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Niue 2018 Household Electrical Appliances, Lights, and End-use Survey

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Process and Findings

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¹ The views expressed in this document are those of the author and do not necessarily reflect the views of the United Nations Development Programme (UNDP), its Executive Board or its member states.

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Acronyms

AC	Air conditioning
ADB	Asian Development Bank
BMZ	Federal Ministry for Economic Cooperation and Development (Germany)
BTU	British thermal unit
CFL	Compact fluorescent lamp
CRT	Cathode ray tube
CSPro	Census and Survey Processing System
DVD	Digital versatile disc
ESMAP	Energy Sector Management Assistance Program
GEF	Global Environment Facility
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
IUCN	International Union for Conservation of Nature (IUCN)
kWh	kilowatt-hour
L	Litre
LCD	Liquid-crystal display
LCI	Low Carbon Islands
LED	Light-emitting diode
LPG	Liquefied petroleum gas
Min	Minimum
Max	Maximum
MEPS	Minimum energy performance and standards
NZ	New Zealand
NZD	New Zealand Dollars
PALS	Pacific Appliance Labelling and Standards
PEEP-2	Promoting Energy Efficiency in the Pacific - Phase 2
PICs	Pacific Island Countries
REEEP	Renewable Energy and Energy Efficiency Partnership
RMI	Republic of the Marshall Islands
S&L	Standards and labelling
SPC	Pacific Community
TV	Television
UNEP	United Nations Environment Programme
UNDP	United Nations Development Programme
USD	United States dollars
V	Voltage
W	Watts
WB	World Bank
Wh	Watt-hour

Map of Niue



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1. Survey Results

A household electrical appliances, lights, and end-use survey was undertaken in Niue during the period 2-23 March 2018. A total of 210 households were surveyed, which is around 44% of all households. Please refer to *Annex D* for the detailed survey results. Mentioned below are some of the findings as well as a few observations.

1.1 Selected Survey Results

Residence

- In 92% of surveyed households one (1) building has electricity.
- 7% of surveyed households report that two or three households share the same power meter.
- The median value households estimate they pay per month for electricity is 100 New Zealand dollars (NZD).
- 86% of surveyed households pay their electricity bill via pre-paid meters.
- 97% of the roofs in the main building are steel.
- 14% of outside walls in the main building of the surveyed homes are painted medium or dark colours.
- 53% of roofs on main buildings are unpainted and 24% are painted medium or dark colours.
- 18.2% of main buildings have no radiant barrier (insulation) right under the roofing materials.

Lighting

- On average, in each household there are 14 light bulbs/tubes, use is 2.4 hours per day per light bulb/tube, and watt (W) rating is 33.4W per light bulb/tube.
- 23.9% of all recorded bulbs/tubes are located in the sleeping room, 19.1% outside on the veranda and 13.8% in the main leaving room.
- 31.4% of all bulbs/tubes are light-emitting diodes (LEDs), with 31.2% being LED bulbs, 0.2% being LED T8 linear tubes and 0.04% being LED T5 linear tubes.
- 27.1% of all bulbs/tubes are compact fluorescent lights (CFLs), with 23.7% being CFLs with integrated electronic ballasts and 3.4% CFLs with separate electronic ballasts.
- 22.9% of all bulbs/tubes are incandescent bulbs, with 18% of the pin (bayonet) type and 4.9% having a screw base.
- 13% of all bulbs/tubes are fluorescent tubes, with 11.4% being T8s (both iron & electronic ballast), 1% small T5s with electronic ballast and 0.6% old style T12 tubes with iron ballast.
- There is a relatively small number of halogen bulbs and other types of lighting (4% and 1.5% of all light bulbs/tubes respectively).
- The total energy use for lighting in the surveyed households is estimated to be 211 kilowatt hours (kWh) per day – an average of 1.003 kWh per household per day.
 - 39.9% of the estimated energy use for lighting in the surveyed households is from incandescent bulbs.

Refrigeration

- 96% of surveyed households in Niue have a refrigerator.
- 49% of refrigerators are placed in the cooking area (kitchen).
- 34% of the refrigerators are six (6) years old or older, 17% were in used condition when they were obtained, and 70% were sourced locally.
- 42% of refrigerators are of the type that include a freezer compartment above and refrigerator below, and 35% have a single door.

- 59% of refrigerators are self-defrosting.
- The estimated average refrigerator volume is 518 litres.
- The door seal is considered to be bad in 17% of the refrigerators.
- 1% of households do not turn on and operate the refrigerator all the time.
- A total of 15 refrigerator manufacturers were identified.
 - 56.9% of surveyed refrigerators are made by Fisher & Paykel.
- 64% of surveyed refrigerators have an energy label.
 - Of these, 95% of the labels are Australian/New Zealand (NZ).
 - Of the refrigerators with an Australia/NZ label, 52% are rated 2.5 stars or lower.
 - 51% have an estimated energy use between 401-500 kWh/year.
- 17% of households in Niue plan to replace their refrigerators.

Freezers

- 76% of surveyed households have a dedicated freezer.
- 29% of freezers are placed in the eating room and 28% in the cooking area (kitchen).
- 48% of the freezers are six (6) years old or older, 19% were in used condition when they were obtained, and 80% were sourced locally.
- 97% are chest freezers (single top opening door).
- 29% of freezers are self-defrosting.
- The estimated average freezer volume is 498 litres.
- The door seal is considered to be bad in 26% of the surveyed freezers.
- 6% of households do not turn on and operate the freezer all the time.
- A total of 13 freezer manufacturers were identified.
 - 75.6% of the surveyed freezers are made by Fisher & Paykel.
- 31% of surveyed freezers have an energy label.
 - Of these, 97% are Australian/NZ.
 - Of the freezers with an Australia/NZ label, 55% are rated 2.5 stars or lower.
 - 36.8% have an estimated energy use between 301-400 kWh/year.
- 13% of surveyed households in Niue plan to replace their freezer.

Air conditioners

- There was a total of thirteen air conditioners in 11 surveyed households (due to this low number the data was not tabulated any further).

Small electrical appliances

- The most numerous small electrical appliances are electric kettles (8.5% of all appliances recorded), top loading single tub washing machines (8%), toaster (6.6%), radios (5.4%), rice cookers (5.1%) and blenders (4.5% of all appliances recorded).
- On average, there are 10.9 small electrical appliances per household.

Desktop and laptop computers including printers

- 49% of surveyed households have a desktop or laptop computer.
- 14% of the computers are six (6) years old or older, 12% were in used condition when they were obtained, and 15% of the computers were sourced locally.
- 99% of the computers have a flat screen.
- The average diagonal screen size is 14 inches.
- 89% of the computers are laptops.

- 71% of surveyed households report 1-6 hours of use per day on school days, and 55% report 1-6 hours of use per day on Sundays.
- The computers are mostly used for watching movies (17%), Facebook, You Tube and similar internet sites (16%) and finance and accounts related work (16%).
- 7% of surveyed households have a laser printer and 12% have an ink-jet printer.
- 10% of surveyed households plan to replace their computers.
- 11% of surveyed households report that computers and associated printers are plugged in and power is on all the time.
- 87% of surveyed households have internet.
- 87% of surveyed households have Wi-Fi.

Microwave Ovens

- 69% of surveyed households have a microwave oven.
- 83% have buttons to set the operating time.
- On average, the microwave ovens are used nine minutes a day.
- For 50% of microwave ovens, wattage is in the range 2001-3900W.
- 34% of the microwave ovens are plugged in and powered on all the time.

Mobile phones

- 82% of surveyed households have at least one mobile phone.
- 15% of households surveyed in Niue report that mobile phone chargers are plugged in and power is on all the time.

Tablet Computers

- 57% of surveyed households have a tablet computer.
- 12% of surveyed households report that chargers for the tablet computer are plugged in and power is on all the time.

Water Heaters

- 65% of surveyed households have a solar water heater and of these 92% are of the flat type and 21% have an electric back-up heater.
- 4% of surveyed households in Niue have a tank type water heater and of these 71% are electric.
- 5% of surveyed households have an 'instant on' type water heater and of these 56% are electric and the remaining gas.

Fans

- 84.1% of surveyed households have fans.
- 64.8% are standing fans, 17% table fans and 14.6% ceiling fans.
- 62% of fans are located in the sleeping room and 31% in the main living room with TV.
- Average values are 2.2 fans per household, 7 hours of use per day during wet season (December to March), 4 hours of use per day during dry season (April to November) and 55W each.

Cooking

- 80% of surveyed households have a gas cooking unit.
 - For 67% of these households, gas is the main fuel for cooking.
- 57% of surveyed households cook with wood.
 - For 12% of these households, wood is the main fuel for cooking.

- 50% of surveyed households have an electric cooking unit.
 - For 27% of these households, electricity is the main fuel for cooking.
- 0.5% of surveyed households (one household) have a kerosene cooking unit.
- 11% of surveyed households report they are cooking with other fuels.
 - For 9% of these households, charcoal is the main fuel for cooking.
- 43.3% of surveyed households cook with two (2) fuels, 25.2% with three (3) fuels, and 1.4% with four (4).

Televisions

- 85.1% of surveyed households in Niue have a television (TV).
- 75% of TVs are located in the main living room and 23% in the sleeping room.
- 6% of the TVs are nine (9) years old or older, 11% were in used condition when they were obtained, and 48% of the TVs were sourced locally.
- 36% of the TVs are in the 51-100W range and the average is 108W.
- 13% of the TVs have a cathode ray tube (CRT) display.
- The average diagonal screen size is 34 inches.
- 35% of surveyed households have a satellite box.
- For 83% of the TVs there is a remote-control unit.
- 65% of surveyed households report 1-6 hours of TV use per day on school days, and 83% report 1-6 hours of TV use per day on Sundays.
- 6% of surveyed households are not satisfied with their TV unit and 13% plan to replace the unit.
- 25% of surveyed households have a Digital Versatile Disc (DVD) player.
 - On average 1.3 DVDs are played each week.
- 12% of surveyed households have a game console.
 - On average games consoles are used 2.4 hours per week.
- 37% of the surveyed households report that TVs, DVDs, satellite boxes and game consoles are plugged in and power is on all the time.

1.2 A few Observations

Although a detailed analysis of survey results is not included in this document, below are a few initial observations.

People do *not* want energy itself, but ‘energy services’ such as cooking, illumination, heating, pumped water, transportation, etc.² Energy sources (such as biomass) and carriers (such as electricity) ‘...are all useless until they are converted into the energy services needed, by machines or other kinds of end-use equipment, such as stoves, turbines, or motors’.³ Thus without end-use equipment - including electrical appliances and light lights - there can be no energy services. On the other hand, there are costs associated with buying, repairing, and replacing electrical appliances and lights and in addition paying for the electricity they use.

Human comfort is affected by air temperature, humidity, air movement, solar and heat radiation, and temperature differences both within a space and within building materials.⁴ Regarding the nearly all surveyed homes in Niue that are not air conditioned, the 15.9% household that have no fans, the 24% of the main residential buildings where the roof is painted medium or dark colours and the 18.2% of the main buildings that have no roof insulation, there are several opportunities to improve indoor thermal comfort. Options for existing buildings include shading (e.g. trees and other structures), applying light colours to surfaces, and installing insulation, radiant barriers, and roof/attic vents.⁵ For instance, a light coloured roof can reflect 25-30% of the sun’s radiant heat and can be as much as 6.7° Celsius cooler than a dark coloured roof.⁶ While a metal sheet has a reflectance value of 70%, white coloured metal sheets have a reflectance value of 70-80%.⁷ While insulation slows the rate of heat transfer, radiant barriers reflect the sun’s radiant heat away from the home. Properly installed radiant barriers can reflect up to 95% of the sun’s radiant heat and reduce indoor air temperature by 2.2° Celsius, which can make occupants feel 5° Celsius cooler.⁸ Options to improve indoor thermal comfort for new homes include orientation of the building, landscape elements (such as planting and other ground cover, porous paving materials), natural ventilation (air flow around and in buildings) and shading.⁹

There is significant potential to reduce energy use for lightning in Niue. For instance, the many inefficient incandescent light bulbs (22.9% of all light bulbs/tubes) are suitable for cost-effective replacement with more efficient lightning types such as LEDs, which already are widely in use in the residential sector (LED bulbs currently constitute nearly 1/3 of all light/bulbs found in the surveyed households).

Door seals are leaking or poorly fitted in 17% of the surveyed refrigerators and 26% of freezers. Replacing seals could result in considerably less electricity use. The results from this survey also indicate there are many inefficient refrigerators and freezers in the homes in Niue: of the refrigerators with an Australia/NZ

² Department for International Development (DFID), Government of the United Kingdom, *Energy for the Poor – Underpinning the Millennium Development Goals*, p. 5, August 2002.

³ World Commission on Environment and Development, *Our Common Future*, 1987.

⁴ State of Hawaii, *Field Guide for Energy Performance, Comfort, and Value in Hawaii Homes*, Edition 1.0, July 2001, p. 11.

⁵ Ibid., pp. 31-40

⁶ Ibid., p. 31

⁷ Ibid., p. 32

⁸ Ibid., p. 34

⁹ Ibid.

energy label, 52% are rated 2.5 stars or lower, and of the freezers with an Australia/NZ energy label, 55% are rated 2.5 stars or lower. Over time these could be replaced with more efficient models.¹⁰

37% of the surveyed households report that TVs, DVDs, satellite boxes and game consoles are plugged in and power is on all the time, and 11% of households report that the same is the case with laptop and desktop computers as well as printers. Having these electrical appliances always plugged in can waste electricity (even with the appliances turned off) unless the outlets are switched off as well.

A World Bank (WB) study from 2003 stated that evidence ‘...from a growing number of countries is showing multiple fuel [for cooking] to be fairly common...Thus a large number of households simultaneously use a variety of cooking fuels... Fuel use better resembles a menu choice in which households choose both high-cost and low-cost items depending on their budget, preferences, and needs’.¹¹ The household decision-making process related to energy consumption and fuel type is complex, with economic and technical aspects interlinked with social and cultural issues.¹² The findings from the Niue energy survey also show multiple fuels used (fuel stacking) for cooking – 69.9% of surveyed households use two or more cooking fuels. Results from other UNDP-supported energy household surveys in urban areas in Kiribati, Nauru, urban areas in Tuvalu, rural areas of Vanuatu, un-electrified areas in Samoa, urban areas in the Republic of the Marshall Islands (RMI) and two outer islands in the Cook Islands also show multiple fuels used for cooking.^{13 14}

¹⁰ In this context it should be mentioned that in early 2017 an energy efficiency loan scheme was launched by the Niue Development Bank with the support from IUCN and GEF. The objective is to provide financial incentives for businesses and households to switch towards energy efficient appliances, specifically freezers, refrigerators and washing machines. A 25% discount are provided for cash purchases of Australia/New Zealand Energy Rating labelled washing machines with a minimum of 4 stars and refrigerators and freezers with a minimum of 3.5 stars. Alternatively, an interest free loan can be obtained for these whiteware appliances.

¹¹ WB, 2003, p. 11.

¹² BMZ, 2014, p. 2.

¹³ 52% of households in Majuro used three types of cooking fuels (2008); 26% of households in un-electrified areas in Samoa used three types of cooking fuels (2007/2008); 50% of households in Rakahanga atoll, Cook Islands used three types of cooking fuels and 13% use as many as four different cooking fuels (2011); in Mitiaro island, Cook Islands around 87% of households used a second cooking fuel and one household used as many as five different cooking fuels (2011); in the village of Port Olry (Espiritu Santo), Vanuatu 44% of households used two types of cooking fuels and 10% three different cooking fuels (2010); in the urban areas of Tuvalu (the capital Funafuti) 50% of surveyed households cook with two cooking fuels, 28% with three fuels and 2% of surveyed households cook with four fuels (2014); in Nauru 44.8% of surveyed households cook with two fuels, 19.4% with three fuels, 3.6% with four, and 0.4% with five fuels (2015); in South Tarawa (the capital of Kiribati) 58.6% of surveyed households cook with two fuels, 18.8% with three fuels, 2.1% with four fuels, and 0.1% with five fuels (2016); and, in Kiritimati Island (Kiribati) 54.9% of surveyed households cook with two fuels, 23.8% with three, and 3% with four fuels (2016).

¹⁴ Rural areas in Pacific Island Countries still are very much biomass (wood or coconut fronds, shells and husks) dependent areas though rural areas with good transport connections are starting to use kerosene and liquefied petroleum gas (LPG) in homes where there is sufficient cash income.

2. Niue 2018 Household Electrical Appliances, Lights and End-use Survey

2.1 Household Definition

What is a household? The following definition is provided in the 2011 Niue Census of Population and Households report (2012, p. 121): ‘...one or more people who have a common arrangement for providing themselves with food, i.e. preparing meals and eating together.’ Not surprisingly, household definitions vary, but usually include some intersection of keywords relating to residency requirements, common food consumption, and/or intermingling of income or production decisions. The issue of correctly classifying individuals into household units is a problem that may be acute in societies where extended families cohabitate together in shared family compounds (refer to Beaman, Lori & Andrew Dillon, June 2011) – this situation is often the case in Pacific Island Countries.

2.2 Expected Outcomes

The expected outcomes of the household energy survey are:¹⁵

- a) Which electrical appliances and lights are the major users of energy and have the most potential for efficiency improvements;¹⁶
- b) A baseline for the urban residential sector concerning electrical appliances and lights established; and,
- c) Potential residential sector energy savings and energy efficiency target(s) recommended.¹⁷

2.3 Survey Objective

The objective for the energy survey was:

- a) To fill-in key energy data gaps for the residential sector in an accurate and statistically relevant manner.

