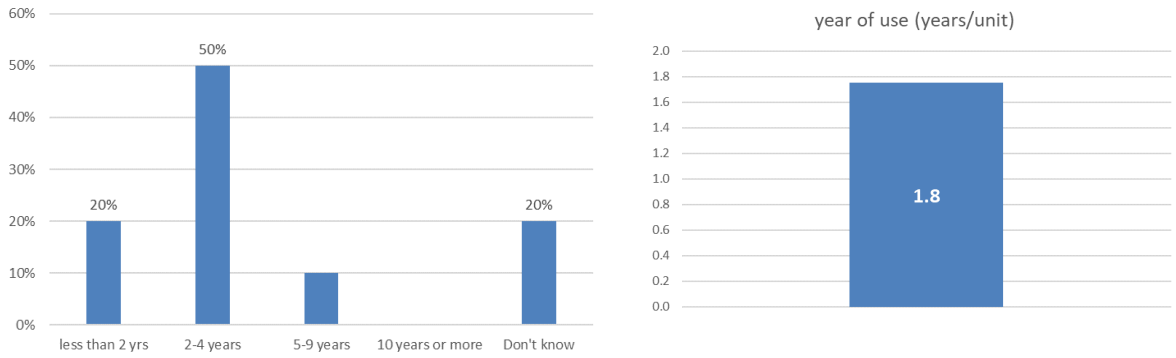


Figure 6-52: Years of Use of Clothes Washer Unit

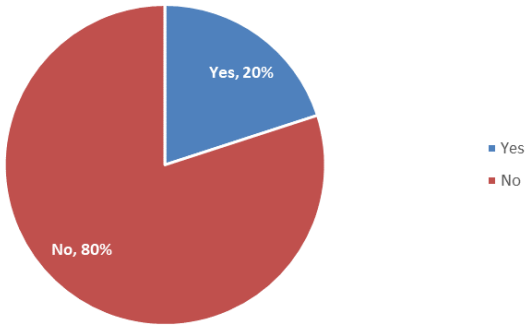


Figure 6-53: Plan to Replace

In addition, as shown in Figure 6-54, the most popular sizes of the clothes washer unit are between 8 and 8.5 kg.

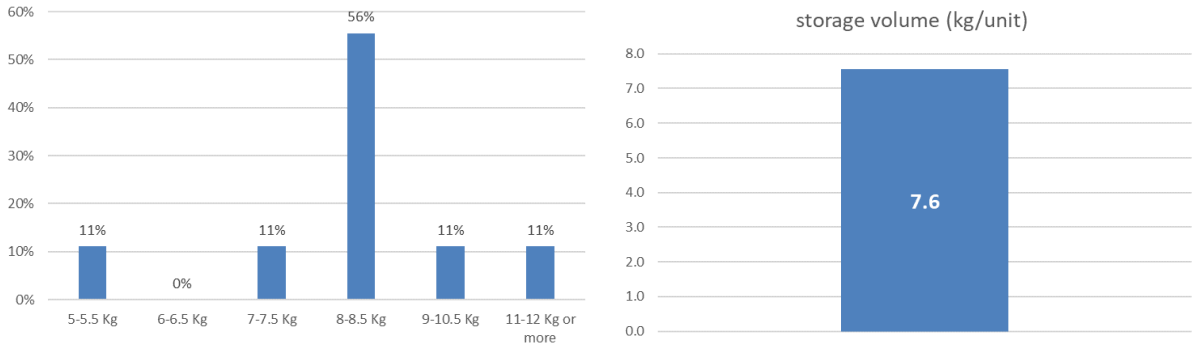


Figure 6-54: Capacity of Clothes Washer Unit

The penetration rate of energy-efficient models of the clothes washer unit is shown in Figure 6-55. Half of the models have the energy label (56%).

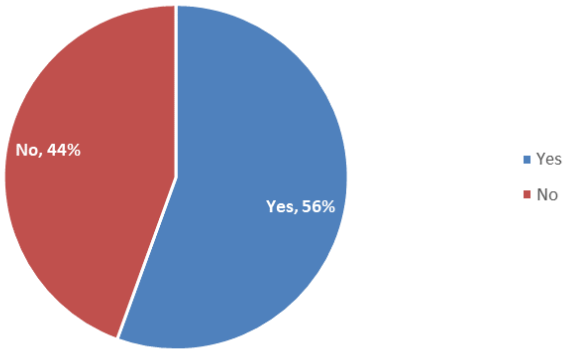


Figure 6-55: Penetration Rate of Clothes Washer Unit with Energy Label

6.3.2 Household Survey Questionnaire

ID:

Electricity Category: ☐ up to 60 kWh ☐ 61 to 120 kWh ☐ over 120 kWh

QUESTIONNAIRE

Enhance Vanuatu's Market for Energy Efficient Appliances

The "***Enhance Vanuatu's Market for Energy Efficient Appliances***" project is funded by the GCF through the Climate Technology Centre and Network (CTCN). This technical assistance (TA) project aims to support the *Department of Energy* to accelerate the transition to energy-efficient appliances in Vanuatu.

This household survey activity, as part of this project, is to verify ownership and saturation of lighting products and appliances among households and to measure consumer awareness and use of energy labels and analyze purchasing behaviour of electrical appliances. The survey results will be used to evaluate the effectiveness and impact of the recently introduced standards and labelling programme (energy ratinglabelss) for households' refrigerators, freezers, air conditioners, and lighting products.

[Interviewer] *SA: single answer, MA: multiple answers, OA: open answer, N: number, T: text

Part I: Information about the respondent

Name of respondent:

Gender: ☐ Male ☐ Female ☐ Other

Age: ☐ Under 20 years old ☐ 20-29 years old ☐ 30-39 years old ☐ 40-49 years old

☐ 50-59 years old ☐ 60 years old or over

Address:

Telephone:

Part II: Information of the Household

Q1. Please indicate type of residence

single storey house	1
double storey house	2
three storeys	3
Apartment	4
Residence over shop	5

Q2. Please indicate the number of people that usually live in this household most time of the year. (N)

	persons

Q3. Please indicate whether the house you live in is owned or rented. (SA)

[Interviewer] *If the respondent doesn't' know or would rather not answer about it, please fill in **"999999"**.

* If "Other" is given, fill in the specific answer in the parentheses.

Own/Buying (Homeowner with a mortgage)	1
Rent	2
Other (specifically:)	3

Q4. Please indicate the gender of the household head/ main income earner. (SA)

Male	1
Female	2
Other	3

Q5. Please indicate the age of the household head or main income earner from the following list. (SA)

Under 20 years old	1
20-29 years old	2
30-39 years old	3
40-49 years old	4
50-59 years old	5
60 years old or over	6

Q6. Please indicate the highest education of the household head or main income earner from the following list. (SA)

Not literate	1
Primary	2
Secondary	3
Tertiary (Bachelor)	4
Vocational/Professional	5
Postgraduate/Master	6
Ph.D	7
Don't know	8

Q7. Please indicate your household's monthly income from the following list. (SA)

< 20,000	1
20,000 – 39,999	2
40,000 – 59,999	3
60,000 – 79,999	4
80,000 – 99,999	5
100,000 – 119,999	6

120,000 – 139,999	7
140,000 – 159,999	8
160,000 – 179,999	9
180,000 – 199,999	10
> 200,000	11
Don't' know/Won't answer	12

Q8. Is a household member who makes the purchase decision of electrical appliances the same as the household head/ income earner? (SA)

Yes	1	Go to the Part III
No	2	Go to the next question
Other (depends on what type of electrical appliances – can be both household head income earner or other household members)	3	Go to the next question

Q8.1. Please indicate the gender of the household member who mostly makes the purchase decision of electrical appliances. (SA)

Male	1
Female	2
Other	3

Q8.2. Please indicate the age of the household member who mostly makes the purchase decision of electrical appliances. (SA)

Under 20 years old	1
20-29 years old	2
30-39 years old	3
40-49 years old	4
50-59 years old	5
60 years old or over	6

Q8.3. Please indicate the highest education of the household member who makes the purchase decision of electrical appliances.