The residential energy survey focused on determining the size, age, configuration, source, use patterns, conditions and other information about the home and its electricity-using equipment. In addition, the survey provides data on other key energy aspects at household level (such as cooking).

2.4 Survey Preparation and Implementation

The main components and associated key steps undertaken as part of survey preparation and implementation are described below.

2.4.1 Project Development and Design

During the period 12-16 September 2017, a trip by the UNDP Pacific – Fiji Office was undertaken to Niue with the objective to undertake consultations and initial planning for the household energy survey. This visit resulted in a concept note (November 2017) that included a situation analysis, expected outcomes, objective, outputs, activities, management arrangements and a tentative budget.¹⁸

¹⁵ Another potential outcome is improved residences for human comfort even though there is no air condition and little or no usage of fans, i.e. actual energy savings are not the issue in this case. Refer to section 1.2.

¹⁶ Likewise, which electrical appliances use so little energy that the cost of doing projects to improve their energy efficiency would not be very cost effective determined.

¹⁷ Such target(s) could then be monitored and assessed against the baseline.

¹⁸ Available here: <https://drive.google.com/open?id=1aD39lqyP3xReumv1MuRUia9KoVBx1eNu>

2.4.2 Stocktaking and Reviewing Available Information and Data

The survey was to build on/complement existing information. Thus, one of the first activities was locate, access, and review relatively recent information.

In 2012 a survey of the appliance market in Niue was carried out. It was funded by the Renewable Energy and Energy Efficiency Partnership (REEEP) with the objective to analyse the characteristics of select appliances and lighting products and markets and provide input to decision making for a possible standards and labelling (S&L) strategy for Niue. However, it provides total imports by value, not imports for nor by private households,¹⁹ so it is not directly useful as supplementary information for this household survey. In addition, the report only looked at seven (7) electrical appliances²⁰ and incandescent light bulbs. However, it did provide a useful checklist of electrical appliances to be included in this survey.

In February 2017, a survey of consumer awareness and use of energy rating labels was undertaken. The survey was commissioned by the Pacific Community (SPC) and carried out in context of preparing for the introduction of minimum energy performance standards (MEPS) and energy rating labels in Niue. The core objective of the survey is to 'establish a baseline for tracking the awareness of electrical appliance efficiency promotion activities and awareness of energy labels by householders...' However, other useful aspects were covered including 'Household appliance inventory for refrigerators, freezers, air conditioners, televisions', 'How recently major appliances were purchased', 'Appliance most likely to be next purchased' and 'Familiarity and usage of lighting types'. Based on the draft *Survey of Consumer Awareness and Use of Energy Rating Labels in PICs: Niue Country Report* the following tentative observations are made:

- There are indications that the results are not statically representative for all Niuean households. A total of 50 households were surveyed (10.3% of all households), but the sample was restricted to '...areas in Alofi'. Furthermore, the Statistics and Immigration Office was not involved in the survey; instead households were selected using a random walk ('left-hand rule') methodology.
- The survey only covers eight (8) electrical appliances²¹ and for these information is limited to quantity (number of appliances). E.g. for refrigerators/freezers no information is available on: bought new or used; obtained overseas or locally; the type (door arrangement), size (volume), age, condition (quality of door seal), self-defrosting or not, etc.
- Regarding lighting, information is limited to 'Use incandescent', 'Use CFL', 'Use tube' and/or 'Use LED'. No information is provided on the specific types of light bulbs/tubes,²² their location, hours of use and wattage. The last two pieces of information are required to estimate energy consumption.
- A tabulated dataset is not available.

¹⁹ The data presented in the Niue REEEP report was based on one on-site survey of major wholesaler and retailer shops as well as available customs data. Thus, the report does not cover electrical appliances imported privately.

²⁰ Specifically, the following electrical appliances: refrigerators, freezers, air conditioners, dishwashing machines, washing machines, water heaters, fans and televisions.

²¹ Specially the following electrical appliances were recorded: refrigerators, freezers, air conditioners, fans, televisions, cloth washers, water heaters, and 'electric cookers'. Thus, for example the following electrical appliances were not recorded: desktop and laptop computers, tablet computers, electric water cooler, electric sewing machine, sandwich maker, radio, musical keyboard, water pumps, etc.

²² There are several types of light bulbs/tubes. Main types include: standard old style fluorescent tube (T12) with iron ballast, standard fluorescent (T8) with electronic ballast, small tube fluorescent (T5) with electronic ballast, compact fluorescent lamp (CLF) bulb with integrated electronic ballast, CLF plug-in bulb with separate electronic ballast, light-emitting diode (LED) bulb, LED tube, incandescent with screw base, incandescent with pin type (bayonet) and halogen bulb.

To summarize regarding the February 2017 household energy survey: while the information is useful, the results do not appear to be statically representative, only a few electrical appliances were covered and information on these are limited, and the survey does not provide critical information on the type of light bulb/tube, power rating and hours of use.²³

Finally, the latest census was undertaken in March 2017. The results are not yet available, but the questionnaire included: main source of lighting; main means of cooking; main cooking area; main means of hot water; 'Umu Place'; ownership of several kitchen appliances including electrical; ownership of some leisure appliances including electrical; ownership of some communication appliances including electrical; ownership of some other electric appliances; and electricity energy efficiency and usage. Regarding the latter, there are questions related to freezer size ('small', 'medium', 'large') and for five electrical appliances²⁴ daily and weekly usage (usage is not specified in the questionnaire, but likely refers to hours of usage or the number of times used).

All in all, while the recent census and the two prior energy surveys provide some information on certain aspects there are large data gaps at the household level including electricity consumption for lighting.

2.4.3 Questionnaire Design

A survey is no better than the questions asked. The questions should be prepared by someone (preferably a team) with extensive knowledge of the group being surveyed, the processes needed for analysis of the survey, and the effect the questions have on that analysis. Frequently, it takes many questions to get one answer; i.e. several related questions have to be asked so the result from the combination of answers can be determined. The following are recommended for wording survey questions: i) keep it simple; ii) avoid acronyms and abbreviations; iii) ask only relevant questions; iv) be specific; v) avoid 'double-barrelled questions';²⁵ and vi) avoid leading questions.²⁶ Questions should be brief and not require elaborate directions or long written responses. In this context instead of blanks to be filled in from memory checklists/multiple choice or yes/no responses are recommended. Furthermore, though general impressions are an important part of a survey, the actual data must be in a form that is either numerical or represents a very limited, clear choice of responses.

Concerning survey questions, it is recommended practice to use survey questions that have worked elsewhere as this increases the likelihood that they will work (in addition survey results can be directly compared with those of other surveys). Regarding what electrical appliances and lights are in place in a household, the use pattern of appliances and lights and their characteristics are important data. It was decided that the questionnaire developed as part of recent household energy surveys in Tonga, Vanuatu, Tuvalu, Nauru and Kiribati be used. These surveys were undertaken during the period 2013-2016 supported by the Asian Development Bank (ADB), Global Environment Facility (GEF), Government of Australia, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), Pacific Community (SPC), International Union for Conservation of Nature (IUCN), United Nations Environment Programme (UNEP) and UNDP. Based on lessons and findings from the 2016 Kiribati survey, a few changes were made to the

²³ It should also be noted that the draft *Survey of Consumer Awareness and Use of Energy Rating Labels in PICs: Niue Country Report* include '...suggested improvements to the data collection tool' and that most of these were addressed in the questionnaire used for this household electrical appliances, lights and end-use survey.

²⁴ Specifically, automatic washing machine, iron, microwave, electric jug and electric stove.

²⁵ A question that touches upon more than one issue, yet allows only for one answer.

²⁶ EC, pp. 51-52, 2013.

questionnaire.²⁷ Overall the questionnaire was designed to assist in determining the following aspects among others:²⁸

- Residence
 - Type, main building materials, roof insulation in the main building, color of roof and outer walls in the main building, and sanitary facilities.
- Electricity
 - Whether more than one household share the same meter, how many buildings in the compound have electricity, average bill per month & method of payment.
- Vehicles
 - Type and number.
- Household members
 - Number, age composition and main sources of income.
- Washing machine
 - Estimated loads per week.
- Lighting
 - Types, number, wattage, location and hours of use.
- Refrigeration and freezers
 - Location, type (door arrangement), size, age, new or used when obtained, obtained locally or overseas, manufacturer, model, condition (door seal), self-defrosting, energy label including country, and plans to replace.
- Air conditioners
 - Location, type, origin, age, new or used when obtained, obtained locally or overseas, manufacturer, model, condenser shaded most of the day, condition, status of evaporator filter, remote control unit, wattage, British thermal unit (BTU) rating, hours of use (hot season and cool season), if noise is considered a problem, and plans to replace.
- Computers including printers
 - Location, age, new or used when obtained, obtained locally or overseas, type of monitor (flat screen or cathode ray tube (CRT)), type (desktop or laptop), printer (laser or ink), purpose, hours of use (school days, school holidays, Saturdays & Sundays), are plugged in and powered on all the time, internet access, and plans to replace.
- TVs
 - Location, age, new or used when obtained, obtained locally or overseas, type of monitor (flat screen or CRT), satellite or cable box, wattage, remote control unit, hours of (school days, school holidays, Saturdays & Sundays), DVD player including frequency DVDs played, game box including hours of use, if plugged in and powered on all the time, and plans to replace.
- Fans
 - Type, location, number, wattage, location, and hours of use (hot season and cool season).
- Microwave Ovens
 - Type of controls, minutes of use, wattage, and if plugged in and powered on all the time.

²⁷ An example. For the survey in Niue concerning air conditioners and fans, respondents were asked about hours of use per day for the hot as well as the cold season. However, this was not required in Kiribati, Nauru, nor Tuvalu that experiences consistent monthly average temperatures throughout the year.

²⁸ At the household level, an EuroStat Task Force recommends the following topics as 'Highest priority or 'Must Have': housing stock characteristics; household characteristics; consumption/expenditure on energy commodities; unit/specific consumption; energy consumption by end use; space heating; hot water; penetration of energy efficiency technologies; cooking; and air conditioning (refer to EC, p. 18, 2013).

- Mobile phones
 - Number and if charger is plugged in and powered on all the time.
- Tablet computers
 - Number and if charger is plugged in and powered on all the time.
- Small electrical appliances
 - Types, number, wattage, and hours of use.
- Cooking
 - Type of fuel and extent of usage.
- Solar water heaters
 - Type, electrical back-up heater & tank type.

Preferably, questions should be provided in the local language. This, will facilitate that all questions will be asked in the same manner by the surveyor²⁹ and understood by the respondent, since both reduce survey error. For this survey a dual language questionnaire was used, specifically Niuean was written in cursive after English text.³⁰

The full questionnaire is available in *Annex B*.

2.4.4 Survey Scope, Sample Size and Household Selection

It was the intention for the survey to be statistically representative for all households in Niue. In determining an appropriate sample size, numerous factors come into the equation including:³¹

- a) The degree of accuracy required for key estimates;
- b) The population size of the country;
- c) The manner in which the sample is selected;
- d) Cost or staffing constraints which may exist;
- e) Whether or not estimates are required for sub-populations; and,
- f) The level of variability in the data being collected.

In a UNESCO publication related to this issue the following is written:³²

‘...the higher the percentage of the total population surveyed, the better the accuracy of the results, but the accuracy improves most between 0% and 15%. Above 15% the accuracy still improves, but more slowly. Also, the greater the number of units surveyed, the better the accuracy, but the accuracy improves most dramatically up to about 20 units. Above about 20 surveyed units, the accuracy still improves, but more slowly. Thus as a general rule of thumb for these types of small survey, no less than 15% of the total group should be surveyed and no less than 20 surveys should be taken when using this random selection method.’

If the above mentioned ‘15% general rule of thumb’ was followed for this survey, this would mean around 73 households be surveyed. However, as the absolute number of households is relatively small (485 as per 2017 census preliminary results) and there are relatively low variable costs associated with such a survey in Niue, instead a sample in the order of 250 households were agreed to. In the end, a total of 210 households were surveyed, which is around 44% of all households. This is a relatively high percentage for

²⁹ If surveyors do an on-site translation from English to local language this increases the risk of inaccuracy in the survey.

³⁰ In Nauru, it is standard practice for the Nauru Bureau of Statistics to undertake surveys only in English (but sometimes having a few dedicated surveyors speaking Mandarin).

³¹ P. 4, *Preliminary Survey Design Investigations for the 2006 Kiribati HIES*.

³² Refer to p. 37, *Solar Photovoltaic Project Development*, 2003.

a national level sample survey.³³ The sample method used by the Statistics and Immigration Office to select households for prior sample surveys was followed. As part of the 2017 census the household listing with the NSO has been updated and this recently updated database was used to select households for the sample.

2.4.5 Selection and Training of Surveyors and Supervisors

The quality of a survey is greatly affected by the quality of the surveyors. Thus, getting good, reliable and honest surveyors is critical. Basic skills required in surveyors include language proficiency, decent ability to communicate, patience and attention to detail - little is required in the way of special technical skills. Experience with rural energy surveys in many developing countries indicate that the least-biased survey interviews are usually obtained by sending a young male/female team to each household. The value of a survey is also greatly affected by the quality of the supervision of the surveyors. Survey supervision - overall as well as onsite - will make or break a survey and supervisors should be chosen carefully. Preferably supervisors should have already worked on a survey team, understand survey methodology and especially be reliable and meticulous. On site survey supervisors will be in charge of the survey teams in the field. Their main tasks include:

- 1) Tour the survey area to ensure the surveyors are in fact working in the right area and that there are no problems to be solved;
- 2) Check every questionnaire for: i) wildly varying responses between respondents who are obviously similar; ii) notable differences in the number of people questioned by the different surveyors; iii) very consistent responses to questions asked by surveyors compared to the consistency of responses found by other surveyors; and iv) questions that are consistently left unanswered or answered by the equivalent of 'I don't know' indicate a problem with those questions; and,
- 3) Check that the surveyors correct any obvious errors and omissions, clear/sign-off on all questionnaires and collect and store completed questionnaires at an appropriate (including secure/locked) venue until data entry is completed.

The Statistics and Immigration Office identified surveyors and supervisors some of which had prior survey experience - either as enumerator, field supervisor, doing data entry, etc. E.g. a couple of them were involved in the 2017 census. 10 surveyors and 1 local supervisor underwent an intensive two-day training program. The training covered background, the survey cycle, general survey pointers, questionnaire familiarisation, detailed walk-through of the questionnaire, a test in their own home with feed-back from surveyors the next day, and planning including logistics for the main survey. In addition, during the actual survey (e.g. 4 and 6 March) feedback was provided to the surveyors on specific issues identified with the filled-in questionnaires. These debriefings were provided collectively (i.e. to all surveyors and supervisors in one room) as well to individual survey teams. De facto, this mechanism served as additional training (this feedback proved to be effective, as the number of errors dropped over the survey period). The programme for the training workshop held is available in *Annex C*.

³³ For the Vanuatu electrical appliances and lights survey an estimated 12.9% of all electrified households in Port Vila completed the questionnaire (1,009 households) and 16.5% of all electrified households in Luganville completed the questionnaire (329 households); for the Tuvalu survey an estimated 51.4% of all electrified households in Funafuti completed the questionnaire (434 households); for the Nauru survey an estimated 17% of all electrified households completed the questionnaire (286 households); for the South Tarawa survey an estimated 10.4% of all electrified households completed the questionnaire (819 households); and, for the Kiritimati Island survey an estimated 16.1% of all electrified households completed the questionnaire (164 households). Thus, the percentage of household's survey ranged from 12.9% to 51.4%.

A key training material - as well as a key tool during field-work - was a de facto Survey Manual/Interview Protocol. For the “Promoting Energy Efficiency in the Pacific Phase 2” (PEEP-2) supported household energy survey in Tonga a (44-pages) Survey Questionnaire Manual was prepared for the supervisors. For the Niue survey – among others based on the Tonga Survey Questionnaire Manual - a Detailed Walk-through of the Survey Questionnaire PowerPoint presentation was prepared (187-slides). Each of the surveyors was provided with a hardcopy of this comprehensive presentation.

2.4.6 Households Surveyed and Survey Supervision

Immediately before and during surveying, information about the survey was provided to the population via radio broadcasts and TV spots. Surveying began 2 March and ended 23 March 2018. Below in Table 1 is a breakdown of the households visited and surveyed.

Table 1: Households Visited and Surveyed

	Number	Percentage
Un-electrified	1	0.5
Vacant	3	1.4
Refused to Participate	2	0.9
No data entries	0	0
Surveyed	210	97
Total	216	100

As can be seen 0.9% of the households refused to participate, which is a low figure compared to similar national level sample surveys in other PICs. De facto a total of 210 households were surveyed, which is 43.3% of all households in Niue.³⁴ Select households in all 14 villages were surveyed, i.e. Alofi South, Alofi North, Makefu, Tuapa, Namukulu, Hikutavake, Toi, Mutalau, Lakepa, Liku, Hakupu, Vaiea, Avatele and Tamakautoga.

Information on time used to complete interviews is provided in Table 2 below.

Table 2: Time used Interviewing

Minimum	12 minutes
Maximum	180 minutes
Average	45 minutes
Median	40 minutes

³⁴ As per 2017 preliminary census results there is a total of 485 households in Niue.

2.5 Data Entry, Validation and Tabulation

2.5.1 Data Entry

Ideally, data entry of paper questionnaire results is entered as the survey is underway in order for this task to be almost complete once the field work is over and to allow correction of questionnaire errors that adversely affect data entry. However, many times this is not possible (manpower, logistics, etc.). Data entry is a somewhat specialised area, and the best results with the highest accuracy are attained when completed by people familiar with the process (usually people from the statistics office or who have worked on data entry in other surveys).

For this survey, the data entry form (and questionnaire) was designed for ease of and accuracy of data entry. Data entry was done in Excel³⁵ as this facilitates using people not familiar with dedicated statistical survey software such as Census and Survey Processing System (CSPPro) (just about everyone outside the Statistics field). Data entry was done by someone outside the Statistics and Immigration Office (as most staff were out in field interviewing).

2.5.2 Data Checking and Tabulation

The raw dataset was quality checked by the author and the author also undertook tabulation. Concerning tabulation, it should be noted that while energy use for lights was estimated - for various types of lights as well as in total – this is not the case for electrical appliances.³⁶ For lights, W times hours of use will result in a reasonable estimate of energy use - Watt-hour (Wh) - because they are always drawing the same watts as their nameplate value. With regard to electrical appliances, the W value on appliance labels is useful in comparing equipment and noting what the relative households have in terms of energy-using equipment, but are not an accurate way to determine kWh used. The W rating given on appliance labels is the *maximum* that may occur and is listed mainly to assure that the customer plugs the appliance in an outlet that can handle that maximum level of power demand. The actual usage often is a fraction of that maximum power demand. Thus, for electrical appliances high Wattage does indicate high watt-hours, but the actual number depends on pattern of usage.³⁷ Because usage patterns of many electrical appliances have such an effect on kWh, it is practically impossible to develop a reliable energy use profile for a particular appliance without actually measuring it. Instead what is looked for in this survey is: 1) the mix of electrical appliances that people actually use; and 2) their relative power requirements. So, in identifying and designing programmes through 1) it can be known what appliances to address and through

³⁵ The same was the case with PEEP-2 surveys in Tonga and Vanuatu, the IUCN and UNDP supported survey in Nauru, the SPC and UNDP supported survey in Tuvalu, the UNDP supported survey in Kiribati and other past UNDP-supported household energy surveys in Fiji, Samoa, RMI, Vanuatu and Cook Islands.

³⁶ This section is based on personal communication with Dr. Herbert A. Wade.

³⁷ A few examples: A radio has nameplate wattage at 42W. If it is plugged into a wattmeter it reads 4W with the volume at a low value, one that is good for personal listening with the radio nearby. If volume is turned up, the watts go up in step with the volume, so both the hours of use and the manner of use have a major effect on kWh for that device. Computer energy usage is also very dependent on how the device is used. Somebody who watches a lot of videos will have more kWh used by their computer than someone who just reads e-mails and uses MS Office. Nonetheless, if a radio has a listed wattage of 100W, then it is highly likely to be using over 2X the kWh relative to a radio with a listing of 42W. The same applies to TVs, computers, video games, etc. Refrigerators, Freezers and AC units will also have considerable variation in kWh used, but again the unit with the higher watts on the label can be expected to use more kWh under the same conditions of use as one with lower Watts. Another example would be an electric iron. The wattage may be 2000W, but using the iron for an hour will not use 2 kWh of energy because the iron thermostat switches the power on and off to keep the iron at a fairly constant temperature. When the iron is sitting still in its rack while the person using it is folding clothes, the energy use is much lower than when it is actually ironing on the cloth. If the cloth is still damp, the energy use will be even higher because the evaporation of the moisture will cool the iron, causing the thermostat to come on more quickly and stay on longer. But a 4000W iron will invariably use more kWh than a 2000W iron.

2) it can be assessed which appliances are probably the most inefficient. An example: If TVs are found in most houses and some show 50W on their nameplates but many others show 250 Watts, it can reasonably be assumed that the 250W units can be replaced by more efficient TVs. The survey might further show that most homes have the TVs running 4 hours or more a day, so there is good reason to prepare a programme to replace inefficient TVs.

2.6 Survey Deliverables, Costs and Funding

2.6.1 Survey Deliverables

Various deliverables were produced with the key ones being:

- i. Survey questionnaire;
- ii. Training workshop agendas and materials;
- iii. De facto survey manual/interview protocol;
- iv. Data entry template;
- v. List of selected households for the sample;
- vi. Filled-in and signed off questionnaires;
- vii. Raw data set;
- viii. Tabulated data set; and,
- ix. Survey report (this one).

2.6.2 Costs and Funding

The direct local survey costs totalled NZD22,080.20 (refer to *Annex E* for a comparison of the estimated direct survey costs associated with energy household surveys undertaken in various Pacific Island Countries). Financial support from the Department of Foreign Affairs and Trade, Government of Australia via UNDP covered survey costs. It should be noted that significant in-kind contributions were provided by local stakeholders, particularly the Statistics and Immigration Office.

2.7 Survey Quality

Overall survey quality depends on many factors including sampling design, questionnaire design, field work, and data management.³⁸ Various aspects of the Niue survey process incurred issues that possibly could have influenced the quality of the survey negatively, as summarised below.

2.7.1 Questionnaire

There were some issues related to the questionnaire. For instance, the code 'F' was given to both electric frying pan and flashlight and 'SM' to both sandwich maker and sanding machine. During the training workshop it was agreed that electric frying pans would be 'F1' and flashlights 'F2' and sandwich maker would be 'SM1' and sanding machine 'SM2'. However, in the raw dataset there were several cases where 'F' was entered (a total of 29) as well as 'SM' (a total of 39). This means that electric frying pans and/or flashlights are under reported (as 'F' is not counted/tabulated) and the same is the case for sandwich makers and/or sanding machines (as 'SM' is not counted/tabulated).

2.7.2 Training

As part of the training process preferably small-scale field trial surveys should be undertaken. The purpose of such is to double check that: i) the questionnaire is understandable by the respondents and the surveyors; and ii) that the surveyors understand exactly what they are to do. Trial surveys are important

³⁸ According to a recent EU publication the '...5 main elements to achieve good results are careful planning, a clear understanding of the needs for the survey, a clear and simple questionnaire, well trained interviewers and comprehensive data validation' (EU, p. 52, 2013).

as they will form the basis for any modification of the questionnaires and will help the surveyors more clearly understand the requirements of the survey. While the surveyors did a test survey of their own household, it was not possible to modify the questionnaire as questionnaires were printed before the training workshop. Nevertheless, this is not considered a major issue since the questionnaire has been trialled, successfully utilised and continuously improved during recent use in five other countries (Tonga, Vanuatu, Tuvalu, Nauru and Kiribati).

2.7.2 Surveying, Supervision and Data Entry

As mentioned above some of the surveyors had prior survey experience, but the majority had none. Obviously prior survey experience is beneficial as the survey process and many operational issues are identical no matter the specific focus of a survey.

Furthermore, there were issues with the recording of responses by surveyors. However, such issues are to be expected, particularly during the first days of surveying. The important thing is that these are identified and addressed via clarification collectively (i.e. all surveyors) as soon as possible (on a positive note, such lessons learned can be used to improve the training associated with future similar surveys).

Finally, during data validation the author noted several issues including: many empty cells, many incorrect entries (e.g. 0W flashlight), and numerous unlikely entries (e.g. 0.5W toaster, 1005W small fluorescent T5 tube with electronic ballast, 2400 cm high refrigerator, etc). Concerning unlikely responses/entries as part of validation, data outliers were identified (by identifying maximum and minimum values) and corrected (i.e. disregarded) where needed by the author.

2.7.3 Overall Survey Quality

As mentioned above, some issues that may have impacted the validity of results negatively have been identified. Thus, overall the survey is deemed to be of satisfactory quality: as such, the results can be considered to be indicative of the electrical appliances and lights currently in place in households in Niue, as well as the use patterns of appliances and lights and their characteristics.³⁹

2.8 Recommendations for future Similar Household Electrical Appliances and Lights Surveys

Based on experiences including lessons learned, provided below are recommendations for certain aspects of future similar household energy surveys in Pacific Island Countries:

- *Questionnaire*
 - If the aim is to assess what electrical appliances and lights are in place in an urban household and their use patterns and characteristics, using the questionnaire is recommended. Among others, this will enable direct comparison with other PICs including Tonga, Vanuatu, Tuvalu, Nauru, Kiribati, Niue and Palau. However, the issues mentioned above should be addressed.⁴⁰

³⁹ It should be noted that even when flawlessly executed, household surveys are approximations at best. Some of the weakness associated with such surveys include: 'Misses what is not easily quantifiable; sampling frame may miss significant members of the population; may fail to capture intra-household allocation; assumes that numbers are objective and conclusive; assumes that the same question means the same thing in different cultural contexts' (Sumner and Tribe, 2008, p. 111).

⁴⁰ In April-May 2018 the Palau Energy Administration, IUCN and UNDP undertook a survey of urban households in Palau. The Palau questionnaire addresses the issues with the questionnaire used in Niue and is available here: https://drive.google.com/open?id=1wGp_hoKAIHfsg3x8Lq1bZxnMKAPGZe0v

- *Supervision*
 - Undertake detailed daily check of *all* filled-in questionnaires.
 - Provide daily feedback to surveyors on specific issues identified with filled-in questionnaires. Undertake such debriefings:
 - In the mornings before commencing survey work.
 - Collectively (i.e. to all surveyors and supervisors in one room) as well to individual survey teams.
 - After possible issues have been addressed, require supervisor sign-off that the questionnaire has been satisfactorily completed.
- *Data Entry, Quality Check & Tabulation*
 - For Excel-based raw data sets, the person(s) doing tabulation must be familiar with more advanced Excel formulas (including COUNTIF, COUNTIFS, SUMIF, AVERAGEIFS, etc.) *before* beginning tabulation.
 - Supervisor(s) undertake spot-checks to assess accuracy of data entry.
 - The first step in data quality checks must be a calculation of maximum and minimum values – this will greatly assist localising and fixing (including disregarding) data outliers where necessary.

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Annex B: Questionnaire

Surveyor Name(s):		Survey ID Code	
Village / <i>Maaga</i>			
Survey Start time / <i>Tulā kamata</i>			
Survey Finish Time / <i>Tulā ne oti e fekau</i>			
Survey Date / <i>Aho</i>			
Full Name of Person interviewed / <i>Higoa katoa he tagata tali huhū</i>			
Age of Person interviewed / <i>Tau moui he tagata tali huhu</i>			
Gender of Person interviewed (M/F) / <i>Ko e tagata taane po ke tagata fifine ne tali huhu</i>			
Telephone Number / <i>Numela telefoni</i>			
1	Type of residence / <i>Vahega fale nofo he kaina</i> <i>S = Single storey house / Fale toka taha</i> <i>D = Double storey house / Fale luga fata ua</i> <i>A = Apartment in an apartment building / Taha Fale nofo he atu Fale- luga nofo fata loga</i> <i>M = Three storeys / Fale luga fata tolu</i> <i>R = Residence over shop / Fale nofo l luga he Fale koloa</i> <i>X = Other / Taha vahega fale foki _____</i>	1	
2	If the residence is in an apartment building, is the residence on the top floor of the building? (Y/N) / <i>Kaeke ko e taha fale nofo he atu Fale- luga nofo Fata loga, toka ka e fale nofo ia he fata fakahikuaki i luga?</i>	2	
3	Main building construction materials / <i>Tau koloa ne talaga aki e Fale nofo</i> <i>F = Coconut / Tau koloa mai he niu</i> <i>W = Other Wood / Tau koloa mai he falu akau</i> <i>B = Brick/Stone / Piliki/ maka</i> <i>C = Concrete Block / Poloka simeni</i> <i>S = Metal / Lapatoa</i> <i>A = Asbestos / Lapa simeni</i> <i>O = Other / Falu vahega koloa foki _____</i>	Walls / <i>Tau kaupā</i>	3a
		Roof / <i>Ulu fale</i>	3b
4	Main building colours / <i>Lanu ne vali aki e fale nofo</i> <i>1 = Unpainted/ Ai fai vali</i> <i>2 = White /Vali tea po ke fakahina</i> <i>3 = Light Colour / Vali lanu mamā</i> <i>4 = Medium Colour /Vali lanu vahāloto</i> <i>5 = Dark Colour /Vali lanu uhi</i>	Outside Walls / <i>Tau kaupā l fafo</i>	4a
		Roof / <i>Tua fale</i>	4b
5	More than one (1) household share the same electricity meter? (Y/N) (<i>if N, go to Q7</i>) / <i>Tokologa nakai ne fakaaoga e taha ni e mita hila? (Kaeke ko e Nakai e tali ti holo loa ke he huhū 7)</i>	5	
6	If yes, how many households share the same electricity meter? / <i>Kaeke ko e tali Ē, toko fiha e kaina ne fakaaoga taha e mita hila ia?</i>	6	

Surveyor Name(s):

Survey ID Code

7	How many buildings in the household that have electricity / <i>Fiha e fale he kaina ne fai hila?</i> <i>(DO NOT INCLUDE BUILDINGS THAT ARE NOT CONNECTED TO ELECTRICITY) / (UA TOTOU E TAU FALE NE NAKAI HOKO E HILA KI AI)</i>	7	
8	How many people in total belong to this household and are resident most of the year? / <i>Tokofiha e tagata ne nonofo he kaina mo e nonofo mau he tau katoa?</i>	8	
9	How many people are in the following age groups that belong to this household and are resident most of the year? / <i>Toko fiha e tagata, he tau atu tau ne kua fakakite, ne nonofo he kaina mo e nonofo mau he tau katoa?</i>		
	Under 5 years / <i>I lalo hifo he 5 e tau moui</i>	9a	
	5-10 yrs / <i>5-10 e tau moui</i>	9b	
	11-17 yrs / <i>11-17 e tau moui</i>	9c	
	18-35 yrs / <i>18-35 e tau moui</i>	9d	
	36-50 yrs / <i>36-50 e tau moui</i>	9e	
	51-65 yrs / <i>51-65 e tau moui</i>	9f	
	Over 65 years / <i>molea e 65 e tau moui</i>	9g	
10	On average, about how much does the household estimate it pays per month for electricity? (in NZ\$) / <i>Ka fakaevaleti e tau tupe ne totogi aki e hila he kaina, liga fiha e tupe (talā NiuSilani), ne totogi aki e hila he taha e mahina?</i>	10	
11	Method of payment of electricity bill / <i>Puhala fefē ne totogi aki e kaitalofa hila</i> 1 = Cash payment of bill / <i>Totogi aki e tupe maō</i> 2 = Electronic payment / <i>Totogi he tau puhala initanete</i> 3 = Pre-paid meter / <i>Tuku e numela he tokene ne kua totogi, ke he mita hila, to fakaaoga e hila</i> 4 = Other (specify) / <i>Falu puhala foki (talahau)</i>	11	
12	Roof insulation / <i>Puhala pupuni puipui he alofale</i> 1 = Radiant barrier right under the roofing materials (typically aluminium) / <i>Fakaalo aki e taha pepa kikila (tuga e foila aluminiamu matolu lahi)</i> 2 = Batts (fiberglass or cotton) / <i>Fakaalo aki taubatts- fafatu iko fibreglass</i> 3 = Blown (fiberglass or cellulose) / <i>Ko e taha puhala ne fakaaoga e tau lakau hila ke uulo e tau vala fibreglass po ke cellulose ke he alofale</i> 4 = Spray foam / <i>Ko e puhala ne fakaaoga e tau vahega spray foam (fiho pelesitiki) ke pamu ke he alofale.</i> 5 = Other (specify) / <i>Falu puhala foki (talahau)</i> _____ 6 = None / <i>Ai fai</i>	12	
13	Do any residents of the household own and register a motor vehicle (car, truck, van, bus or motorcycle, etc.) or own a bicycle? (Y/N) / <i>Fai tagata nakai he kaina ne fai mo e kua tohia letititā e ha peleōafi (motoka, tulaki, vene, pasi, pasikala afi, mo e heigoa foki) po ke fai pasikala taholi? (Y/N)</i> <i>(If N to Q13, proceed to Q15) / (Kaeke ko e Nakai e tali, ti holo loa ke he huhū 15)</i>	13	

Surveyor Name(s):

Survey ID Code

		Type / Vahega	Number / Numela	
14	What type of registered vehicles and bicycles are owned and the number of each / Ko e heigoa e vahega peleōafi po ke pasikala taholi ne moua he kaina mo e fiha e loga he tau koloa ia? 1 = Automobile (carries 2 to 5 adults) / Motokā (ne maeke ke heke ai 2 ke he 5 tagata lalahi) 2 = Motorcycle / Pasikala afi 3 = Truck / Tulaki 4 = Van (carries more than 5 adults) / Vene (ke heke ai molea e 5 e tagata lalahi) 5 = Bus / Pasi 6 = Bicycle / Pasikala taholi 7 = Other (specify) / Fai foki (talahaui) _____	14a		
		14b		
		14c		
		14d		
		14e		
SOURCES OF HOUSEHOLD INCOME / MOUAAGA HE TUPE HE KAINA				
15	G = Salaried Government / Totogi he Gahua Fakatufono S = Salaried Private / Totogi he gahua he tagata ni A = Farming / Fakafua Tau fua he Fonua W = Skilled work / Gahua tufuga he tagata H = Own business at home / Totogi he gahua pisinisi i kaina B = Own business outside / Totogi he gahua pisinisi i fafo he kaina F = Fishing / Totogi he tau gahua he Tofia mo e fakafua e tau lka P = Pension / Totogi fuakau mo e Tupe lagomatai kia lautolu ne nakai katoatoa R = Remittances / Tau tupe lagomatai mai fafo i Niue C = Cutting copra / fakafua Niu hihi tavaki X = Other (specify) / Falu foki (talahaui) _____	Main income source / Matapatu puhala ne moua e tupe he kaina	15a	
		Second most important source / Puhala ne vaipa ua he moua tupe he kaina.	15b	
		Third most important source / Puhala ne vaipa tolu he lahi he tupe ne moua	15c	
		Fourth most important source / Puhala ke faaki he lahi he tupe ne moua	15d	
		Additional source / Taha puhala moua tupe foki	15e	
		Additional source / Taha puhala moua tupe foki	15f	
		Additional source / Taha puhala moua tupe foki	15g	
		Additional source / Taha puhala moua tupe foki	15h	
		Additional source / Taha puhala moua tupe foki	15i	
		Additional source / Taha puhala moua tupe foki	15j	
16	Type of sanitary facilities / Tau Vahega Fale vao 1 = Flush toilet / Falevao fakatafe 2 = Water sealed squat toilet / Fale vao nofo tiketike, ligi vai 3 = Outside Pit latrine / Fale vao luo keli i fafo 4 = Compost toilet / Fale vao luo ke he tau otaota sesemoko 5 = Other (specify) / Falu foki (talahaui) _____ 6 = None / Ai fai	16		
17	Do you do the family washing with a washing machine? (Y/N) / Fakaaoga nakai e koe e masini unumena mo unu e tau koloa he kaina? (Y/N) (If N, proceed to Q19) / Kaeke ko e Nakai e tali ti holo loa ke he Huhū 19)	17		
18	If Yes, how many washing machine loads per week do you estimate you do? / Kaeke ko e E e tali, fuafua ko e liga fiha e uta unu haau ka taute he taha e faahi tapu?	18		
Comments / Falu Manatu:				