Not literate	1
Primary	2
Secondary	3
Tertiary (Bachelor)	4
Vocational/Professional	5
Postgraduate/Master	6
Ph.D	7
Don't know	8

Q8.4. Please indicate your household's monthly income from the following list. (SA)

< 20,000	1
20,000 – 39,999	2
40,000 – 59,999	3

60,000 – 79,999	4
80,000 – 99,999	5
100,000 – 119,999	6
120,000 – 139,999	7
140,000 – 159,999	8
160,000 – 179,999	9
180,000 – 199,999	10
> 200,000	11

Part III: Electricity Usage and Expenses

Q9. Are you aware of which tariff rate group you are currently charged?

Yes	1	(Go to next question)
No	2	(Go to Q10)

Q9.1 If yes, please specify which tariff rate group:

1st block - up to 60 kWh (around 20 VT/kWh)	1
2nd block - 61 to 120 kWh (around 72 VT/kWh)	2
3rd block - over 120 kWh (around 180 VT/kWh)	3

Q10. On average, how many electricity units do you consume per month? (N)

[Interviewer] *If the respondent is unable to answer, please fill in "999999".

Q11. On average, how much do you pay per month for electricity? (N)

[Interviewer] *If the respondent is unable to answer, please fill in "999999".

VUV$

Q12. How do you receive your monthly electricity bill?

Post	1
Email	2
SMS (text messages)	3
Others please specify	4

Q13. How do you pay the electricity bill?

Cash	1
Direct credit payment	2
Refill cards for smart meters	3
Others please specify	4

Q14. Please indicate the average percentage of monthly income spent on the electricity bill. (SA)

2-4%	1
5-7%	2
8-10%	3
More than 10%	4
Don't know/won't answer	5

Part IV: Standard and Labelling Program Awareness and Purchasing Behavior

Q15. Where do you normally buy or plan to buy new electrical appliances/Light bulbs? (SA)

Modern trade stores	1
Traditional trade stores / Local retail shops	2
Online channel e.g. retailer's website, brand official website	3
Others please specify	4

Q16. Why do you choose such a channel? (MA)

☐ 1 Variety of product selection	☐ 5 Price
☐ 2 Delivery service available	☐ 6 Convenience
☐ 3 Provide product warranty	☐ 7 Installation payment available
☐ 4 Organize promotional activities	☐ 8 Reliable
☐ 9 Others please specify	

	Scale			
	1 None	2 Low	3 Moderate	4 High
Q17. What kind of media advertisement makes an impact on your household's purchase decision on electrical appliances/Light bulbs?				
Television	( )	( )	( )	( )
Radio	( )	( )	( )	( )
Out-of-home advertising (billboards, digital billboards, public transportation ads and posters)	( )	( )	( )	( )
Articles or Ads in newspapers/magazines	( )	( )	( )	( )
Brochure and leaflet distributed	( )	( )	( )	( )
Website of manufacturer/distributor	( )	( )	( )	( )
Social networks i.e. Facebook, Twitter	( )	( )	( )	( )
Reviews/ Articles by Blogger	( )	( )	( )	( )
Words of mouth /Recommendations from family and friends	( )	( )	( )	( )
In-store Media e.g. brochures and ads on product shelves	( )	( )	( )	( )
Others, (Specify)	( )	( )	( )	( )

Q18. Who will normally make purchase decisions on the following products in your household? [Gender Differences in Purchase Decision Making].

	Male	Female	HH head/ Main Income Earner	Where to buy it:
Lighting products	( )	( )	( ) Yes ( ) No	☐ Modern trade stores ☐ Local retail shops ☐ Online
Refrigerators	( )	( )	( ) Yes ( ) No	☐ Modern trade stores ☐ Local retail shops ☐ Online
Air-conditioners	( )	( )	( ) Yes ( ) No	☐ Modern trade stores ☐ Local retail shops ☐ Online
TVs	( )	( )	( ) Yes ( ) No	☐ Modern trade stores ☐ Local retail shops ☐ Online
Clothes Washers	( )	( )	( ) Yes ( ) No	☐ Modern trade stores ☐ Local retail shops ☐ Online

	Scale				
	1 Not Important At All	2 Of Little Importance	3 Of Average	4 Very Important	5 Absolutely Essential
Q19. What are your drivers of choice when buying new electrical appliances (e.g. ACs and refrigerators)/Light bulbs?					
Price	( )	( )	( )	( )	( )
Product design	( )	( )	( )	( )	( )
Product durability	( )	( )	( )	( )	( )
Brand	( )	( )	( )	( )	( )
Electricity saving	( )	( )	( )	( )	( )
Have energy label	( )	( )	( )	( )	( )
Environmentally friendly	( )	( )	( )	( )	( )
Advertisement	( )	( )	( )	( )	( )
Brand Ambassador Popularity	( )	( )	( )	( )	( )
Recommendation from family/friends	( )	( )	( )	( )	( )
Credibility of Store/distribution channel	( )	( )	( )	( )	( )
Salesperson (e.g. recommendation and demonstration)	( )	( )	( )	( )	( )
Warranty	( )	( )	( )	( )	( )
0% interest installment payment plans (e.g. AC purchase)	( )	( )	( )	( )	( )
Low down payment	( )	( )	( )	( )	( )
Attractive cash discounts	( )	( )	( )	( )	( )
Use bank's credit cards					
Availability of trade-in service (e.g. trade the old AC in when purchasing a new one)	( )	( )	( )	( )	( )
Easy to maintain (e.g. find spare parts)	( )	( )	( )	( )	( )

	Scale				
	1 Not Important At All	2 Of Little Importance	3 Of Average	4 Very Important	5 Absolutely Essential
After-sale service	( )	( )	( )	( )	( )

Q20. Which payment methods do you use when purchasing new appliances? (MA)

Cash	1
Credit	2
Installment	3
Hire purchase	4
Other (please specify)	5

Q21. Which payment methods do you prefer most when purchasing new large appliances (e.g.air conditioners)? (SA)

Cash	1
Credit	2
Installment	3
Hire purchase	4

Q22. Would you pay more money for an appliance if guarantees energy savings? (SA)

Yes	1	Go to Q22.1
No	2	Go to Q23

Q22.1. If you are willing to pay more money, how much percentage would you be willing to pay more?

Willing to pay 1-5% more	1
Willing to pay 6-10% more	2
Willing to pay 11-20% more	3
Willing to pay over 20% more	4

Q23. Have you ever seen these energy performance labels (As/NZS Label) before?