19. Lighting Inventory / Fakamauaga he tau koloa Moli hila he kaina

19a) How many light bulbs/tubes does this household have in total? / *Fiha e katoatoa he moli fua veliveli/vikoviko mo e moli fua loloa he kaina?* = _____

(If none, go to Q2Q) / (Ka nakai fai ti holo loa ke he Huhū 20)

19	LIGHT TYPE CODE / TAU MATATOHI MO FAKAVAHEGA E TAU FAGA MOLI F = Big old style fluorescent tube with iron ballast (T12) / <i>Fua moli loa lahi mai fakamua (T12)</i> V = Standard old style fluorescent tube with iron ballast (T8) / <i>Fua moli loa tuai ne lahi e fakaoga (T8)</i> E = Standard fluorescent tube with electronic ballast (T8) / <i>Fua moli loa foou mo e ko e taha puhala hila ni ne fuafua aki e maama (T8)</i> T = Small tube fluorescent with electronic ballast (T5) / <i>Moli loa foou, tote e kupu lahi he fua moli (T5)</i> Z = LED T8 linear tube / <i>Moli loa. LED T8</i> A = LED T5 linear tube / <i>Moli loa. LED T5</i> C = CFL bulb with integrated electronic ballast / <i>Moli hila CFL, ne mavikoviko fahu, fua tea</i> B = CFL plug-in bulb with separate electronic ballast / <i>Moli CFL palaki tuga e C i luga, ti vala kehe ka fuafua aki e maama</i> L = LED bulb / <i>Fua moli, LED, veliveli po ke mavikoviko</i> S = Incandescent bulb with screw base / <i>Fua moli maama lahi ka e vilovilo ka tuku he palaki</i> P = Incandescent bulb with pin type (bayonet) / <i>Moli tuga e S i luga ka e huhulu ka tuku he palaki</i> H = Halogen bulb / <i>Fua moli veliveli, Halogen, maama lahi</i> X = Other (specify) / <i>Falu foki (talahaui)</i>	Light type code / Vahega a moli	Hours of use per day / Numela tulā ka fakapuho he aho	Location code / Tokaaga he fua moli	Watts per bulb or tube / Malolō uota hila he taha e moli veliveli poke moli loa
		19b			
		19c			
		19d			
		19e			
		19f			
		19g			
		19h			
		19i			
		19j			
		19k			
		19l			
		19m			
		19n			
		19o			
		19p			
		19q			
		19r			
		19s			
		19t			
		19u			
		19v			
		19w			
		19x			
		19y			
		19z			
		19aa			

ROOM LOCATION CODE / MATATOHI MO FAKAVAHEGA E POKO NE TOKA AI S = Sleeping room / <i>Poko mohe</i> E = Eating room / <i>Poko kai</i> L = Main living room / <i>Poko lahi- lotofale</i> C = Cooking area (Kitchen) / <i>Poko taute kai</i> W = Shop / <i>Fale Koloa</i> B = Room used for other business purposes (specify business purpose for the room) / <i>Poko gahua he taha vala he pisinisi (Talahau ko e heigoa e vala ia he pisinisi)</i> O = Office for personal use / <i>Poko ofisa he tagata</i> T = Bathroom or toilet / <i>Poko kōukou po ke Poko falevao</i> H = Hallway / <i>Avaloa</i> R = Storage room or closet / <i>Poko toka koloa po ke puha toka koloa</i> G = Garage / <i>Fale motokā</i> V = Veranda / <i>Kaupā</i> M = Other places outside (yard lights, security lights, etc.) / <i>Falu matakavi foki i fafo (moli fafo, moli matakaki, fai foki)</i> X = Other (specify) / <i>Falu foki (Talahau)</i>

Surveyor Name(s):

Survey ID Code

20. Refrigerators / Tau Filisa Fakamomoko20a) How many refrigerators does this household have in total? / *Fiha e filisa fakamomoko he kaina nai? =* ____

(If none, go to Q21) / (Ka nakai fai ti holo loa ke he huhū 21)

ROOM LOCATION CODE / TAU MATATOHI MO FAKAVAHEGA E TAU POKO NE FAI MOLĪ		No. 1	No. 2	No. 3
S = Sleeping room / <i>Poko mohe</i> E = Eating room / <i>Poko kai</i> L = Main living room / <i>Poko lahi lotofale</i> C = Cooking area (Kitchen) / <i>Poko taute kai</i> W = Shop / <i>Fale koloa</i> B = Room used for other business purposes (specify business purpose for the room) / <i>Poko taute gahua pisinisi (talahau ko e heigoa e vala gahua he pisinisi)</i> O = Office for personal use / <i>Poko Ofisa gahua he tagata</i> H = Hallway / <i>Avaloa</i> R = Storage room or closet / <i>Poko toka koloa</i> G = Garage / <i>Fale motokā</i> V = Veranda / <i>kaupā</i> M = Other places outside / <i>Falu poku fale foki I fafo</i> X = Other (specify) / <i>Falu foki (Talahau)</i> _____	Location (Room code) / <i>Vala fale he kaina (Matatohi he poko he kaina)</i>	20b		
	Approximate year obtained / <i>Fuafua ko e tau fe ne moua ai</i>	20c		
	Obtained new or used? (N/U) / <i>Ko e koloa foou poke koloa Tuai kua fakaaoga he magaaho ne moua ai (N/U)</i>	20d		
	From local or overseas source (L/O) / <i>Moua I Niue po ke moua mai I fafo I Niue (L/O)</i>	20e		
	Self-defrosting (Y/N) / <i>Fakatataka ni e ia (Y/N)</i>	20f		
	Door arrangement code / <i>Matatohi Fakavahega he tokaaga gutuhala</i>	20g		
	Width in cm / <i>Kupulahi he fuafua-senetimita</i>	20h		
	Height in cm / <i>Tokoluga he fuafua-senetimita</i>	20i		
	Door seal check-Good or Bad (G/B) / <i>Tivi e momi he gutuhala ko e mitaki po ke kelea (G/B)</i>	20j		
	Is the refrigerator powered on and operating all the time? (Y/N) (If Y, go to 20m) / <i>Fakamoui tumau nakai e filisa ti gahua tumau? (Y/N) (Kaeke ko e tali E fti holo ke he 20m)</i>	20k		
	If No, how many hours per day is it powered on and operating? (24-hours period) / <i>Kaeke ko e tali Nakai, fiha e tulā he aho ka fakamoui mo e gahua? (he 24 tulā aho)</i>	20l		
A = Freezer above, refrigerator below / <i>Filisa maō I luga, filisa momoko I lalo</i> B = Freezer door beside the refrigerator door / <i>Ko e gutuhala he filisa maō ne fetataaki mo e gutuhala he filisa momoko.</i> U = Freezer door under the refrigerator door / <i>Ko e gutuhala he filisa maō I lalo he gutuhala filisa momoko</i> R = Freezer in a drawer under the refrigerator door / <i>Ko e filisa maō i loto he puha toloa, I lalo he gutuhala he filisa momoko</i>	How much do you think it costs for electricity every month? (in NZ\$) / <i>Ka fuafua e koe liga fiha e tupe fakamole ke he hila he taha e mahina? (tupe Niu Silani)</i>	20m		
	Manufacturer name / <i>Higoa he kamupani ne talaga e filisa</i>	20n		
	Is there an energy label? (Y/N) / <i>Tohi nakai e Malolō hila he leipolo? (Y/N) (If N, go to Q20s) / Kaeke ko e tali Nakai ti holo ke he huhū 20s)</i>	20o		
	If Yes, how many stars/checks? / <i>Kaeke ko e tali E, fiha e fetū/fakamooli?</i>	20p		

Surveyor Name(s):

Survey ID Code

Comments / Tau Manatu:	What country is the label from? / <i>Ko e kautū fe ne fakakite he leipolo?</i> Australia/Ausetalia NZ / <i>Niu Silani</i> = A Japan / <i>Iapana</i> = J USA / <i>Amelika</i> = U Korea / <i>Kolea</i> = K Singapore / <i>Sigapoa</i> = S China / <i>Saina</i> = C Thailand / <i>Tailene</i> = T Other / <i>Falu foki</i> = O	20q			
	What is the estimated kWh/year energy use shown on label? / <i>Ko e fiha e fua fua kilo-uota he tau ka fakamole he malolō hila ne fakakite he leipolo?</i>	20r			
	Plans to replace (Y/N) (<i>If N, go to Q21</i>) / <i>Onoonoaga ki mua ke moua taha koloa foou (Y/N) (Kaeke ko e tali, Nakai. ti holo atu ke he Huhū 21)</i>	20s			
	If Yes, how many months from now? / <i>Kaeke ko e tali ē, toe fiha e mahina ne toe mai he mogonai</i>	20t			

Surveyor Name(s):

Survey ID Code

21. Freezers / Filisa Maō

21a) How many freezers does this household have in total? / Fiha e filisa maō he kaina? = ____

(If none, go to Q22) / Ka nakai fai ti holo atu ke he huhū 22)

ROOM LOCATION CODE / FAKAVAHEGA faka Matatohi HE POKO NE TOKA AI		No. 1	No. 2	No. 3
S = Sleeping room / Poko mohe E = Eating room / Poko kai L = Main living room / Poko Lahi lotofale C = Cooking area (Kitchen) / Poko taute kai W = Shop / Falo koloa B = Room used for other business purposes (specify business purpose for the room) / Poko ke lata moe taha gahua he pisinisi (Talahau ko e heigoa e gahua he poko ia) O = Office for personal use / Ofisa gahua he tagata H = Hallway / Avaloa R = Storage room or closet / Poko toka koloa G = Garage / Fale motoka V = Veranda / Kaupā M = Other places outside / Taha matapoko I fafo he fale X = Other (specify) / Fai foki (talatau)	Location (Room code) / Matakavi he kaina ne toka ai	21b		
	Approximate year obtained? / Tau ne liga moua ai	21c		
	Bought new or used? (N/U) / Foou agaia he fakatau po ke kua fakaoga tuai? (N/U)	21d		
	From local or overseas supplier? (L/O) / Moua I Niue po ke tamai he tau motu kehe / (L/O)	21e		
	Self-defrosting? (Y/N) / Fakatataka ni e ia? (Y/N)	21f		
	Door arrangement code / Tokaaga he gutuhala	21g		
	Width in cm / Fuafua kupulahi faka senetimita	21h		
	Height in cm / Fuafua tokoluga faka senetimita	21i		
	Door seal check-Good or Bad? (G/B) / Fefē e momi he gutuhala - Mitaki po ke kelea (G/B)	21j		
	Is the freezer powered on and operating all the time? (Y/N) (If Y, go to Q20m) / Fakamoui tumau nakai e hila mo e gahua e filisa? (Y/N) (Kaeke ko e tali E, ti holo atu ke he huhū 20m).	21k		
	If No, how many hours per day is it powered on and operating? (24-hours period) / Kaeke ko e tali Nakai, fiha e tulā he aho ka fakamoui mo e gahua? (taha e aho 24 tulā)	21l		
	How much do you think it costs in electricity every month? (in NZ\$) / Fuafua e koe liga fiha e tupe fakamole ke he hila he taha e mahina? (tupe Niu Silani)	21m		
	Name of manufacturer / Higoa he kamupani ne talaga e koloa	21n		
	Is there an energy label? (Y/N) (If N, go to Q21s) / Fai fakamailoga nakai ke lata mo e malolō hila? (Y/N) (Kaeke ko e Nakai e tali, ti holo ke he huhū 21s)	21o		
	If Yes, how many stars/checks? / Kaeke ko e tali E, fiha e fetū/fakamooli?	21p		
DOOR ARRANGEMENT CODE / Matatohi ke lata mo e TOKAAGA HE GUTUHALA				
C = Single Top opening door / Taha e gutuhala hafagi ki luga				
E = Two top opening doors / Ua e gutuhala hafagi ki luga				
F = Front opening door / Gutuhala hafagi ki mua				

Surveyor Name(s):

Survey ID Code

Comments / Tau Manatu:	What country is the label from? / <i>Ko e fakamailoga leipolo he motu fe?</i> Australia/Ausetalia/NZ / Niu Silani = A Japan / <i>Iapana</i> = J USA / <i>Amelika</i> = U Korea / <i>Kolea</i> = K Singapore / <i>Sigapoa</i> = S China / <i>Saina</i> = C Thailand / <i>Tailene</i> = T Other / <i>Taha motu foki</i> = O	21q			
	What is the estimated kWh/year energy use shown on label? / <i>Ko e heigoa e malolō he hila kilouota he taha e tau ne fakakite he leipolo?</i>	21r			
	Plans to replace? (Y/N) (If N, go to Q22) / <i>Fai amaamanakiaga nakai ke moua taha koloa foou? (Y/N) (Kaeke ko e tali Nakai ti holo atu ke he huhū 22)</i>	21s			
	If Yes, how many months from now? / <i>Kaeke ko e tali E, liga fiha e mahina ne toe to moua?</i>	21t			

Surveyor Name(s):

Survey ID Code

22. Air Conditioners / Masini fakamomoko Poko22a) How many air conditioners does this household have in total? / *Fiha e katoa he masini fakamomoko poku he kaina?*

= ____

(If none, go to Q23) / (Ka nakai fai ti holo atu ke he huhū 23)

ROOM CODE / Matatohi ke lata mo e Poko		No. 1	No. 2	No. 3
S = Sleeping room / <i>Poko mohe</i> E = Eating room / <i>Poko kai</i> L = Main living room / <i>Poko Lahi lotofale</i> C = Cooking area (Kitchen) / <i>Poko taute kai</i> W = Shop / <i>Fale koloa</i> B = Room used for other business purposes (specify business purpose for the room) / <i>Poko fakaaoga ma e taha vala gahua he pisinisi (talatau e gahua pisinisi ia he poku)</i> O = Office for personal use / <i>Poko Ofisa ma e tagata ni</i> X = Other (specify) / <i>Falu foki (talatau)</i>	Location of evaporator (Room Code) / <i>Tokaaga he vala he masini fakamomoko ko e evaporator (matatohi he Poko)</i>	22b		
	Approximate year obtained? / <i>Tau ne liga moua ai?</i>	22c		
	Bought new or used? (N/U) / <i>Moua he foou agaia po ke kua fitā e fakaaoga? (N/U)</i>	22d		
	From local or overseas source? (L/O) / <i>Moua mai I Niue ni po ke tamai he tau motu kehe? (L/O)</i>	22e		
	Type of air conditioner (Type Code) / <i>Vahega Masini Fakamomoko (Vahega numela)</i>	22f		
	Is condenser shaded most of the day? (Y/N) (ask householder if not obvious) / <i>Uufi nakai e condenser he lahi he tau magaaho he aho? (Y/N)</i>	22g		
TYPE CODE / Matatohi he Vahega he Masini W = Window unit / <i>Masini maeke ke tuku he pu hio</i> S = Split unit / <i>Masini ua e vala</i> C = Ceiling mounted unit / <i>Masini tau tau he alo fale</i> P = Portable unit / <i>Masini maeke ke utafano</i>	If a split system, is the pipe insulation outside intact? (Y/N) / <i>Kaeke ko e split system, mau nakai e tau pupuni I fafo he paipa? (Y/N)</i>	22h		
	Condition: 1 to 5 (with 5 the best) / <i>Tuaga he mitaki: 1-5 (5 ka mitaki lahi ueatu)</i>	22i		
	Is there a remote-control unit? (Y/N) / <i>Fai unit nakai ke remote control aki? (Y/N)</i>	22j		
EVAPORATOR FILTER CODE / Matatohi he Vahega hakahaka he Evaporator C = Clean and free air flow / <i>Meā mo e fano viko e ea</i> S = Some area clogged but generally clean / <i>Ponotia falu vala ka e lahi ke meā</i> P = Partially clogged (50% or less) / <i>Hafa ponotia - gatamai he 50%</i> M = Mostly clogged (over 50%) / <i>Lahi e ponotia (molea e 50%)</i> X = No filter at all / <i>Nakai fai hakahaka</i>	Watts rating for AC unit / <i>Malolō he hila uota he Masini Fakamomoko</i>	22k		
	BTU rating for AC unit / <i>Malolō he Masini Fakamomoko ke uta kehe e ea mafana, BTU.</i>	22l		
	How much do you think it costs in electricity every month? (in NZ\$) / <i>Liga lahi fefē e tofogi he hila he taha e mahina? (\$ Niu Silani)</i>	22m		
	Hours of use per day wet season (December to March)? / <i>Numela tulā he aho ka fakamoui he vahā vela (Tesemo kia Mati)</i>	22n		
	Hours of use per day during dry season (April to November) / <i>Numela tulā he aho ka fakamoui ai he vahā tō laa po ke vaha makalili (Apelila ki a Novema)</i>	22o		

Surveyor Name(s):		Survey ID Code			
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Comments / <i>Falu Manatu</i>:	Evaporator filter code / <i>Faka-matahigoa he hakahaka he Evaporator</i>	22p			
	Is noise considered a problem? (Y/N) / <i>Hohā nakai e masini ia? Y/N</i>	22q			
	Plans to replace? (Y/N) (If N, go to Q22t) / <i>Fai amaamanakiaga nakai ke moua taha koloa foou (Y/N)? (Kaeke ko e tali Nakai, holo atu ke he huhū 22t)</i>	22r			
	If yes, how many months from now? / <i>Kaeke ko e tali E, fiha e mahina I mua ne toe?</i>	22s			
	Name of manufacturer / <i>Higoa he kamupani ne talaga e koloa.</i>	22t			

Surveyor Name(s):

Survey ID Code

23. Small Electric Appliance Inventory / Potaaga he falu koloa hila ikiiki

SMALL APPLIANCE CODE / Fakavahega faka-matatohi he tau koloa hila ikiiki	Appliance Type Code / vohaga koloa	Hours of use per week / Tuia fakaga faahi tapu	Watts (Nameplate) / Uota hila (higao talaga)
R = Rice cooker / Ulo hila tunu alaisi	23a		
K = Electric kettle / Tioki hila	23b		
F = Electric frying pan / Paani hila	23c		
G = Electric griddle / Paani hila lahi atu	23d		
V = Table top electric oven / Umu tote fano he hila	23e		
D = Hot water dispenser (always hot) / Eni hila tunu vai vela	23f		
N = Electric iron / Maka auli hila	23g		
L1 = Washing machine (top loading single tub) / Masini unumena fafao l luga mo e taha e liu tapu	23h		
L2 = Washing machine (top loading dual tub) / Masini unu mena fafao l luga mo e ua e liu tapu	23i		
LF = Washing machine front loading / Masini unumena ne fafao hala mua	23j		
LW = Washing machine with wringer / Masini unumena tatau he tau iko momi	23k		
B = Electric water cooler / Eni hila mo fakamomoko vala vai	23l		
A = Electric hair clipper / Taifi hifi ulu hila	23m		
S = Electric sewing machine / Lakau tuitui hila	23n		
E = Electric dishwasher / Masini holoholo kapiniu hila	23o		
H = Toaster / Koloa hila mo fakapaku falaoa	23p		
Z = Radio / Letio	23q		
F = Flashlight / kasa	23r		
BC = Battery charger / masini mo fagai puha hila	23s		
BL = Blender / masini hmo tavili inu	23t		
HD = Hair dryer / koloa hila mo fakamomō lauulu	23u		
HS = Hair straightener / koloa hila mo fakahahako lauulu	23v		
CD = Clothes dryer / Masini mo fakamomō mena tui	23w		
CM = Coffee machine / masini tavili mo e taute kofe inu	23x		
ST = Stereo / koloa hila ke fakatagi leo kofe, stereo	23y		
SM = Sandwich maker / koloa hila mo fakapaku seneuisei	23z		
FP = Food processor / masini hila mo tavili aki e tau mena kai	23aa		
VC = Vacuum cleaner / Masini hila mo olo fakameā e tau kiva efu			
GG = Electric glue gun / koloa hila ke fakatafe aki e kulū			
WL = Electric welder / Pili hila			
MX = Electric mixer / Tavili hila taute kai			
MK = Musical keyboard / Piano hila			
WP = Electric water pump / Pamu vai hila			
ED = Electric drill / Vilo hila			
BM = Bread making machine / Masini taute fua falaoa			
IB = Impulse bag sealer / Koloa hila mo pili taga pepa kikila			
SC = Slow cooker / Ulo hila tunu kai fakatekitekti			
SM = Sanding machine / Masini hila fakamomole akau			
GX = Electric coconut scraper / Volu niu hila			
CS = Circular saw / Kili hila utafano hele vala akau			
MS = Mitre saw / Kili hila mo hele akau fakalifa			
GM = Grinding machine / Masini olo lapatoa			
X1 = Other/ Fai foki			
X2 = Other/ Fai foki			
X3 = Other/ Fai foki			
X4 = Other/ Fai foki			
X5 = Other/ Fai foki			
X6 = Other/ Fai foki			
X7 = Other/ Fai foki			

Surveyor Name(s):

Survey ID Code

24. Computers / Komopiuta

24a) How many laptop and desktop computers does this household have in total? / *Fiha e komopiuta uta fano mo e komopiuta toka mau he laulau he kaina?* = ____

(If none, go to Q25) / *Ka nakai fai ti holo loa ke he huhū 25)*

ROOM CODE / <i>Higoa faka matatohi he tau poko</i>		No. 1	No. 2	No. 3
S = Sleeping room / <i>poko mohe</i>	Location of computer (Room code) / <i>Poko ne toka ai e komopiuta (matatohi fe)</i>	24b		
E = Eating room / <i>poko kai</i>	Approximate year obtained? / <i>Liga moua he tau fe?</i>	24c		
L = Main living room / <i>poko lahi lotofale</i>	Obtained new or used? (N/U) / <i>Foou he moua po ku a fakaaoga tuai (N/U)</i>	24d		
C = Cooking area (Kitchen) / <i>poko taute kai</i>	From local or overseas source? (L/O) / <i>Moua I Niue po ke tamai he tau motu kehe? (L/O)</i>	24e		
W = Shop / <i>poko fale koloa</i>	Flat screen or CRT? (F/C) / <i>Lapalapa a mua po ke CRT? (F/C)</i>	24f		
B = Room used for other business purposes (specify business purpose for the room) / <i>poko fakaaoga ma e taha vala he pisinisi (talaha ko e vale fe he pisinisi he poko ia)</i>	Diagonal measure screen size in cm / <i>Loa he hio I mua mai he matapotu hema I lalo ke he matapotu matau I luga faka senetimita.</i>	24g		
O = Office for personal use / <i>Ofisa ma e tau gahua he tagata</i>	Desktop or laptop? (D/L) / <i>Ko e komopiuta toka mau po ke komopiuta utafano?</i>	24h		
X = Other (specify) / <i>Fai foki (talaha)</i>	Is there a laser printer? (Y/N) (if N, go to Q24i) / <i>Fai lomi tohi hila laser nakai? (Y/N) (Kaeke ko e tali Nakai ti holo atu ke he huhū 24i)</i>	24i		
	Is there an ink-jet printer? (Y/N) (if N, go to Q24n) / <i>Fai lomi tohi ink-jet nakai? (Y/N). (Kaeke ko e tali Nakai ti holo atu ke he huhū 24n)</i>	24j		
USAGE CODE / MATATOHI KE FAKAKITE E FAKAAGAAGA	Hours computer used per day on school days? / <i>Fiha e tau tulā ne fakaaoga e komopiuta he tau aho aoga he taha e aho?</i>	24k		
F = Facebook, You Tube and other Internet sites / <i>Facebook, You Tube mo e falu polokalame initanete</i>	Hours computer used per day on school holidays? / <i>Fiha e tau tulā he fakaaoga e komopiuta ka tuku e tau aoga he taha e aho?</i>	24l		
R = Research, looking up information / <i>Kumikumi, fa iloa tala</i>	Hours computer used per day on Saturdays? / <i>Fiha e tulā ne fakaaoga e komopiuta he taha e aho he tau aho Faiumu?</i>	24m		
S = School work / <i>Tau gahua Aoga</i>	Hours computer used per day on Sundays? / <i>Fiha e tulā ne fakaaoga e komopiuta he taha e aho he tau aho Tapu?</i>	24n		
W = Writing documents / <i>Tohi tala</i>	Plans to replace computer? (Y/N) (if N, go to Q24t) / <i>Fai amaamanakiaga nakai ke moua taha komopiuta foou? (Y/N)</i>	24o		
F = Finance and accounts / <i>Kumi tala ke he tau tupe mo e tau pepa tupe</i>	If Yes, how many months from now? / <i>Kaeke ko e tali E fiha e mahina ne toe to moua?</i>	24p		
E = Email / <i>Meli hila</i>	What is the computer mostly used for? (Computer usage code) / <i>Ko e heigoa e mena lahi ne fa fakaaoga e komopiuta ki ai? (Matatohi ke lata mo e tau komopiuta)</i>	24q		
G = Games / <i>Ata Pelē</i>				
M = Movies / <i>Kitekite ata kifaga</i>				
X = Other (specify) / <i>Falu Foki (talaha)</i> _____				

Surveyor Name(s):		Survey ID Code	
Comments /Tau manatu:	Is the equipment above all left connected to power all the time? (Y/N) / <i>Fakamoui tumau nakai e hila ke he komopiuta? (Y/N)</i>	24r	
	Is there Internet access at the home? (Y/N) / <i>Tutaki atu nakai e kaina ke he initanete? (Y/N)</i>	24s	
	Is there WiFi in the home? (If N, go to Q25) (Y/N) / <i>Fai WiFi nakai e kaina? (Y/N)</i> (Kaeke ko e tali Nakai ti holo atu ke he huhū 25)	24t	

25. Microwave Ovens, Phones and Tablet Computers /Umu hila microwave, telefoni utafano mo e tau komopiuta tepelete

(If none, go to Q26) / Ka nakai fai ti holo atu ke he huhū 26)

Microwave Ovens / Umu hila microwave	Is there a microwave oven? (Y/N) (if N, go to Q25f) / <i>Fai umuhila microwave? (Y/N) / (Kaeke ko e tali Nakai, holo atu ke he huhū 25f)</i>	25a	
	If Yes, is the operating time set by turning a knob or by buttons? (K/B) / <i>Kaeke ko e tali E, ko e kamata ke fakagahua ke vivilo e nopo po ke fotafota e tau mahina? (K/B)</i>	25b	
	How many minutes per day average is it used? / <i>Liga fiha e minute he taha e aho ka fakaaoga ai?</i>	25c	
	Watts rating / <i>Papahi he malolō uota hila</i>	25d	
	Is it left plugged in all the time? (Y/N) / <i>Fa mahani ka ke toka ni he palaki he tau mogo oti? (Y/N)</i>	25e	
Mobile Phones / Telefoni utafano	How many mobile phones in use by all household members? (if N, go to Q25h) / <i>Fiha e telefoni utafano ne fakaaoga he tau tagata oti he kaina? (Kaeke ko e tali Nakai fai, ti holo atu ke he huhū 25h)</i>	25f	
	Are chargers left plugged in and power on to the chargers all the time? (Y/N) / <i>Toka mau ka e tau vala fagai he tau pu palaki ti moui e hila he tau mogo oti? (Y/N)</i>	25g	
Tablet Computers / komopiuta tepelete	How many tablet computers in use by all household members? (if N, go to Q26) / <i>Fiha e komopiuta tepelete ne fakaaoga he tau tagata he kaina? (Kaeke ko e tali, Ai fai, holo atu ke he huhū 26)</i>	25h	
	Are chargers left plugged in and power on to the chargers all the time? (Y/N) / <i>Toka mau ka e tau vala fagai he tau pu palaki mo e moui e hila he tau mogo oti? (Y/N)</i>	25i	

Surveyor Name(s):

Survey ID Code

26. Cooking /Tunu Kai*(If none, go to Q27) / Ka nakai fai ti holo atu ke he huhū 27)*

COOKING FUEL USE CODE Matatohi ke fakavahega aki e tau puhala tunu kai S = Small usage of around ¼ of the time or less / Tote e magaaho fakaaoga, I lalo hifo he kuata he tau magaago M = Used for cooking from ¼ to half the time / Fakaaoga ke tunu kai ke he vahā loto he kuata mo e hafa he tau magaaho L = More than half the time and that is the main means for cooking / Molea e hafa he tau magaaho ti ko e puhala lahi ni a ia he tunu kai Comment /Tau Manatu:	Is there an electric cooking unit? (Y/N) (if N, go to Q26c) / Fai koloa hila nakai mo tunu kai? (Y/N) (Kaeke ko e Nakai e tali, holoatu ke he huhū 26c)	26a	
	If Yes, estimate its usage (S/M/L) / Kaeke ko e E e tali, fuafua ko e fiha e lahi he fakaaoga (S/M/L)	26b	
	Is there a gas cooking unit? (Y/N) (if N, go to Q26e) / Fai koloa tunu kai nakai ne fakaaoga he kese? (Y/N) (Kaeke ko e Nakai e tali ti holo ke he huhū 26e)	26c	
	If Yes, estimate its usage (S/M/L) / Kaeke ko e tali E, fuafua ko e fiha e lahi he fakaaoga (S/M/L)	26d	
	Is there a kerosene cooking unit? (Y/N) (if N, go to Q26g) / Fai koloa tunu kai nakai ne fakaaoga he kalasini? (Y/N) (Kaeke ko e tali Nakai, holo atu ke he huhū 26g)	26e	
	If Yes, estimate its usage (S/M/L) / Kaeke ko e tali E, fuafua ko e fiha e lahi he fakaaoga (S/M/L)	26f	
	Is cooking done with wood? (Y/N) (if N, go to Q26i) / Fakaaoga nakai e gaafi mo tunu kai (Y/N) (Kaeke ko e Nakai e tali, holo atu ke he huhū 26i)	26g	
	If Yes, estimate its usage (S/M/L) / Kaeke ko e tali E, fuafua ko e fiha e lahi he fakaaoga (S/M/L)	26h	
	Is cooking done with any other fuel? (Y/N) (if N, go to Q27) / Fai puhala tunu kai foki nakai? (Y/N) (Kaeke ko e tali Nakai, holo atu ke he huhū 27)	26i	
	If Yes, specify other fuel _____ / Kaeke ko e tali E, talahau ko e heigoa.....	26j	
If Yes, estimate the other fuel's usage (S/M/L) / Kaeke ko e tali E, fuafua ko e fiha e lahi he fakaaoga. (S/M/L)	26k		

Surveyor Name(s):

Survey ID Code

27. Water Heaters / Tau Koloa fakavela valavai

27a) How many water heaters does this household have in total? / Fiha e katoa he koloa fakavela valavai he kaina? = __

(If none, go to Q28) / Ka nakai fai ti holo atu ke he huhu 28)

SOLAR WATER HEATHER CODE / TAU MATATOHI KE FAKAVAHEGA AKI E TAU KOLOA FAKAVELA VALAVAI T = Tube type solar water heater / Koloa fakavela vala vai he Laa - Tube Water heater F = Flat type solar water heater / Solar heater lapalapa G = Gas / Puhala fakavela vala vai fano he kese E = Electric / Puhala fakavela valavai fano he hila TANK TYPE CODE / VAHEGA TULA G = Gas / Kese E = Electric / Hila INSTANT-ON WATER HEATER CODE/ Vahega Fakavela mafiti G = Gas / Kese E = Electric / Hila	Solar Water Heater			
	Vai vela he Laa			
	Is there a solar water heater? (Y/N) (if N, go to Q27e) / Fai heater nakai ne fakavela he laa? (Y/N)		27b	
	If Yes, a tube or flat type solar water heater? (T/F) / Kaeke ko e E e tali, ko e faga tube po ke faga lapalapa (T/L)		27c	
	Is there an electric back-up heater in the solar water heater if there is no sun? (Y/N) / Fai puhala paletua nakai ke fakavela e vai ka nakai fai laa? (Y/N)		27d	
	Tank Type Water Heater			
	Vai Vela he Tula			
	Is there a tank type water heater? (Y/N) (if N, go to Q27h) / Fai tula nakai ne fakavela ai e vai? (Y/N) (Kaeke ko e Nakai e tali ti holo atu ke he huhu 27h)		27e	
	If Yes, is it gas or electric? (G/E) / Kaeke ko e tali E, vela he kese poke hila? (G/E)		27f	
	Watts rating / Malolō he uota		27g	
	Instant-on Water Heater			
	Koloa fakavela valavai mafiti mogoia-ni			
Is there an instant-on water heater? (Y/N) (if N, go to Q28) / Fai koloa fakavela vai vela mafiti mogoia-ni nakai? (Y/N)		27h		
If Yes, is it gas or electric? (G/E) / Kaeke ko e tali E, vela he kese poke hila? (G/E)		27i		
Watts rating / Malolō he uota		27j		

Surveyor Name(s):

Survey ID Code

28. Fans / Iliili hila28a) How many fans does this household have in total? / *Fiha e katoa he tau iliili hila he kaina?* = ____

(If none, go to Q29) / (Kaeke ke nakai fai ti holo atu ke he huhū 29)

FAN TYPE CODE / MATATOHI KE VAHEGA E TAU ILIILI C = Ceiling fan / <i>Iliili alofale</i> T = Table fan / <i>Iliili tuku fuga laulau</i> F = Standing fan / <i>Iliili tū</i> A = Floor fan / <i>Iliili fakatū he kelekele</i> W = Window fan / <i>Iliili Window</i> S = Wall mounted fan / <i>Iliili tautau he kaupā</i> H = Homemade fan / <i>Iliili talaga I kaina</i> X = Other (specify) / <i>Falu foki (talahaui)</i>		Fan Type / Faga Iliili	Hours of use per day during wet season (Dec to March) ? / Tula ne fakaoaga ai he oho he magahala uho/veia (Teseimo-Marc)	Hours of use per day during dry season (April to Nov) / Tula ne fakaoaga ai he oho he magahala tō la (Apelila-Novemo)	Watts / Uota	Location / Tokaga
	28b					
	28c					
	28d					
	28e					
	28f					
	28g					
ROOM LOCATION CODE / POKO NE TOKA AI S = Sleeping room / <i>Poko mohe</i> E = Eating room / <i>Poko kai</i> L = Main living room / <i>Poko lahi lotofale</i> C = Cooking area (Kitchen) / <i>Poko taute kai</i> W = Shop / <i>Fale Koloa</i> B = Room used for other business purposes (specify business purpose for the room) / <i>Poko ne taute ai taha vala he pisinisi (Talahau ko e heigoa e gahua ia he pisinisi)</i> O = Office for personal use / <i>Ofisa gahua he tagata</i> X = Other (specify) / <i>Falu foki (talahaui)</i>	28h					
Comments / Tau Manatu:						