Yes	1	Go to Q23.1

No	2	Go to Section V

Q23.1. How did you see this label? (MA)

TV	1
YouTube	2
Radio	3
Out-of-home advertising (billboards, digital billboards, public transportation ads and posters)	4
Print & Digital Publications (Magazine)	5
Newspaper	6
Website of manufacturer/distributor	7
Social Media (Facebook, LinkedIn, Instagram, Twitter, etc.)	8
Friend/relative	9
Retail store/showroom	10
Other (specifically:)	11

	Scale				
	1 Strongly Disagree	2 Somewhat Disagree	3 Neither Agree nor Disagree	4 Somewhat Agree	5 Strongly Agree
Q23.2. How much do you agree with the following statement					
Energy Label helps to guarantee the quality of electrical appliance products	( )	( )	( )	( )	( )
More stars guarantee the higher efficiency or lower electricity consumption	( )	( )	( )	( )	( )
Energy Label helps consumers to purchase products that help them save on electricity bills	( )	( )	( )	( )	( )
Buying a product that has been certified for Energy Label is worth the money	( )	( )	( )	( )	( )
Affixing Energy Label to the product makes the price more expensive	( )	( )	( )	( )	( )
I am willing to pay more money for a labeled product than non-labeled product	( )	( )	( )	( )	( )
I can use the information shown on the label to compare the energy efficiency level between the 2 products.	( )	( )	( )	( )	( )

Q23.3. Do you pay attention to energy performance labels on the appliances you purchase? (SA)

Yes	1	**Go to Section V**
No	2	Go to the next question
Sometimes	3	Go to the next question

If the answer is "No"

	Scale				
	1 Strongly Disagree	2 Somewhat Disagree	3 Neither Agree nor Disagree	4 Somewhat Agree	5 Strongly Agree
Q23.4 I don't pay attention to energy performance labels when I purchase because					
I don't believe in actual energy efficiency.	( )	( )	( )	( )	( )
More powerful appliances can be bought at the same price.	( )	( )	( )	( )	( )
I don't care about the electricity charges.	( )	( )	( )	( )	( )
I'm not familiar with energy performance labels	( )	( )	( )	( )	( )
They are more expensive	( )	( )	( )	( )	( )
Can only buy what I can afford					
Other (Specify)	( )	( )	( )	( )	( )

Part V: Appliances & Usage Pattern

SECTION: REFRIGERATOR				
1	**Does your household use a refrigerator? (1=Y 2=N)**	☐ *If No, skip to Section: Freezer*		
2	**Refrigerator number**	1	2	3
3	**Manufacturer name/Brand**			
4	**How long have you bought/use this refrigerator?**			
5	**Bought new or used? (1=N 2=U)**			
6	**From local or overseas supplier (1=L 2=O)**			
7	**Self-defrosting (1=Y 2=N)**			
8	**Door arrangement code (1 - 4)**			
	1 = Single door; 2 = Freezer above, refrigerator below; 3 = Freezer door beside the refrigerator door; 4 = Freezer door under the refrigerator door			
9	**Width in centimetres**			
10	**Height in centimetres**			
11	**Does your refrigerator have an energy label? (1=Y 2=N)**			
12	**Which energy performance label?**			
	for example: EU label, AUS/NZ label; China label etc.			
13	**Energy Star Rating**		.	.
	(please indicate energy rating level specified on the label e.g. 1, 2, 3 or A, B, C etc.)			
14	**Storage Volume/capacity (Litres)**			
15	**Estimated kWh/year as specified on label**			
16	**Plans to replace (1= Y 2=N)**			
17	**If yes how many months from now (01 - 12)**			

SECTION: FREEZERS				
1	**Does your household use a freezer? (1=Y 2=N)**		*If No, skip to Section: Air Conditioner*	
2	**Freezer number**	1	2	3
3	**Manufacturer name/Brand**			
4	**How long have you bought/use this freezer?**			
5	**Bought new or used? (1=N 2=U)**			
6	**From local or overseas supplier (1=L 2=O)**			
7	**Self-defrosting (1=Y 2=N)**			
8	**Freezer type (1 or 2)** *1 = Top door (chest type); 2 = Front door (upright type)*			
9	**Width in centimetres**			
10	**Height in centimetres**			
11	**Does your freezer have an energy label? (1=Y 2=N)**			
12	**Which energy performance label?** *for example: EU label, AUS/NZ label; China label etc.*			
13	**Energy Star Rating** *(please indicate energy rating level specified on the label e.g. 1, 2, 3 or A, B, C etc.)*		.	.
14	**Storage Volume/capacity (Litres)**			
14	**Estimated kWh/year on label**			
15	**Plans to replace (1=Y 2=N)**			
16	**If yes, how many months from now (01 - 12)**			
	Comments:			

	SECTION: AIR CONDITIONERS			
1	**Does your household use an air conditioner? (1=Y 2=N)**			
2	**Air Conditioner number**	1	2	3
3	**Type (1=split unit 2=window unit 3=portable unit)**			
4	**Manufacturer name/Brand**			
5	**How long have you bought/use this refrigerator?**			
6	**Bought new or used? (1=N 2=U)**			
7	**From local or overseas supplier (1=L 2=O)**			
8	**Location of air conditioner** *(e.g. bedroom, living room, dining room, work area, kitchen)*			
9	**Does your AC have an energy label? (1=Y 2=N)**			
10	**Which energy performance label?** *for example: EU label, AUS/NZ label; China label etc.*			
11	**Energy Star Rating** *(please indicate energy rating level specified on the label e.g. 1, 2, 3 or A, B, C etc.)*		.	.
12	**Estimated kwh/year specified on label**			
13	**EER if listed**			
14	**Label watts rating if present**			
15	**Cooling capacity (Watt) listed on the label** *(if not listed in label, please provide information)*			
16	**Use hours per day during hot season (00 - 24)**			
17	**Use hours per day during cool season (00 - 24)**			
18	**Plans to replace (1=Y 2=N)**			
19	**If yes, how many months from now (01 - 12)**			

SECTION: TYPES OF LIGHT															
1	**Number of lights**	01	02	03	04	05	06	07	08	09	10	11	12	13	14
2	**Light type (1-17)** *(see lighting code)*														
3	**Location (1-12)**														
4	**Watts per lamp**														
5	**Avg. use hours per day** (00 - 24)														
	TYPES OF LIGHT(continued)														
6	**Number of lights**	15	16	17	18	19	20	21	22	23	24	25	26	27	28
7	**Light type (1-8)**														
8	**Location (1-12)**														
9	**Watts per lamp**														
10	**Avg. use hours per day** (00 - 24)														
	TYPES OF LIGHT(continued)														
11	**Number of lights**	29	30	31	32	33	34	35	36	37	38	39	40	41	42
12	**Light type (1-8)**														
13	**Location (1-12)**														
14	**Watts per lamp**														
15	**Avg. use hours per day** (00 - 24)														

SECTION: CLOTHES WASHER			
1	**Does your household use any Colthes Washers (1=Y 2=N)** ☐ *If No, skip to other appliance*		
2	**Number of Clothes Washers**	1	2
3	**Manufacturer name/Brand**		
4	**Approximate year obtained**		
5	**Bought New or Used? (1=N 2=U)**		
6	**From local or overseas supplier (1=L 2=O)**		
7	**Top Loaded Twin Tub, Top Loaded Single Tub, Front Loaded (1=TT, 2=TS, 3=F)**		
8	**Washing capacity (kg)**		
9	**Does your CW have an energy label? (1=Y 2=N)** ☐		☐
10	**Which energy performance label?** *for example: EU label, AUS/NZ label; China label etc.*		
11	**Energy Star Rating** *(please indicate energy rating level specified on the label e.g. 1, 2, 3 or A, B, C etc.)*	.	.
12	**Estimated kwh/year on label**		
13	**Average days used per week (1 - 7)**		
14	**Average hours used per day on weekdays (00 - 24)**		
15	**Average hours used per day on Saturday (00 - 24)**		
16	**Average hours used per day on Sunday (00 - 24)**		
17	**Plans to replace (1=Y 2=N)**		
18	**If yes, how many months from now (00 - 24)**		

SECTION: TELEVISION(TV)					
1	**Does your household use any tv? (1=Y 2=N)**	☐ *If No, terminate*			
2	**Number of TV**	1	2	3	4
3	**Manufacturer name/Brand**				
4	**Approximate year obtained**				
5	**Bought New or Used? (1=N 2=U)**				
6	**From local or overseas supplier (1=L 2=O)**				
7	**Flat screen or CRT (1=F 2=C)**				
8	**Diagonal measure screen size (cm)**				
9	**Does your TV have an energy label? (1=Y 2=N)**	☐	☐	☐	
10	**Which energy performance label?** *for example: EU label, AUS/NZ label; China label etc.*				
11	**Energy Star Rating** *(please indicate energy rating level specified on the label e.g. 1, 2, 3 or A, B, C etc.)*		.	.	
12	**Hours used per day during the week during school days (00 - 24)**				
13	**Hours used per day during the week during school holidays (00 - 24)**				
14	**Hours used per day on Saturdays (00 - 24)**				
15	**Hours used per day on Sunday (00 - 24)**				
16	**Plans to replace (1=Y 2=N)**				
17	**If yes, how many months from now (00 - 24)**				
18	**Is the equipment left connected to power all the time? (1=Y 2=N)**				

6.5 Annex D – Retailer Survey

6.5.1 Retailer Survey Findings

Interaction and Perception of the Standard & Labelling Program

Almost half of the respondents said they have not received any specific guidance on how to present/explain the energy performance standards and labels from DOE to customers.

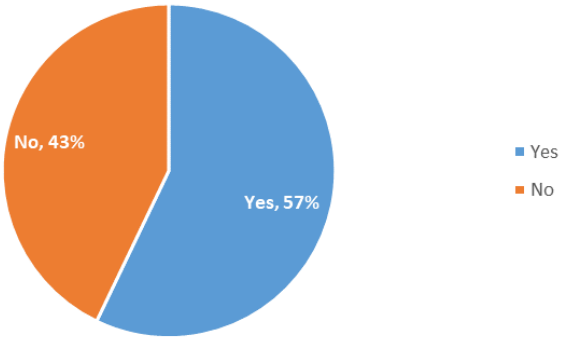


Figure 6-56: Whether to Receive any Guidance on How to Present/Explain the Energy Performance Standard and Label from DOE to Customers

Around 43% of respondents said they have never visited the DOE's MEPSL (minimum energy performance standards and labelling) page on the website (https://doe.gov.vu/index.php/energy-security/energy-efficiency-conservation/mepsl/general-information).

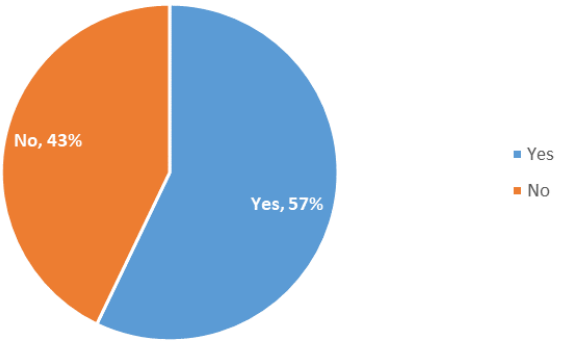


Figure 6-57: Visiting the DOE's MEPSL Page on the Website

Respondents were asked to indicate their level of satisfaction with the program information provided by the government. The results in Figure 6-58: indicate that only 14% of the respondents are very satisfied with the information provided by DOE, and 29% are not satisfied.

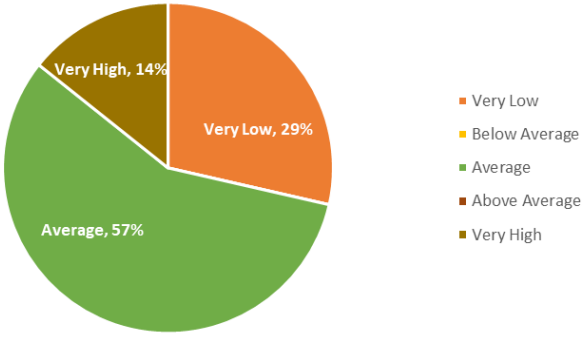


Figure 6-58: Satisfaction of Program Information Provided

To the question about how retailers would like DOE to improve their understanding of the program, some respondents stated the following:

- DOE should make the program more practical and thorough and provide more training programs.
- It should be addressed and more emphasized that the efficiency ratings, electricity consumption level, and energy performance requirements to comply are specific and different for each appliance.
- The program should raise more awareness among consumers on the purchase of energy-efficient products such as air conditioners and refrigerators and encourage stakeholders (importers/retailers) to import and/or sell more EE appliances.
- It should be stricter on import rules i.e., only import license holders, which means that all air conditioning companies that have operated for over 5 to 7 years should only be allowed to import products. Currently, there have been a lot of Chinese air conditioner products, which are OEM (Original Equipment Manufacturer) products imported from China and do not meet EE requirements in the market. Moreover, many importers are not aware of air conditioning refrigerants, such as HCFCs (Hydrochlorofluorocarbons).
- DOE should provide a better explanation of the star ratings. Turning start rating into how much it is going to cost you per month. Putting information into brochures and pamphlets.
- A monthly or regular newsletter should be published and distributed to stakeholders to provide all updates, a road map, and links to necessary documents.

Retailer Perception and Understanding of the Labels Used

Respondents were asked about the importance of electrical appliance products having an energy performance label, and most respondents agreed that the energy label is an important indicator for certifying the quality of appliances (see Figure 6-59:).

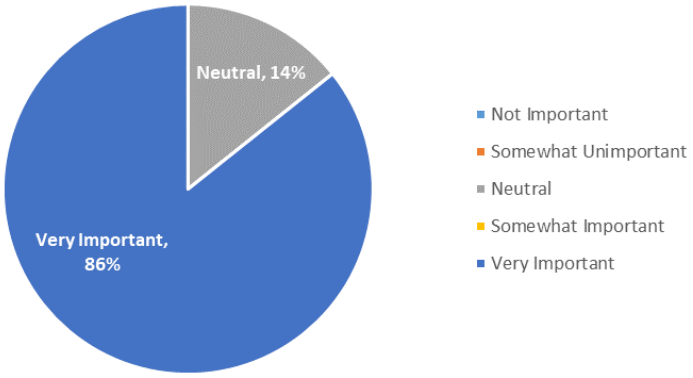


Figure 6-59: Importance of Electrical Appliance Products that have Energy Performance Label

Respondents value the importance of energy labels on appliance products. All of them can use the information on the energy performance label to compare the EE levels between two brands of products. They agreed that buying a product that has been certified for energy label is worth the money (86%) and they are willing to pay more money for a labeled product than for a non-labeled product (86%), in which the labeled product can help them save money on utility bills (86%) and guarantee the quality of the product (71%). Over half of respondents (58%) feel that affixing the energy label to appliance products can make the price more expensive (29% Strongly agree, and 29% Somewhat agree) (see Figure 6-60:).