Surveyor Name(s):

Survey ID Code

29. TVs / TAU TIVI29a) How many TV does this household have in total? / *Fiha e katoa he tau tivi he kaina?* = ____

(If none, the questionnaire is finished) / (Kaeke ke ai fai, kua oti tuai e tau huhū)

ROOM LOCATION CODE		No. 1	No. 2	No. 3
/MATATOHI KE FAKAKITE E POKO NE TOKA AI	Location of TV (Room code) / <i>Poko ne toka ai e tivi</i>	29b		
S = Sleeping room / <i>Poko mohe</i>	Approximate year obtained? / <i>Liga ko e tau fe ne moua ai?</i>	29c		
E = Eating room / <i>Poko kai</i>	Bought new or used? (N/U) / <i>Foou he fakatau po ke tuai- kua fakaaoga? (N/U)</i>	29d		
L = Main living room / <i>Poko lahi lotofale</i>	From local or overseas supplier? (L/O) / <i>Moua I Niue po ke tamai he tau motu kehe? (L/O)</i>	29e		
C = Cooking area (Kitchen) / <i>Poko taute kai</i>	Flat screen or CRT? (F/C) / <i>Ko e tivi Lapalapa tatai e hio kitekite po ke CRT faga pulefu e hio?</i>	29f		
W = Shop / <i>Fale koloa</i>	Diagonal measure screen size in cm / <i>Loa (faka senetimita) he hio mai he matapotu hema I lalo ke he matapotu matau I luga.</i>	29g		
B = Room used for other business purposes (specify business purpose for the room) / <i>Poko ke lata mo e falu gahua he pisinisi (talahau ko e heigoa e gahua ia)</i>	Is there a satellite or cable box? (Y/N) / <i>Fai puha setalate po ke puha keipolo nakai? (Y/N)</i>	29h		
O = Office for personal use / <i>Ofisa gahua he tagata</i>	Is there a remote-control unit? (Y/N) / <i>Fai remote-control nakai? (Y/N)</i>	29i		
X = Other (specify) / <i>Fai foki (talahau)</i>	Watts rating for TV / <i>Malolō he uota hila he tivi</i>	29j		
Comments / <i>Tau Manatu:</i>	Hours used per day during the week during school days? / <i>Numela tulā ne fakamoui ai he taha e tapu he tau tapu ne tā e tau aoga?</i>	29k		
	Hours used per day during the week during school holidays? / <i>Numela tulā ne fakamoui ai he taha e tapu he tau tapu tukuaoga?</i>	29l		
	Hours used per day on Saturdays? / <i>Numela tulā ne fakamoui ai he taha e aho Faiumu?</i>	29m		
	Hours used per day on Sundays? / <i>Numela tulā ne fakamoui ai he taha e aho Tapu?</i>	29n		
	Satisfied with unit? (Y/N) / <i>Fiafia nakai e loto ke he tivi? (Y/N)</i>	29o		
	Plans to replace? (Y/N) (if N, go to Q29r) / <i>Fai amaamanakiaga nakai ke fakatau taha mena foou? (Y/N)</i>	29p		
	If Yes, how many months from now? / <i>Kaeke ko e tali E, fiha e mahina ne toe ti moua?</i>	29q		

Annex C: Programme for Survey Training Workshop, 28 February & 1 March 2018

	TIME	TOPICS	PRESENTER / FACILITATOR
Wed 28 Feb	DAY 1: Background, Survey Cycle, General Survey Pointers, Questionnaire Familiarization and Detailed Walk-through of Questionnaire		
	9.00am	Introductory remarks	DG for Ministry of Infrastructure / UN CO
	9.05am	Opening Prayer	tbc
	9.10am	Introduction to participants	All
	9.15am	Presentation of workshop program	Thomas L. Jensen, Energy Programme Specialist, UNDP
	9.20am	The Niue Household Electrical Appliances and Lights Survey – background, survey objectives & key deliverables	Thomas L. Jensen
	9.40am	Introduction to main components in the survey cycle	Thomas L. Jensen
	10.10am	The Niue survey questionnaire design and survey pointers	Thomas L. Jensen
	10.40am	Familiarization with the survey questionnaire	Surveyors (individual work)
	11.00am	TEA BREAK	
	11.15am	Detailed walk-through of Niue survey questionnaire including Q&A	Thomas L. Jensen
	1.00pm	LUNCH BREAK	
	2.00pm	Detailed walk-through of Niue survey questionnaire including Q&A (continued)	Thomas L. Jensen
	4.00pm	TEA BREAK	
	4.15pm	Briefing surveyors on test of questionnaire in their own home overnight	Fanuma Sioneholo, Statistics Officer (Niue Stats) & Thomas L. Jensen
	4.30pm	Summary of Day 1 and program for Day 2	UN CO & Thomas L. Jensen
	4.45pm	Closing Prayer	tbc
END OF DAY 1			

	TIME	TOPICS	PRESENTER / FACILITATOR
Thu 1 March	DAY 2: Feed-back from Surveyors, Recap of Walk-through of Questionnaire and Planning including Logistics for Survey		
	8.45am	Welcome & Prayer	tbc
	9.00am	Surveyors feed-back from test of the questionnaire in their own home	Surveyors
	9.30am	Detailed walk-through of Niue survey questionnaire including Q&A (continued)	Thomas L. Jensen
	10.30am	TEA BREAK	
	10.45am	Detailed walk-through of Niue survey questionnaire including Q&A (continued)	Thomas L. Jensen
	1.00pm	LUNCH BREAK	
	2.00pm	Recap of critical aspects of the questionnaire	Thomas L. Jensen

	3.00pm	General survey pointers	Fanuma Sioneholo
	4.00pm	TEA BREAK	
	4.15pm	Planning including logistics for main survey	Fanuma Sioneholo
	5.00pm	Closing comments & Prayer	tbc
END OF DAY 2			

	TIME	TOPICS	PRESENTER / FACILITATOR
Fri 2 March	DAY 3: Surveying		
	8.00am	Surveying begins	5 teams of 2 persons each

	TIME	TOPICS	PRESENTER / FACILITATOR
Sat 3 March	DAY 4 and Onwards: Daily Feed-back from Supervisors on Questionnaires & Surveying		
	9.00am	Daily feed-back from supervisors on questionnaires – collectively as well as individual survey teams	Thomas L. Jensen/ Fanuma Sioneholo/ Jay Gataua
	10.30am	Surveying continues	5 teams of 2 persons each

Annex D: Detailed Survey Results

Below are the tabulated data from the response to the survey questions. Comments are provided on important methodological aspects for some questions.

Power Meter

Table 3: If Household Share the same Power Meter

	Number	Percentage
No	193	93
Yes	15	7
Total	208	100

Table 4: Number of Households sharing the same Power Meter

	Number	Percentage
2 Households	8	88.9
3 Households	1	11.1
Total	9	100

Gender & Age of People Interviewed

Table 5: Gender of People Interviewed

	Number	Percentage
Female	115	55
Male	93	45
Total	208	100

Table 6: Age of People Interviewed

Minimum	15 years old
Maximum	88 years old
Average	55 years old
Median	56 years old

Number of Buildings in the Household that have Electricity

Table 7: Number of Buildings in the Household that have Electricity

	Number	Percentage
1 building	174	92
2 buildings	12	6
3 buildings	4	2
Total	190	100

Min	0
Max	3 buildings
Average	1 building
Median	1 building

Main Building Construction

Table 8: Construction Materials of Walls in Main Building

	Number	Percentage
Coconut	1	0.5
Other Wood	133	63.3
Brick	20	9.5
Concrete Block	37	17.6
Metal	0	0
Asbestos	8	3.8
Other	11	5.2
Total	210	100

Table 9: Materials of Roofs in Main Building

	Number	Percentage
Coconut	0	0
Other Wood	4	2
Brick	0	0
Concrete Block	2	1
Metal	190	97
Asbestos	0	0
Other	0	0
Total	196	100

Main Building Colours

Table 10: Colour of the Walls in Main Building

	Number	Percentage
Unpainted	18	9
White	44	22
Light colour	109	55
Medium colour	21	11
Dark colour	5	3
Total	197	100

Table 11: Colour of the Roof in Main Building

	Number	Percentage
Unpainted	107	53
White	13	6
Light colour	35	17
Medium colour	36	18
Dark colour	12	6
Total	203	100

Type of Residence

Table 12: Type of Residence

	Number	Percentage
Single story house	198	95.2
Double story house	7	3.4
Apartment in an apartment building	0	0
Three stories	0	0
Residence over shop	0	0
Other	3	1.4
Total	208	100

Household Age Group Composition

Table 13: Total Number of People Surveyed in Various Age Groups

	Number	Percentage
Total number of people under 5 years old in surveyed households	69	9
Total number of people 5-10 years old in surveyed households	65	9
Total number of people 11-17 years old in surveyed households	93	13
Total number of people 18-35 years old in surveyed households	142	20
Total number of people 36-50 years old in surveyed households	120	17
Total number of people 51-65 years old in surveyed households	133	18
Total number of people over 65 years old in surveyed households	105	14
Total	727	100

Min number of People in Surveyed Households	1
Maximum number of People in Surveyed Households	13
Average number of People in Surveyed Households	3
Median number of People in Surveyed Households	3

Average Amount the Household estimates it pays per Month for Electricity

Table 14: Amount the Household estimates it pays per Month for Electricity

Average	103 NZ\$
Median	100 NZ\$
Maximum	400 NZ\$
Minimum	15 NZ\$

Method of Payment of Electricity Bill

Table 15: Method of Payment of Electricity Bill

	Number	Percentage
Cash payment of bill	17	8
Electronic payment	7	3
Pre-paid meter	178	86
Other	4	2
Total	206	100

Roof Insulation

Table 16: Roof Insulation

	Number	Percentage
Radiant barrier right under the roofing materials (typically aluminium)	160	78.8
Batts (fiberglass or cotton)	2	1.0
Blown (fiberglass or cellulose)	0	0
Spray foam	0	0
Other	4	2
None	37	18.2
Total	203	100

Motor Vehicles

Table 17: Any Residents of the Household own and have registered a Motor Vehicle?

	Number	Percentage
Yes	178	94
No	11	6
Total	189	100

Table 18: Automobiles

	Number	Percentage
Don't own a car	23	11.7
1 car	91	46.4
2 cars	51	26.0
3 cars	17	8.7
4 cars	7	3.6
5 cars	5	2.6
6 cars	1	0.5
7 cars	1	0.5
Total	196	100

Table 19: Motorcycles

	Number	Percentage
Don't own a motorcycle	169	85.4
1 motorcycle	18	9.1
2 motorcycles	9	4.5
3 motorcycles	1	0.5
4 motorcycles	1	0.5
Total	198	100

Table 20: Trucks

	Number	Percentage
Don't own a truck	151	76.6
1 truck	39	19.8
2 trucks	7	3.6
Total	197	100

Table 21: Vans

	Number	Percentage
Don't own a van	163	82.3
1 van	27	13.6
2 vans	4	2
3 vans	2	1
4 vans	1	0.5
6 vans	1	0.5
Total	198	100

Table 22: Buses

	Number	Percentage
Don't own a bus	195	98
1 bus	3	2
Total	198	100

Table 23: Bicycles

	Number	Percentage
Don't own a bicycle	174	90
1 bicycle	8	4
2 bicycles	8	4
4 bicycles	4	2
Total	194	100

Table 24: Other Vehicles

	Number	Percentage
No other vehicles	196	99
1 other vehicle	1	0.5
2 other vehicles	1	0.5
Total	198	100

Sources of Household Income

Table 25: Sources of Household Income

	Salaried Govt	Salaried Private	Farming	Skilled Work	Own Business at Home	Own Business Outside	Fishing	Pension	Remittances	Cutting copra	Other	Total
Main income source	111	18	1	0	5	6	1	62	0	0	5	209
Second most important source	9	31	6	3	18	7	7	28	3	0	10	122
Third most important source	0	4	5	2	7	2	1	9	0	0	9	39
Fourth most important source	0	0	3	0	0	0	1	3	1	0	1	9

Sanitation

Table 26: Sanitary Facilities

	Number	Percentage
Flush toilet	202	99.5
Water sealed squat toilet	0	0
Outside pit latrine	0	0
Compost toilet	0	0
Other	0	0
None	1	0.5
Total	203	100

Family Washing with a Washing Machine

Table 27: If the person being interviewed does the family washing with a washing Machine

	Number	Percentage
Yes	175	85
No	31	15
Total	206	100

Table 28: Estimated number of washing machine loads the person being interviewed does per week

	Number	Percentage
1-5	117	65.7
6-10	39	21.9
11-15	15	8.4
16-20	7	3.9
21-25	1	0.6
26-30	2	1.1
Total	178	100

Lighting

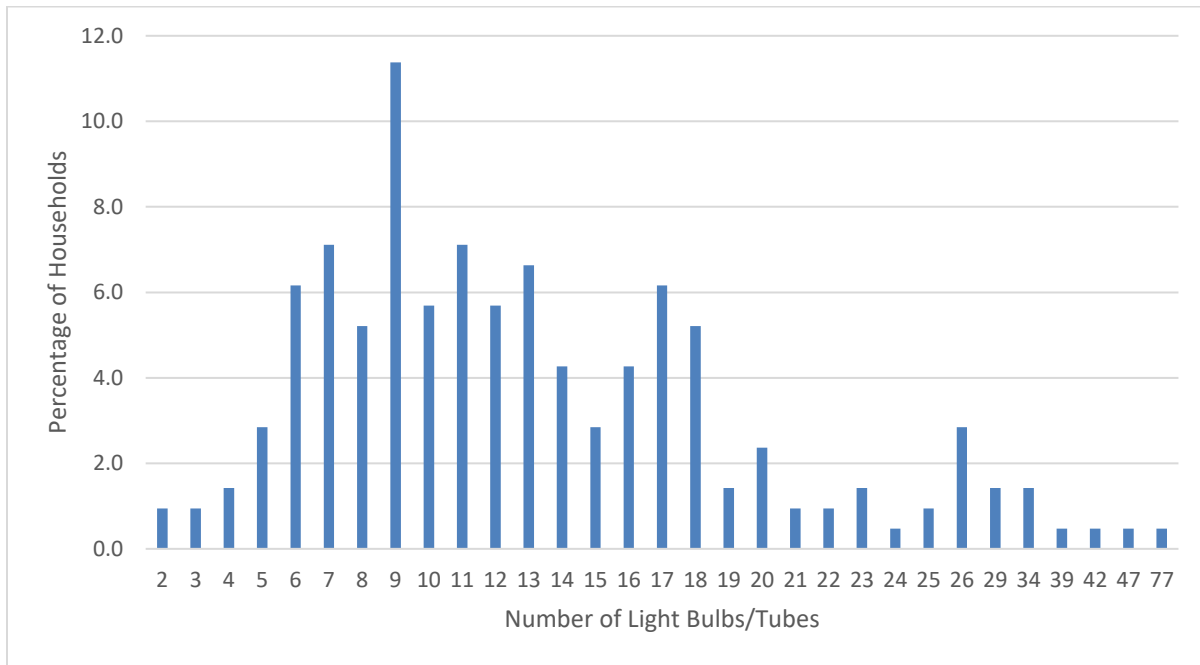
Regarding lighting, it should be noted that what was recorded was Watts per light bulb/tube, *not* Watts per fixture. An example: a fixture has four (4) fluorescent tubes of the old style with iron ballast. The number of lines needed to be filled in the questionnaire for a fixture will be equal to the number of tubes in the fixture - in this case, four (4). The data recorded in the four lines for this fixture - i.e. location, Watts & hours of use - are the same since all the tubes in a fixture go on and off at the same time. Concerning the acronyms 'T12', 'T8' and 'T5' for fluorescent tubes, then 'T' indicates that the shape of the bulb is tubular and the number after is the diameter in eighths of an inch.

The total number of light bulbs/tubes in surveyed households is 2863.