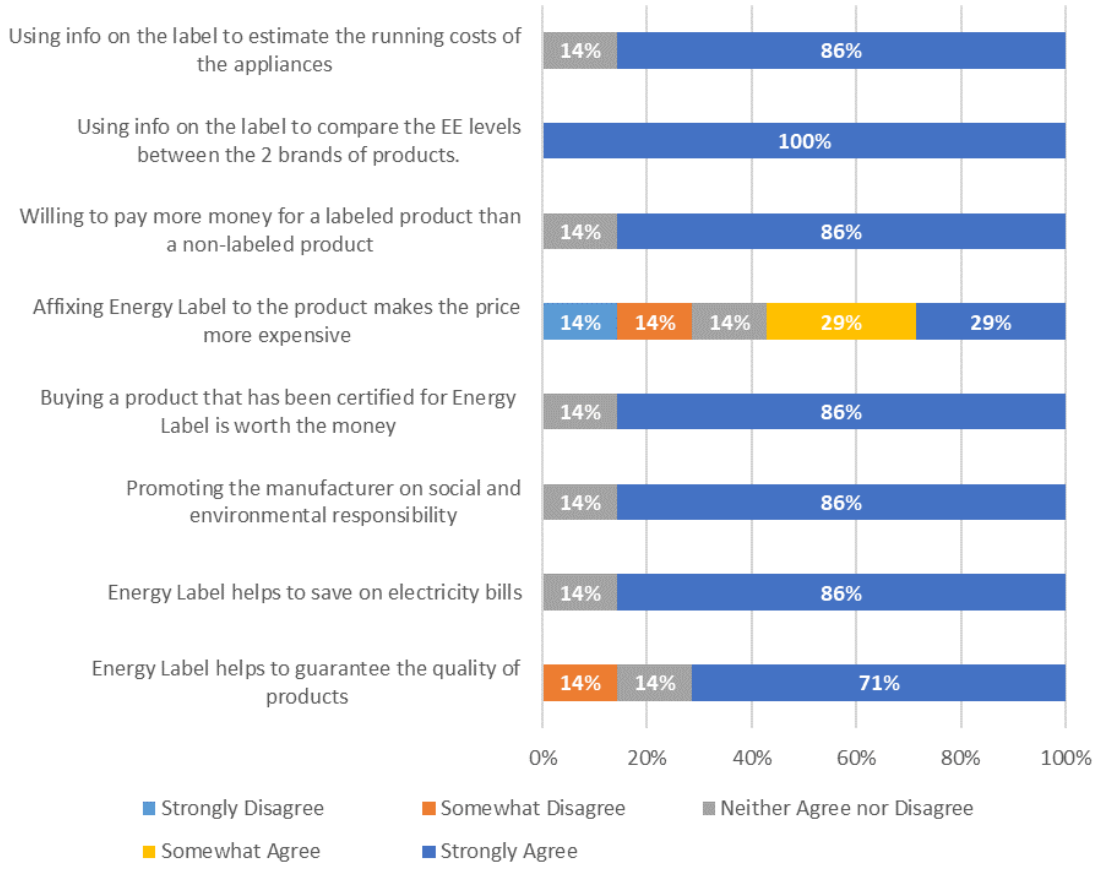


Figure 6-60: Attitudes towards Energy Label of Retailers

Consumer Perception and Understanding of the Energy Label from a Retailers' Perspectives

Less than half (43%) of the respondents said that their customers ask for *energy labels* of the refrigerator and air conditioner products in the store. Among those who answered "no", said that most customers are more price-driven and they are not aware of the importance of energy labels and how it affects their electricity bills. However, a customer will show interest more in the energy efficiency product after the explanation. Most (71%) of those respondents believe that their customers understand the scale of the stars in the energy label and said that customers ask about *energy efficiency/saving* issues before buying the product (see Figure 6-61:). Half of the respondents mentioned that customers asked them for clarifications on the information provided on the energy labels, particularly the following:

- The difference of each rating level - How much additional savings on electricity costs and power consumption.
- Why is this same brand but star rating better than the other one?

The survey also investigated whether male and female customers show interest/concern differently in energy labels and energy-saving issues from the retailer's perspective when interacting with those customers. It reveals that gender is not different in terms of interest in the information provided on energy labels, as well as concerns about energy efficiency/saving issues before buying an appliance product.

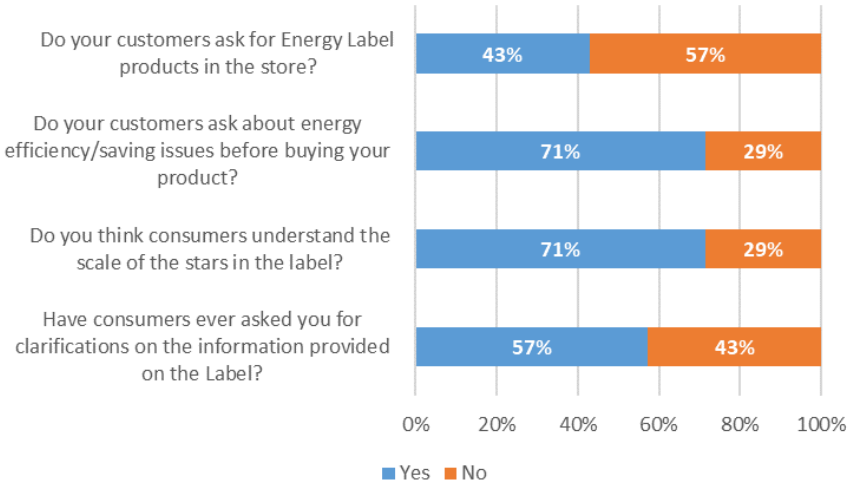


Figure 6-61: Consumer's Awareness of the Energy Label

The findings reveal that the energy label is positively perceived by consumers from the retailers' perspectives. When being asked how customers perceive the value of the energy label, 72% (43% Strongly agree, and 29% Somewhat agree) of respondents agreed that the energy label is an important influence on consumers' choices and more than half (57%) of the respondents believed that consumers are likely to pay more money for more efficient products (14% Strongly agree, and 43% Somewhat agree).

However, less than half (43%) of the respondents thought that the energy Label somehow influences consumers' purchasing decisions (14% Strongly agree, and 29% Somewhat agree) and customers are willing to pay more money for a labeled product than a non-labeled product (29% Strongly agree, and 14% Somewhat agree). More than half (58%) of the respondents are doubtful if customers can use the information shown on the label to compare the EE level between 2 brands of products (29% Strongly disagree, and 29% Somewhat disagree) (see Figure 6-62:).

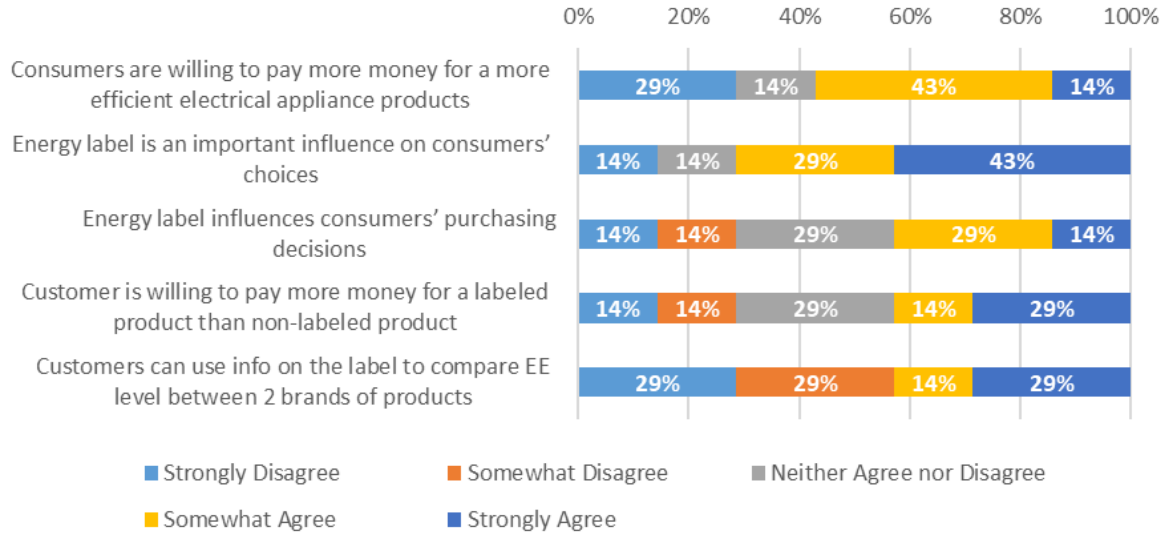


Figure 6-62: Attitudes and Understanding towards the Energy Label of Consumers from Retailers' Perspectives

Consumer Priorities when Purchasing a Large Appliance such as Air Conditioner, Refrigerator, and Washing Machine from the Retailers' Perspectives

From the retailers' perspective, all of the important criteria when purchasing a large appliance such as an air conditioner, refrigerator, and washing machine, are not much different among male and female customers, and the "*price*" has the highest priority from consumers' preferences. "*Exterior design*" shows slight gender differences, in which preference from the female customer is a bit higher than that of the male customer. The other three most important factors include *warranty*, *functions*, and *energy labels*. The most unimportant factor for both male and female customers is "*environmental-friendly*" products, as shown in Figure 6-63: .

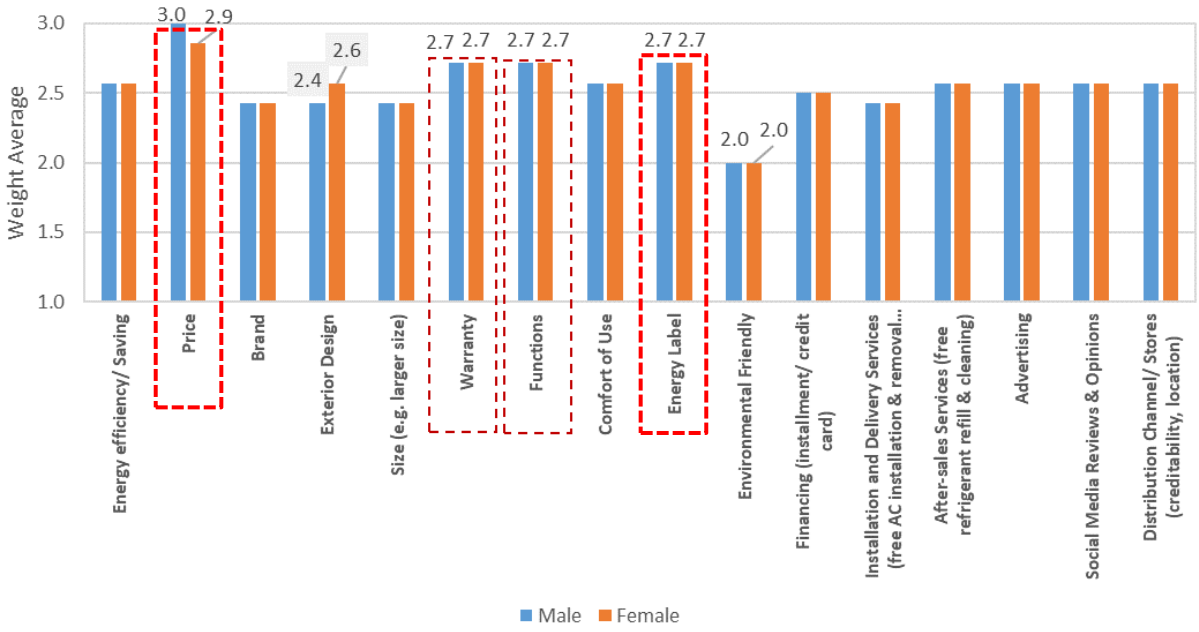


Figure 6-63: Criteria and Features that Consumers Look for when Purchasing a Large Appliance

The following comments and feedback illustrate consumers' preferential and functional priorities when purchasing a large appliance:

- For washing machines and dishwashers, women look for those appliances' functions, comfort to use, social media reviews, and financing, which are different from men.
    - Washing machines: Women look for top loaders for the comfort of use but are now getting more used to front-loaded washing machines. Women also frequently ask for a drier to go with the washing machine.
    - Dishwashers: Women tend to go for drawer dishwashers and men go for (standard) dishwashers.
- For fridges and washing machines, women look for those appliances' price, brand, energy label, installation, after-sales service, and delivery, which are similar to men.

Figure 6-64: shows the average number of females out of 10 customers who purchase appliance products. More than half of 10 customers are women who purchase washing machines (6.8), refrigerators/freezers (6.5), and lighting products (5.3), except for buying an air conditioner, where the average number is less than half or around 4 out of 10 customers.

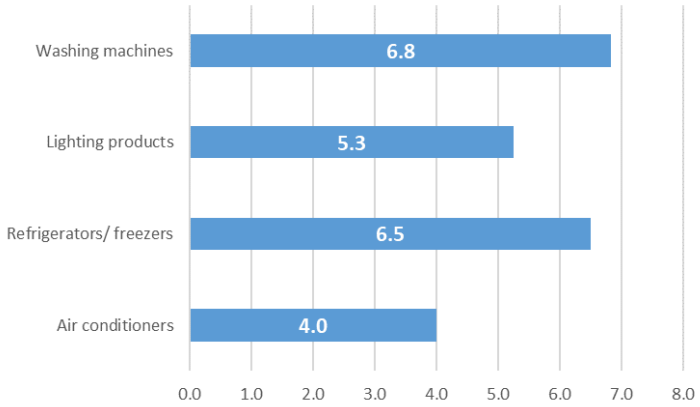


Figure 6-64: Number of Female Customers Out of 10 Purchase Appliance Products

One-third of surveyed respondents said their stores offer installment plans for electrical appliance purchases such as refrigerators, freezers, air conditioners, washing machines, dishwashers, and clothes dryers (white goods). Around 6 out of 10 customers are using this financial service, in which those who use installment payment arrangements are both male and female customers.

6.5.2 Retailer Survey Questionnaire

Retailer Survey - Enhance Vanuatu's Market for Energy Efficient Appliances

The "Enhance Vanuatu's Market for Energy Efficient Appliances" project is funded by the GCF through the Climate Technology Centre and Network (CTCN). This technical assistance (TA) project aims to support the Department of Energy to accelerate the transition to energy-efficient appliances in Vanuatu.

This retailer survey activity, as part of this project, is to analyze:

- Whether retail shops are aware of the appliance efficiency S&L program;
- Availability of products with energy labels, such as refrigerators, and air conditioners.
- How retailers perceive and use energy labels as a marketing tool;
- Whether the energy label generates positive consumer reactions in terms of understanding, attitude, and intention towards purchasing more energy-efficient appliances and lighting products.
- Popular type and size, including energy efficiency performance, of the electrical appliance and lighting products currently off the shelves or supplied in the market.

General Information of Respondents		
Type of Retailer:	( ) Modern Trade	( ) Traditional Trade/ Electrical Shop
	( ) Supermarket	( ) Other, please specify
Name of Retail Store:		
Name of Person:		
Designation:		
Gender: :	( ) Male	( ) Female ( ) Other
Address:		
Ph. No. :		
Email:		

Part 1: Interaction and perception of the standard and labeling program

Q1: Are you aware of the Vanuatu Government [DOE"s] minimum energy performance standards and labelling (MEPSL) program for electrical appliance products?