Table 29: Number of Light Bulbs and Tubes in Surveyed Households

	Number	Percentage
2	2	0.9
3	2	0.9
4	3	1.4
5	6	2.8
6	13	6.2
7	15	7.1
8	11	5.2
9	24	11.4
10	12	5.7
11	15	7.1
12	12	5.7
13	14	6.6
14	9	4.3
15	6	2.8
16	9	4.3
17	13	6.2
18	11	5.2
19	3	1.4
20	5	2.4
21	2	0.9
22	2	0.9
23	3	1.4
24	1	0.5
25	2	0.9
26	6	2.8
29	3	1.4
34	3	1.4
39	1	0.5
42	1	0.5
47	1	0.5
77	1	0.5
Total	211	100

Figure 1: Number of Light Bulbs/Tubes in Surveyed Households



Average	14 light bulbs/tubes
Median	12 light bulbs/tubes
Max	77 light bulbs/tubes
Min	2 light bulbs/tubes

Table 30: Number of Each Type of Light in Surveyed Households

	Number	Percentage
Standard old style fluorescent T12 tube with iron ballast	15	0.6
Fluorescent T8 tube (both iron & electronic ballast)	311	11.4
Small fluorescent T5 tube with electronic ballast	28	1
LED T8 linear tube	5	0.2
LED T5 linear tube	1	0.04
CFL bulb with integrated electronic ballast	645	23.7
CFL plug-in bulb with separate electronic ballast	92	3.4
LED bulb	847	31.2
Incandescent with screw base	133	4.9
Incandescent with pin type (bayonet)	490	18
Halogen bulb	110	4.0
Other	40	1.5
Total	2717	100

Figure 2: Types of Lights in Surveyed Households

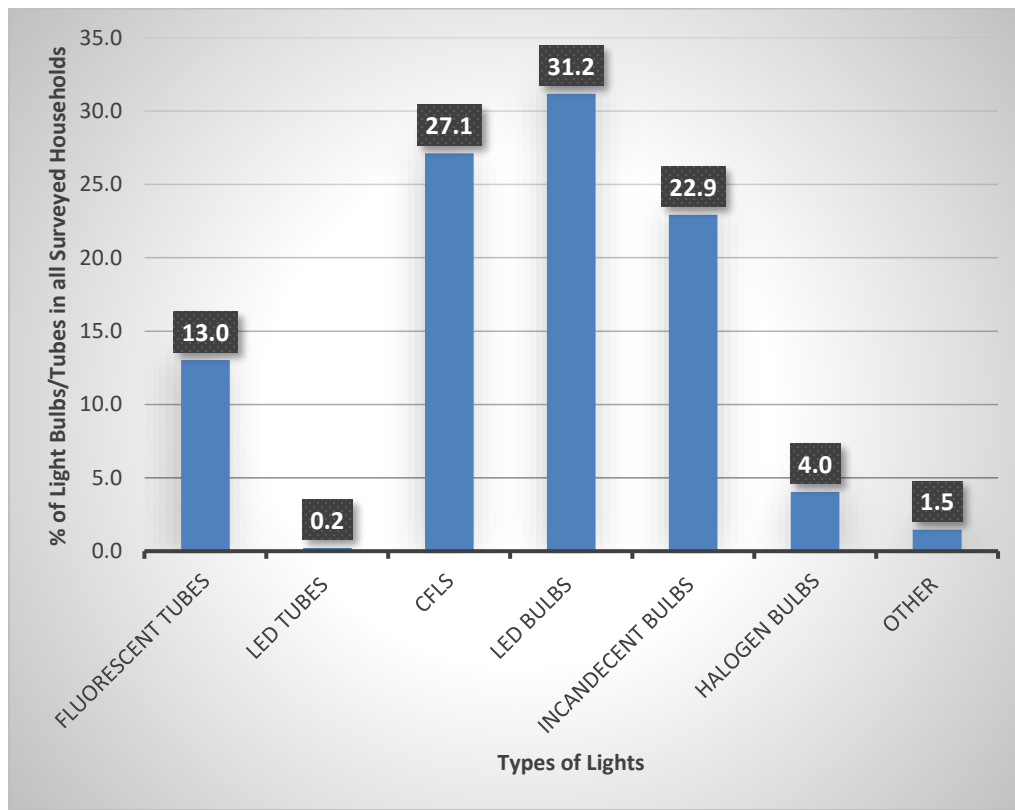
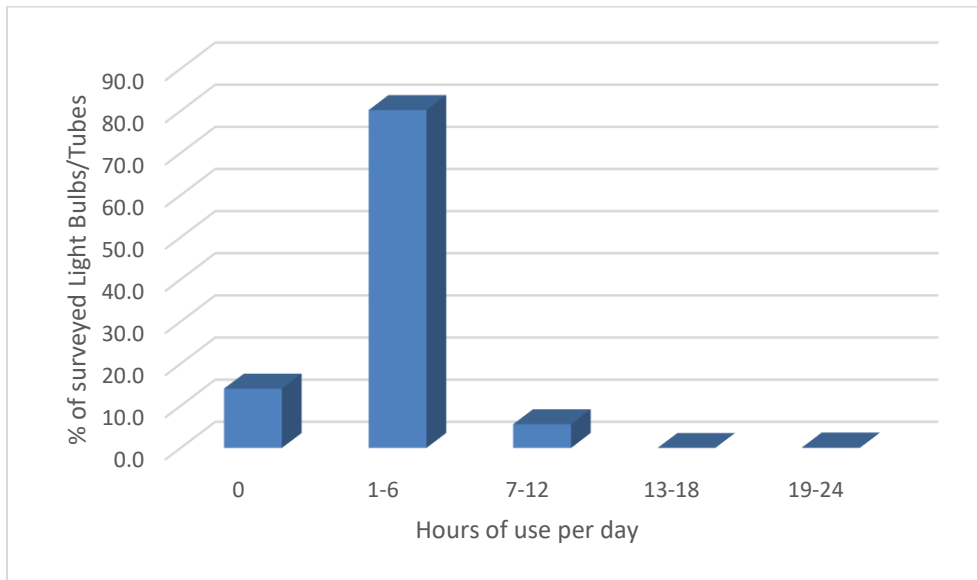


Table 31: Hours of use per Day

	Number	Percentage
0	400	14.1
1-6	2278	80.2
7-12	160	5.6
13-18	0	0
19-24	3	0.1
Total	2841	100

Figure 3: Hours of Use per Day for Lights



Average	2.4 hours of use per day
Median	2 hours of use per day
Max	24 hours of use per day
Min	0 hours of use per day

Table 32: Location of Light Bulbs/Tubes

	Number	Percentage
Sleeping room	675	23.9
Eating room (if there is a separate room for eating)	216	7.6
Main living room	390	13.8
Cooking areas (kitchen)	172	6.1
Shop	4	0.1
Room used for other business purposes	10	0.4
Office for personal use	5	0.2
Bathroom/toilet	364	12.9
Hallway	177	6.3
Storage room or closet	50	1.8
Garage	59	2.1
Veranda	540	19.1
Other places outside (yard lights, security lights, etc.)	113	4
Other	51	1.8
Total	2826	100

Table 33: Watts per Light Bulb/Tube

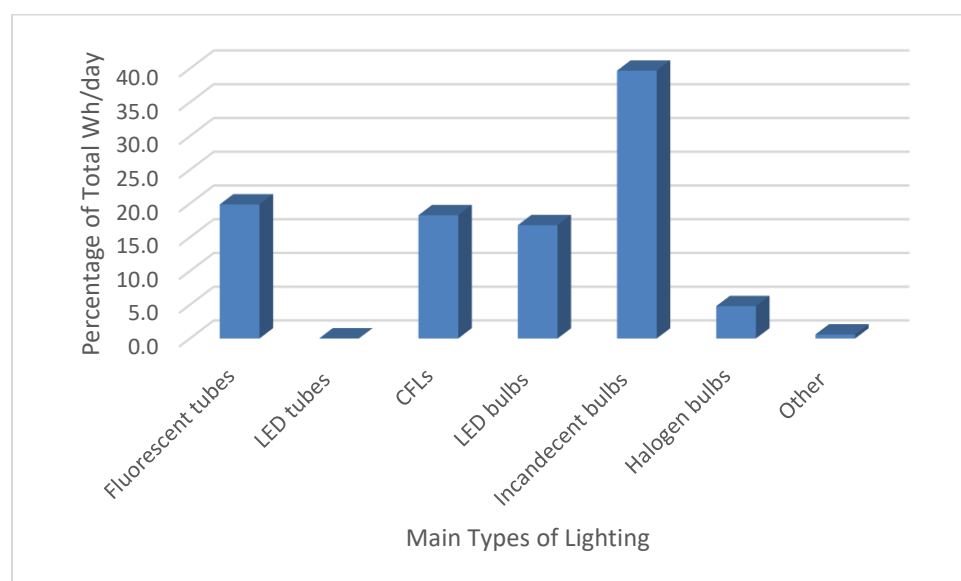
Watts	Number	Percentage
1-10	647	23.3
11-20	893	32.1
21-30	63	2.3
31-40	325	11.7
41-50	202	7.3
51-60	347	12.5
61-70	44	1.6
71-80	137	4.9
81-90	0	0
91-100	113	4
101-150	8	0.3
151-200	2	0.1
201-240	1	0.0
Total	2782	100

Average	33.4 watts
Median	20 watts
Max	240 watts
Min	1 watts

Table 34: Daily Estimated Energy Use in all Surveyed Households for Specific Types of Light Bulb/Tubes

	Wh/day	Percentage
Standard old style fluorescent T12 tube with iron ballast	1461	0.7
Fluorescent T8 tube (both iron & electronic ballast)	38159	18.1
Small fluorescent T5 tube with electronic ballast	2203	1.0
LED T8 linear tube	10	0.005
LED T5 linear tube	0	0
CFL bulb with integrated electronic ballast	29796	14.2
CFL plug-in bulb with separate electronic ballast	8659	4.1
LED bulb	35349	16.8
Incandescent with screw base	24753	11.8
Incandescent with pin type (bayonet)	58809	27.9
Halogen bulb	10097	4.8
Other	1259	0.6
Total	210555	100

Figure 4: Daily Estimated Energy Use in all Surveyed Households for Main Types of Lighting



The estimated total daily energy used for lighting in all surveyed households are 211 kWh/day. Estimated average daily energy used for lighting per surveyed household is 1.003 kWh/day. As a comparison, it has been estimated that total energy use for lighting in Funafuti, Tuvalu is 0.66 kWh per house per day, 0.5 kWh in South Tarawa (Kiribati), 0.7 kWh/day in Kiritimati (Kiribati) and 2.2 kWh per house per day in Nauru.

Refrigerators

The total number of refrigerators in surveyed households are 224.

Table 35: Number of Refrigerators in Surveyed Households

	Number	Percentage
No refrigerator	8	4
1 refrigerator	182	87
2 refrigerators	18	9
3 refrigerators	2	1
Total	210	100

Average	1.1 refrigerators
Median	1 refrigerator
Maximum	3 refrigerators
Minimum	0 refrigerators

Table 36: Location of Refrigerators

	Number	Percentage
Sleeping room	0	0
Eating room	79	35
Main living room	8	3.6
Cooking area (Kitchen)	110	49
Shop	0	0
Room used for other business purposes	1	0.4
Office for personal use	0	0
Hallway	4	1.8
Storage room or closet	3	1.3
Garage	4	1.8
Veranda	9	4
Other places outside	1	0.4
Other	4	1.8
Total	223	100

Table 37: Approximate Year Refrigerator Obtained

Period	Number	Percentage
1989-2000	11	6
2001-2005	12	6
2006-2010	25	13
2011-2012	17	9
2013-2014	49	25
2015-2016	53	27
2017-2018	27	14
Total	194	100

Oldest from	1989
Newest from	2018
Average age	6 years
Median age	4 years

Table 38: Refrigerator obtained new or used

	Number	Percentage
New	178	83
Used	37	17
Total	215	100

Table 39: Refrigerator obtained locally or overseas

	Number	Percentage
Locally	152	70
Overseas	64	30
Total	216	100

Table 40: Refrigerator Self-defrosting

	Number	Percentage
Yes	129	59
No	90	41
Total	219	100

Table 41: Refrigerator Door Arrangement

	Number	Percentage
Single door	74	35
Freezer above, refrigerator below	89	42
Freezer door beside the refrigerator door	5	2
Freezer door under the refrigerator door	40	19
Freezer in a drawer under the refrigerator door	6	3
Total	214	100

Table 42: Indicative Refrigerator Capacity

Indicative Volume (Litres)	Number	Percentage
>0-200	14	7.3
201-300	21	10.9
301-400	10	5.2
401-500	30	15.5
501-600	51	26.4
601-700	37	19.2
701-800	15	7.8
801-900	15	7.8
Total	193	100

Average	518 litres
Median	540 litres
Max	908 litres
Min	72 litres

Regarding the above estimates of refrigerator volume, it should be noted that *only* width and height were measured. However, the depth of major appliances is consistent with the depth of built-in cabinets for kitchens since they are designed to fit into a kitchen using standard cabinet components – thus to calculate volume it is reasonable to use 600-620 mm as a depth.⁴¹ For this particular survey a 600 mm depth was assumed. In addition, it should be noted that the exterior was measured. A significant part of the interior consists of various compartments, shelves, trays, drawers, etc. that take up space - thus the actual refrigerator capacity would be smaller than indicated.

Table 43: Quality of Refrigerator Door Seal

	Number	Percentage
Good	178	83
Bad	36	17
Total	214	100

The method used to assess the quality of door seal was a visual check. The surveyors were to look at the edge of the door and see if there were any gaps between the seal and the surface of the refrigerator chamber. In addition, the door was to be opened and checked if the seal appeared clean and there was no black mould or obvious areas where the seal was damaged and would allow warm air to enter the cold space. Furthermore, the surveyors were to look just inside the area where the door seal fits against the refrigerator/freezer body and see if there was any condensation (drops of water) in areas that indicate that warm air carrying moisture is entering the cold space near those areas.⁴²

Table 44: If Refrigerator is powered on and operating all the time

	Number	Percentage
Yes	220	99
No	3	1
Total	223	100

Table 45: Average amount the household estimates it pays per month for electricity to run the refrigerator

Average	37 NZ\$
Median	30 NZ\$
Maximum	400 NZ\$
Minimum	0 NZ\$

⁴¹ Personal communication with Dr. Herbert A. Wade.

⁴² Another method involves using a piece of thin cardboard. Specifically, open the door and close the door so the piece of cardboard is between the seal and the refrigerator body. Slide the card up and down the seal area. If it is very easy to slide at some places and noticeably more difficult at others, then the seal is bad. If the seal is okay, the card will stay by itself in any spot on the seal when the door is closed and sliding it will feel about the same, with a little friction, all around the seal.

Table 46: Name of Refrigerator Manufacturer

	Number	Percentage
Fisher & Paykel	119	56.9
Mitsubishi	46	22.0
Haier	4	1.9
Samsung	11	5.3
Midea	2	1.0
Kelvinator	5	2.4
Daewoo	1	0.5
Frigidaire	1	0.5
Westinghouse	8	3.8
Simpson	3	1.4
ASPIRA	1	0.5
Shacklock	4	1.9
Beko	1	0.5
ELBA	1	0.5
LG	2	1.0
Total	209	100

In the surveyed households in a total of 15 different refrigerator manufacturers were identified.

Table 47: Energy Label on Refrigerator

	Number	Percentage
Yes	140	64
No	79	36
Total	219	100

Table 48: Number of Stars on Refrigerators with Australia/NZ Energy Label

	Number	Percentage
1	5	4
1.5	0	0
2	38	27
2.5	29	21
3	27	19
3.5	4	3
4	23	16
4.5	3	2
5	7	5
5.5	1	1
6	4	3
Total	141	100

Table 49: Energy Label - Country of Origin

	Number	Percentage
Australia/NZ	149	95
Japan	2	1
Korea	1	1
Other	5	3
Total	157	100

Table 50: Estimated kWh/year Energy Use Shown on Label

	Number	Percentage
201-300	5	4
301-400	37	32
401-500	60	51
501-600	8	7
601-700	7	6
Total	117	100

Average	428 kWh/year
Median	427 kWh/year
Max	675 kWh/year
Min	220 kWh/year

Table 51: Plans to Replace Refrigerator

	Number	Percentage
Yes	38	17
No	181	83
Total	219	100

Table 52: If Planning to Replace the Estimated Number of Months from Now

Months from Now	Number	Percentage
1-12	33	92
13-24	0	0
25-48	2	6
49-60	1	3
Total	36	100

Freezers

The total number of freezers in surveyed households are 187.

Table 53: Number of Freezers in Surveyed Households

	Number	Percentage
No freezer	51	24
1 freezer	134	64
2 freezers	22	10
3 freezers	3	1
Total	210	100

Average	0.9 freezers
Median	1 freezer
Maximum	3 freezers
Minimum	0 freezers

Table 54: Location of Freezers

	Number	Percentage
Sleeping room	2	1
Eating room	53	29
Main living room	7	3.9
Cooking area (Kitchen)	50	28
Shop	0	0
Room used for other business purposes	1	0.6
Office for personal use	0	0
Hallway	5	2.8
Storage room or closet	8	4.4
Garage	4	2.2
Veranda	39	22
Other places outside	6	3.3
Other	6	3.3
Total	181	100

Table 55: Approximate Year Freezer Obtained

Period	Number	Percentage
1990-2000	16	10
2001-2005	16	10
2006-2010	35	21
2011-2012	11	7
2013-2014	30	18
2015-2016	33	20
2017-2018	26	16
Total	167	100

Oldest from	1990
Newest from	2018
Average age	7 years
Median age	5 years

Table 56: Freezer obtained new or used

	Number	Percentage
New	145	81
Used	34	19
Total	179	100

Table 57: Freezer obtained locally or overseas

	Number	Percentage
Locally	145	80
Overseas	36	20
Total	181	100

Table 58: Freezer Self-defrosting

	Number	Percentage
Yes	53	29
No	129	71
Total	182	100

Table 59: Freezer Door Arrangement

	Number	Percentage
Single Top opening door	155	97
Two top opening doors	1	1
Front opening door	4	3
Total	160	100

Table 60: Indicative Freezer Volume

Indicative Volume (Litres)	Number	Percentage
>0-200	6	3.6
201-300	15	8.9
301-400	60	35.5
401-500	14	8.3
501-600	28	16.6
601-700	11	6.5
701-800	20	11.8
801-900	1	0.6
901-1000	13	7.7
1001-1100	1	0.6
Total	169	100

Average	498 litres
Median	432 litres
Max	1045 litres
Min	87 litres

With regard to the above estimates of freezer volume, it should be noted that *only* width and height were measured. However, the depth of major appliances is consistent with the depth of built-in cabinets for kitchens. Since they are designed to fit into a kitchen using standard cabinet components – thus to calculate volume, it is reasonable to use 600-620 mm as a depth.⁴³ For this particular survey, a 600 mm depth was assumed. In addition, it should be noted the exterior was measured. The surfaces of a freezer are relatively thick to accommodate needed insulation plus a significant part of the interior consists of various compartments, shelves, trays, drawers, etc. that take up space – thus the actual freezer capacity is somewhat smaller than indicated in the survey.