Never heard of it	1
I am aware but have never talked about this with customers	2
Talk about it only sometimes with customers	3
Talk about it regularly	4

Q2: Are you aware of which types of electrical appliances products are subject to mandatory energy performance standards and labelling?

Yes (If yes, please answer Q2)	1
No (If no, please go to Q3)	2

Q3: Please specify which types of products are subject to mandatory standards and labelling requirements

	Multiple answers
Air Conditioners	1
Refrigerators	2
Freezers	3
Incandescent lamps	4
Fluorescent lamps	5
Compact fluorescent lamps	6

Q4: Are you aware that the range of rated cooling capacity of air conditioner products up to 65 kW is mandatory to standard and labeling requirements?

Yes	1
No	2

Q5: Did you receive any guidance on how to present/explain the energy performance standard and label from DOE to customers?

Yes	1
No	2

Q6: How satisfied are you with the program information provided?

Scale: Level of Satisfaction				
1 Very Low	2 Below Average	3 Average	4 Below Average	5 Very High

Q7: How can we improve your understanding of the program?

Q8: Have you ever visited the DOE's MEPSL (minimum energy performance standards and labelling) page on the website?

(https://doe.gov.vu/index.php/energy-security/energy-efficiency-conservation/mepsl/general-information)?

Yes	1
No	2

If yes, please specify what you would like to see more on the website

Part 2: Retailer perception and understanding of the labels used

Q2.1: How important is it for you that electrical appliance products have an energy performance Label?

Scale: Level of Importance				
1 Not Important	2 Somewhat unimportant	3 Neutral	4 Somewhat important	5 Very important

Q2.2: How much do you agree with the following statement, with a scale of 1-5, where 1- Strongly Disagree and 5- Strongly Agree

Attitudes towards Energy Label	Scale				
	1 Strongly Disagree	2 Somewhat Disagree	3 Neither Agree nor Disagree	4 Somewhat Agree	5 Strongly Agree
How much do you agree with the following statement?					
1 Energy Label helps to guarantee the quality of products	( )	( )	( )	( )	( )
2 Energy Label helps consumers to purchase products that help them save on electricity bills	( )	( )	( )	( )	( )
3 Energy Label helps promote the image of the manufacturer in showing social and environmental responsibility	( )	( )	( )	( )	( )
4 Buying a product that has been certified for Energy Label is worth the money	( )	( )	( )	( )	( )
5 Affixing Energy Label to the product makes the price more expensive	( )	( )	( )	( )	( )

Attitudes towards Energy Label	Scale				
	1 Strongly Disagree	2 Somewhat Disagree	3 Neither Agree nor Disagree	4 Somewhat Agree	5 Strongly Agree
6 I am willing to pay more money for a labeled product than a non-labeled product	( )	( )	( )	( )	( )
7 I can use the information shown on the label to compare the energy efficiency levels between the 2 brands of products.	( )	( )	( )	( )	( )
I can use the information shown on the label to estimate the running costs of the appliances	( )	( )	( )	( )	( )

Part 3: Consumer perception and understanding of the energy label from a retailer's perspective

Q3.1: Do your customers ask for Energy Label products in the store?

☐ Yes ☐ No

- **If YES, what type of electrical appliances do they always ask for Energy Label**

	Multiple answers
Air Conditioners	1
Refrigerators	2
Freezers	3
Incandescent lamps	4
Fluorescent lamps	5
Compact fluorescent lamps	6

which gender is more interested/concerned about the Energy Label

☐ Male ☐ Female ☐ Other

- **If Not, why do you think customers never ask for it?**

Q3.2: Do your customers ask about energy efficiency/saving issues before buying your product?

☐ Yes ☐ No

- **If Not, Why?**

- **Which gender is more interested/concerned about the Energy efficiency/saving issues before buying your product?**

☐ **Men** ☐ Women ☐ both

Q3.3: Do you think consumers understand the scale of the stars in the label?

☐ Yes ☐ No

Q3.4: Have consumers ever asked you for clarifications on the information provided on the Label?

☐ Yes ☐ No

o If Yes, who usually asked these questions?

☐ Men ☐ Women ☐ Both

Please specify, what is the information they asked about? and What are some of the commonly asked questions men, women, or both usually asked?

Q3.5: How much do you agree with the following statement, with a scale of 1-5, where 1- Strongly Disagree and 5- Strongly Agree

No		Scale				
		1 Strongly Disagree	2 Somewhat Disagree	3 Neither Agree nor Disagree	4 Somewhat Agree	5 Strongly Agree
1	Consumers are willing to pay more money for a more efficient electrical appliance products	( )	( )	( )	( )	( )
2	The presence of the energy label is an important influence on consumers' choices	( )	( )	( )	( )	( )
3	Energy label influences consumers' purchasing decisions	( )	( )	( )	( )	( )
4	Customer is willing to pay more money for a labeled product than for a non-labeled product	( )	( )	( )	( )	( )
5	Customers can use the information shown on the label to compare energy efficiency levels between 2 brands of appliance products	( )	( )	( )	( )	( )

Part 4: Consumer priorities when purchasing a large appliance such as an air conditioner, refrigerator, and washing machine.

Q4.1: What are the criteria and features consumers look for when purchasing large appliances? Using a scale of 1 = Not at all important to 5 = Very important

No.	Criteria & Features	Gender dynamic on criteria/features of the appliance	1 Not Important	2 Somewhat unimportant	3 Neutral	4 Somewhat important	5 Very important
1	Energy efficiency/saving	Men	( )	( )	( )	( )	( )
		Women	( )	( )	( )	( )	( )
2	Price	Men	( )	( )	( )	( )	( )
		Women	( )	( )	( )	( )	( )
3	Brand	Men	( )	( )	( )	( )	( )
		Women	( )	( )	( )	( )	( )
4	Exterior design	Men	( )	( )	( )	( )	( )
		Women	( )	( )	( )	( )	( )
5	Size (e.g. larger size)	Men	( )	( )	( )	( )	( )
		Women	( )	( )	( )	( )	( )
6	Warranty	Men	( )	( )	( )	( )	( )
		Women	( )	( )	( )	( )	( )
7	Functions	Men	( )	( )	( )	( )	( )
		Women	( )	( )	( )	( )	( )
8	Comfort of use	Men	( )	( )	( )	( )	( )
		Women	( )	( )	( )	( )	( )
9	Energy label	Men	( )	( )	( )	( )	( )
		Women	( )	( )	( )	( )	( )
10	Environmental friendly	Men	( )	( )	( )	( )	( )
		Women	( )	( )	( )	( )	( )
11	Financing (installment/ credit card)	Men	( )	( )	( )	( )	( )
		Women	( )	( )	( )	( )	( )
12	Installation and delivery services (Free AC installation and removal fee)	Men	( )	( )	( )	( )	( )
		Women	( )	( )	( )	( )	( )
13	After-sales service (free refrigerant refill and cleaning)	Men	( )	( )	( )	( )	( )
		Women	( )	( )	( )	( )	( )
14	Advertising	Men	( )	( )	( )	( )	( )
		Women	( )	( )	( )	( )	( )
15	Social media reviews and opinions	Men	( )	( )	( )	( )	( )
		Women	( )	( )	( )	( )	( )
16		Men	( )	( )	( )	( )	( )

No.	Criteria & Features	Gender dynamic on criteria/features of the appliance	1 Not Important	2 Somewhat unimportant	3 Neutral	4 Somewhat important	5 Very important
	Distribution channel/ Stores (credibility, location)	Women	( )	( )	( )	( )	( )

Q4.2 What specific appliances do women look for that are different from men and which features/criteria are listed above?

_____

Q4.3 What specific appliances do women look for that are similar to men and which features/criteria are listed above?

_____

Q4.4: Could you estimate how many female customers out of 10 purchase the following products?

- AC: _____
- Refrigerator/freezer: _____
- Lighting:_____
- Washing Machine:_____
- TV: _____

Q4.5: Do you offer installments plans for electrical appliance purchases? ☐ Yes ☐ No

• **If YES**:

- What type of product do you offer?_____-
- Could you estimate how many consumers out of 10 are using this service? _____
- Could you indicate if Installment payment arrangements are under men, women, or both names?

  ☐ Men ☐ Women ☐ Both

Part 5: Data on electrical appliances being sold in the store such as size, type, with energy-saving labels or not, etc.

Information about popular types and sizes of electrical appliances that consumers use in their households

Refrigerators

1. Please rank the following refrigerator types in order of popularity (1-4) - 1 being the most popular

Type	Ranking
Single door	
Freezer door above, the refrigerator door (Top Freezer)	
Freezer door under the refrigerator door (Bottom Freezer)	
Freezer door beside the refrigerator door (Side by Side)	

Available on shop & Popular Models:

Type	Range of refrigerated/ storage volume available in the shop (*small size – large size*) *e.g. 50 – 80 L*	Popular Models Note: For each specified model, please take a photo of the following: 1) Energy Label affixed on the appliance; 2) Specifications Label or Serial Plate; 3) Price Tag
Single door		Model: Brand:
Freezer door above, the refrigerator door (Top Freezer)		Model: Brand:
Freezer door under the refrigerator door (Bottom Freezer)		Model: Brand:
Freezer door beside the refrigerator door (Side by Side)		Model: Brand:

Freezers

2. Please rank the following freezer types in order of popularity (1-3) - 1 being the most popular

Type	Ranking
Chest Freezer	
Vertical Freezer (manual defrost)	
Vertical Freezer (automatic defrost or frost free)	

Available on shop & Popular Models:

Type	**Range of refrigerated/ storage volume available in the shop (*small size – large size*)** *e.g. 50 – 80 L*	**Popular Models** **Note: For each specified model, please take a photo of the following: 1) Energy Label affixed on the appliance; 2) Specifications Label or Serial Plate; 3) Price Tag**
Chest Freezer		Model: Brand:
Vertical Freezer (manual defrost)		Model: Brand:
Vertical Freezer (automatic defrost or frost free)		Model: Brand:

Air-Conditioners

3. **Please rank the following AC types in order of popularity (1-3) - 1 being the most popular**

Type	**Ranking**
Split	

Window	
Portable	

Available on shop & Popular Models:

Type	Range of cooling capacity available in the shop (*small size – large size*) *e.g. 50 – 80 W*	Popular Models Note: For each specified model, please take a photo of the following: 1) Energy Label affixed on the appliance; 2) Specifications Label or Serial Plate; 3) Price Tag
Split		Model: Brand:
Window		Model: Brand:
Portable		Model: Brand:

Clothes Washers

4. **Please rank the following CW types in order of popularity (1-3) - 1 being the most popular**

Type	Ranking
Top Loaded Twin Tub	
Top Loaded Single Tub	
Front Loaded	

Available on shop & Popular Models:

Type	Range of washing capacity available in the shop (*small size – large size*)	Popular Models

	e.g. 50 – 80 kg	Note: For each specified model, please take a photo of the following: 1) Energy Label affixed on the appliance; 2) Specifications Label or Serial Plate; 3) Price Tag
Top Loaded Twin Tub		Model: Brand:
Top Loaded Single Tub		Model: Brand:
Front Loaded		Model: Brand:

Televisions

Available on shop & Popular Models:

Type	Range of screen/display size available in the shop (*small size – large size*) *e.g. xx – xx cm*	Popular Models Note: For each specified model, please take a photo of the following: 1) Energy Label affixed on the appliance; 2) Specifications Label or Serial Plate; 3) Price Tag
All types		Model: Brand:

Lighting

Please rank the following lighting types in order of popularity (1-5) - 1 being the most popular

Type	Ranking
Incandescent	
Halogen	
Fluorescent Tube Lights (FTLs)	
CFL (Compact Fluorescent Lamp)	
LED	

Fluorescent Lamps (FL)

The following FL types are still sold in the shop:

FL Type	Available (1 = Yes; 2 = No)
T12 (4 feet)	
T12 (2 feet)	
T8 (4 feet)	
T8 (2 feet)	

If still sold in the shop, please specify a range of wattage available and popular models of each type

Type	Range of wattage available in the shop (*small size – large size*) *e.g. xx – xx W*	Popular Models Note: For each specified model, please take a photo of the following: 1) Lamp box showing specifications e.g. lumen/watt value; 2) Price Tag
T12		Model: Brand:
T8		Model: Brand:

CFL

The following CFL types are still sold in the shop:

Type	Available (1 = Yes; 2 = No)
CFL (with internal ballast)	
CFL (external ballast)	

If still sold in the shop, please specify a range of wattage available and popular models:

Type	Range of wattage available in the shop (*small size – large size*) *e.g. xx – xx W*	Popular Models Note: For each specified model, please take a photo of the following: 1) Lamp box showing specifications e.g. lumen/watt value; 2) Price Tag
CFL (with internal ballast)		Model: Brand:
CFL (external ballast)		Model: Brand:

Incandescent Lamps

The following Incandescent lamp types are still sold in the shop:

Type	Available (1 = Yes; 2 = No)
Incandescent (screw-in)	
Incandescent (pin)	

If still sold in the shop, please specify a range of wattage available and popular models:

Type	Range of wattage available in the shop (*small size – large size*) *e.g. xx – xx W*	Popular Models Note: For each specified model, please take a photo of the following: 1) Lamp box showing specifications e.g. lumen/watt value; 2) Price Tag
Incandescent (screw-in)		Model: Brand:
Incandescent (pin)		Model: Brand:

Halogen

Halogen lamps are currently sold in the shop? ☐ Yes ☐ No

If still sold in the shop, please specify a range of wattage available and popular models

Type	Range of wattage available in the shop (*small size – large size*) *e.g. xx – xx W*	Popular Models Note: For each specified model, please take a photo of the following: 1) Lamp box showing specifications e.g. lumen/watt value; 2) Price Tag
Halogen		Model: Brand:

LED

Please rank the following LED types in order of popularity (1-4) - 1 being the most popular

Type	Ranking
LED bulb	
LED Tube	
LED Square/ Rounded shape (Recessed lighting fixtures, embedded in the ceiling and wall-mounted)	
LED - Planar (Recessed lighting fixtures, embedded in the ceiling)	

Range of wattage available in the shop and popular models

Type	Range of wattage available in the shop (*small size – large size*) *e.g. xx – xx W*	Popular Models Note: For each specified model, please take a photo of the following: 1) Lamp box showing specifications e.g. lumen/watt value; 2) Price Tag
LED bulb		Model: Brand:

LED Tube		Model: Brand:
LED Square/ Rounded shape (Recessed lighting fixtures, embedded in the ceiling and wall-mounted)		Model: Brand:
LED - Planar (Recessed lighting fixtures, embedded in the ceiling)		Model: Brand:

Thank you for your valuable time!

6.5.3 List of Surveyed Retailers

1	Rapid Electric PVT/LTD
2	Wilco Home Furnishing
3	Supercool Vila
4	Leon Hardware Ltd.
5	Asco Motors Vanuatu
6	Computer World
7	Vate Electrics