Table 61: Quality of Freezer Door Seal

	Number	Percentage
Good	133	74
Bad	47	26
Total	180	100

The method used to assess the quality of door seal was a visual check. Among others, the surveyors were to look at the edge of the door and see if there were any gaps between the seal and the surface of the freezer chamber. In addition, the door should be opened and checked if the seal appeared clean and there was no black mould or obvious areas where the seal was damaged and may allow warm air to enter the cold space. Furthermore, the surveyors were to look just inside the area where the door seal fits against

⁴³ Personal communication with Dr. Herbert A. Wade.

the freezer body and see if there was any condensate (drops of water) in some areas that indicate that warm air carrying moisture is entering the cold space near those areas.⁴⁴

Table 62: If Freezer is powered on and operating all the time (24-hours a day)

	Number	Percentage
Yes	174	94
No	11	6
Total	185	100

Table 63: Average amount the household estimates it pays per month for electricity to run the freezer

Average	35 NZ\$
Median	30 NZ\$
Maximum	200 NZ\$
Minimum	5 NZ\$

Table 64: Name of Freezer Manufacturer

	Number	Percentage
Fisher & Paykel	130	75.6
Mitsubishi	3	1.7
Haier	7	4.1
Midea	1	0.6
Kelvinator	10	5.8
Westinghouse	7	4.1
Simpson	2	1.2
ASPIRA	2	1.2
Shacklock	5	2.9
LG	1	0.6
Telmann	2	1.2
Omega	1	0.6
Nouveau	1	0.6
Total	172	100

In the surveyed households, a total of 13 different freezer manufacturers were identified.

⁴⁴ Another method involves using a piece of thin cardboard. Specifically open the door and close the door so the piece of cardboard is between the seal and the freezer body. Slide the card up and down the seal area. If it is very easy to slide at some places and noticeably more difficult at others, then the seal is bad. If the seal is ok, the card will stay by itself in any spot on the seal when the door is closed and sliding it will feel about the same, with a little friction, all around the seal.

Table 65: Energy Label on Freezer

	Number	Percentage
Yes	56	31
No	123	69
Total	179	100

Table 66: Number of Stars on Freezers with Australia/NZ Label

	Number	Percentage
1	1	2
1.5	0	0
2	16	33
2.5	10	20
3	10	20
3.5	3	6
4	6	12
4.5	0	0
5	2	4
5.5	0	0
6	1	2
Total	49	100

Table 67: Energy Label - Country of Origin

	Number	Percentage
Australia/NZ	85	97
Other	3	3
Total	88	100

Table 68: Estimated kWh/year Energy Use Shown on Label

	Number	Percentage
100-200	1	2.6
201-300	4	10.5
301-400	14	36.8
401-500	8	21.1
501-600	11	28.9
601-703	1	2.6
Total	38	100

Average	418 kWh/year
Median	420 kWh/year
Max	703 kWh/year
Min	145 kWh/year

Table 69: Plans to Replace Freezer

	Number	Percentage
Yes	23	13
No	155	87
Total	178	100

Table 70: If Yes Planning to Replace, the Estimated Number of Months from now

	Number	Percentage
1-12	18	78
13-24	5	22
Total	23	100

Air Conditioners

The total number of air conditioners (ACs) in surveyed households are 13.

Table 71: Number of Air Conditioners in Surveyed Households

	Number	Percentage
No AC	199	95
1 AC	9	4
2 ACs	2	1
Total	210	100

Average	0.1 air conditioner
Median	0 air conditioner
Maximum	2 air conditioners
Minimum	0 air conditioner

Due to the low number of air conditioners the data has not been tabulated further.

Small Electrical Appliances

The total number of small electrical appliances in surveyed households are 2270. The following should be noted:

- Though a washing machine and dishwasher are not usually considered small appliances, they are listed here since available information indicated they are rare in Niuean households. However, for washing machines this turned out to incorrect (refer to Table 74 below).
- Due to an oversight in the questionnaire the code 'F' was given to both electric frying pan and flashlight. During the training workshop it was agreed that electric frying pans would be 'F1' and flashlights 'F2'. However, there are several cases where 'F' has been entered in the raw dataset (a total of 29). This means that electric frying pans and/or flashlights are under reported (as 'F' is not counted/tabulated).
- Due to an oversight in the questionnaire the code 'SM' was given to both sandwich maker and sanding machine. During the training workshop it was agreed that sandwich maker would be 'SM1' and sanding machine 'SM2'. However, there are several cases where 'SM' has been entered in the raw dataset (a total of 39). This means that sandwich makers and/or sanding machines are under reported (as 'SM' is not counted/tabulated).
- Note that the values listed in tables 83-91 are label watts. The watts rating given on appliance labels is the *maximum* that may occur and is listed mainly to assure that the customer plugs the appliance in an outlet that can handle that maximum level of power demand. The actual usage often is a fraction of that maximum power demand. Thus, for electrical appliances high wattage does indicate high watt-hours, but the actual number depends on usage. Because usage patterns of many electrical appliances have such an effect on kWh, it is practically impossible to develop a reliable energy use profile for a particular appliance without actually measuring it. Instead what is looked for in this survey is: 1) the mix of electrical appliances that people actually use; and 2) their relative power requirements. Therefore, in identifying and designing projects/programmes through 1) it can be known what appliances to address and through 2) it can be assessed which appliances are probably the most inefficient.

Table 72: Total Number of Small Electrical Appliances in Surveyed Households

	Number	Percentage
0	0	0
1-10	120	58
11-20	71	34
21-30	13	6
31-40	1	0
41-50	2	1
51-52	0	0
Total	207	100

Average	10.9 small electrical appliances
Median	9 small electrical appliances
Max	52 small electrical appliances
Min	1 small electrical appliance

Table 73: Total Number of Each Type of Small Electrical Appliance in Surveyed Households

	Number	Percentage
Rice cooker	117	5.1
Electric kettle	196	8.5
Electric frying pan	89	3.9
Electric griddle	14	0.6
Table top electric oven	24	1.0
Hot water dispenser (always hot)	20	0.9
Electric iron	177	7.7
Washing machine (top loading single tub)	184	8.0
Washing machine (top loading dual tub)	1	0.04
Washing machine front loading	5	0.2
Washing machine with wringer	10	0.4
Electric water cooler	2	0.1
Electric hair clipper	83	3.6
Electric sewing machine	70	3.0
Electric dishwasher	5	0.2
Toaster	153	6.6
Radio	124	5.4
Flashlight	14	0.6
Battery charger	28	1.2
Blender	103	4.5
Hair dryer	29	1.3
Hair straightener	57	2.5
Clothes dryer	5	0.2
Coffee machine	6	0.3
Stereo	29	1.3
Sandwich maker	87	3.8
Food processor	21	0.9
Vacuum cleaner	90	3.9
Electric glue gun	18	0.8
Electric welder	11	0.5
Electric mixer	23	1.0
Musical keyboard	13	0.6
Electric water pump	9	0.4
Electric drill	61	2.6
Bread making machine	2	0.1
Impulse bag sealer	1	0.04
Slow cooker	38	1.7
Sanding machine	23	1.0
Electric coconut scraper	54	2.3
Circular saw	35	1.5
Mitre saw	14	0.6
Grinding machine	39	1.7
Other	218	9.5
Total	2302	100

'Other' include: 'BBQ GRILL', 'WOK', 'HOT PLATE', 'WATER BLASTER', 'NUTRI-BULLET', 'DEEP FRYER', 'AIR COMPRESSOR', 'MOSQUITO BURNER (REPELANT)', 'IRON PRESSOR', 'SOLDERING IRON' & 'PAINT SPRAYER'.

Table 74: Hours of use per Week for Rice Cookers

	Number	Percentage
0	29	25
<0-1	59	51
1.1-3.9	17	15
4-5.9	1	1
6-10.9	5	4
11-20.9	2	2
21-50.9	2	2
51-80.9	0	0
81-110.9	0	0
111-140.9	0	0
141-168	0	0
Total	115	100

Table 75: Hours of use per Week for Kettles

	Number	Percentage
0	8	4
<0-1	96	49
1.1-3.9	54	28
4-5.9	14	7
6-10.9	12	6
11-20.9	3	2
21-50.9	6	3
51-80.9	1	1
81-110.9	0	0
111-140.9	0	0
141-168	0	0
Total	194	100

Table 76: Hours of use per Week for Irons

	Number	Percentage
0	18	10
<0-1	116	66
1.1-3.9	31	18
4-5.9	6	3
6-10.9	2	1
11-20.9	2	1
21-50.9	1	1
51-80.9	0	0
81-110.9	0	0
111-140.9	0	0
141-168	0	0
Total	176	100

Table 77: Hours of Use per Week for Electric Frying Pans

	Number	Percentage
0	40	45
<0-1	29	33
1.1-3.9	13	15
4-5.9	1	1
6-10.9	3	3
11-20.9	1	1
21-50.9	1	1
51-80.9	0	0
81-110.9	0	0
111-140.9	0	0
141-168	0	0
Total	88	100

Table 78: Hours of use per Week for Top Loading Single Top Washing Machines

	Number	Percentage
0	3	2
<0-1	21	12
1.1-3.9	73	40
4-5.9	23	13
6-10.9	39	22
11-20.9	19	10
21-50.9	2	1
51-80.9	1	1
81-110.9	0	0
111-140.9	0	0
141-168	0	0
Total	181	100

Table 79: Hours of use per Week for Toasters

	Number	Percentage
0	17	11
<0-1	93	62
1.1-3.9	29	19
4-5.9	9	6
6-10.9	1	1
11-20.9	2	1
21-50.9	0	0
51-80.9	0	0
81-110.9	0	0
111-140.9	0	0
141-168	0	0
Total	151	100

Table 80: Hours of Use per week for Blenders

	Number	Percentage
0	44	44
<0-1	48	48
1.1-3.9	5	5
4-5.9	2	2
6-10.9	0	0
11-20.9	0	0
21-50.9	1	1
51-80.9	0	0
81-110.9	0	0
111-140.9	0	0
141-168	0	0
Total	100	100

Table 81: Hours of use per Week for Vacuum Cleaners

	Number	Percentage
0	19	22
<0-1	52	59
1.1-3.9	13	15
4-5.9	0	0
6-10.9	3	3
11-20.9	1	1
21-50.9	0	0
51-80.9	0	0
81-110.9	0	0
111-140.9	0	0
141-168	0	0
Total	88	100

Table 82: Hours of use per Week for Electric Drills

	Number	Percentage
0	25	42
<0-1	32	54
1.1-3.9	2	3
4-5.9	0	0
6-10.9	0	0
11-20.9	0	0
21-50.9	0	0
51-80.9	0	0
81-110.9	0	0
111-140.9	0	0
141-168	0	0
Total	59	100

Table 83: Watts for Rice Cookers

Watts	Number	Percentage
>0-500	58	59
501-1000	33	33
1001-1500	5	5
1501-2000	3	3
Total	99	100

Table 84: Watts for Kettles

Watts	Number	Percentage
>0-500	11	6
501-1000	5	3
1001-1500	17	10
1501-2000	36	21
2001-3000	105	60
Total	174	100

Table 85: Watts for Irons

Watts	Number	Percentage
>0-500	4	3
501-1000	35	23
1001-1500	35	23
1501-2000	40	26
2001-3000	38	25
Total	152	100

Table 86: Watts for Electric Frying Pans

Watts	Number	Percentage
>0-500	3	4
501-1000	4	6
1001-1500	28	41
1501-2000	6	9
2001-3000	27	40
Total	68	100

Table 87: Watts for Top Loading Single Top Washing Machines

Watts	Number	Percentage
>0-500	51	77
501-1000	8	12
1001-1500	4	6
1501-2000	1	2
2001-3000	2	3
Total	66	100

Table 88: Watts for Toasters

Watts	Number	Percentage
>0-500	0	0
501-1000	65	50
1001-1500	39	30
1501-2000	26	20
2001-3000	1	1
Total	131	100

Table 89: Watts for Blenders

Watts	Number	Percentage
>0-500	58	68
501-1000	24	28
1001-1500	1	1
1501-2000	2	2
2001-3000	0	0
Total	85	100

Table 90: Watts for Vacuum Cleaners

Watts	Number	Percentage
>0-500	19	26
501-1000	21	29
1001-1500	14	19
1501-2000	16	22
2001-3000	2	3
Total	72	100

Table 91: Watts for Electric Drills

Watts	Number	Percentage
>0-500	30	94
501-1000	0	0
1001-1500	1	3
1501-2000	1	3
2001-3000	0	0
Total	32	100

Desktop and Laptop Computers

In this section results are reported for desktop and laptop computers. Later there is a section dealing with tablet computers. The total number of desktop and laptop computers in surveyed households are 175.

Table 92: Total Number of Desktop and Laptop Computers in Surveyed Households

	Number	Percentage
No computer	106	51
1 computer	48	23
2 computers	42	20
3 computers	9	4.3
4 computers	1	0.5
5 computers	1	0.5
6 computers	0	0
7 computers	1	0.5
Total	208	100

Average	0.8 computers
Median	0 computers
Maximum	7 computers
Minimum	0 computers

Table 93: Location of Desktop and Laptop Computers

	Number	Percentage
Sleeping room	99	57
Eating room	4	2
Main living room	61	35.3
Cooking area (Kitchen)	1	1
Shop	0	0
Room used for other business purposes	1	0.6
Office for personal use	5	3
Other	2	1.2
Total	173	100

Table 94: Approximate Year Obtained

Period	Number	Percentage
2003-2005	1	1
2006-2010	6	4
2011-2012	15	9
2013-2014	29	18
2015-2016	63	38
2017-2018	51	31
Total	165	100

Oldest from	2003
Newest from	2018
Average age	3 years
Median age	2 years

Table 95: Obtained new or used

	Number	Percentage
New	147	88
Used	20	12
Total	167	100

Table 96: Obtained Locally or Overseas

	Number	Percentage
Locally	26	15
Overseas	143	85
Total	169	100

Table 97: Type of Monitor

	Number	Percentage
Flat screen	168	98
CRT	3	2
Total	171	100

Table 98: Screen Size

Diagonal in inches	Number	Percentage
1-10	34	19.3
11-20	129	73
21-30	11	6.3
31-40	1	0.6
41-42	1	0.6
Total	176	100

Average	14 inches
Median	14 inches
Max	42 inches
Min	5 inches

Table 99: Type of Computer

	Number	Percentage
Desktop	19	11
Laptop	154	89
Total	173	100

Table 100: Laser Printer in Household

	Number	Percentage
Yes	13	7
No	161	93
Total	174	100

Table 101: Inkjet Printer in Household

	Number	Percentage
Yes	20	12
No	149	88
Total	169	100

Table 102: Hours of use per day during the week on Schooldays

	Number	Percentage
0	31	19
1-6	117	71
7-12	15	9
13-18	1	1
19-24	1	1
Total	165	100

Table 103: Hours of use per day during the week on School Holidays

	Number	Percentage
0	32	20
1-6	112	68
7-12	17	10
13-18	1	1
19-24	2	1
Total	164	100

Table 104: Hours of use on Saturdays

	Number	Percentage
0	50	30
1-6	105	62
7-12	12	7
13-18	1	1
19-24	1	1
Total	169	100

Table 105: Hours of use on Sundays

	Number	Percentage
0	51	30
1-6	92	55
7-12	22	13
13-18	2	1
19-24	1	1
Total	168	100

Table 106: Plans to Replace

	Number	Percentage
Yes	17	10
No	155	90
Total	172	100

Table 107: If Yes Planning to Replace the Estimated Number of Months from Now

	Number	Percentage
Imminent	0	0
1-12 months	11	85
13-36 months	2	15
Total	13	100

Table 108: Type of Work the Computer is mostly used for

	Number	Percentage
Facebook, You Tube and other Internet sites	29	16
Research, looking up information	14	8
School work	21	12
Writing documents	21	12
Finance and accounts	29	16
E-mail	23	13
Games	1	1
Movies	30	17
Other	12	7
Total	180	100

Table 109: If the Equipment above is left Connected to the Power all the time

	Number	Percentage
Yes	20	11
No	156	89
Total	176	100

Table 110: If there is Internet access at the home

	Number	Percentage
Yes	155	87
No	24	13
Total	179	100

Table 111: If there is Wi-Fi at Home

	Number	Percentage
Yes	156	87
No	24	13
Total	180	100

Microwave Ovens

Table 112: Microwave Oven in Household

	Number	Percentage
Yes	144	69
No	64	31
Total	208	100

Table 113: Mode for Setting Operating Time

	Number	Percentage
Knob	24	17
Buttons	121	83
Total	145	100

Table 114: Average Use per Day in Minutes

	Number	Percentage
0	10	7
1-10	110	77
11-20	12	8
21-30	5	3
31-100	6	4
101-120	0	0
Total	143	100

Average	9 minutes
Median	5 minutes
Max	120 minutes
Min	0 minutes

Table 115: Watts

Watts	Number	Percentage
200-500	1	1
501-1000	21	11
1001-2000	82	44
2001-3900	83	44
Total	187	100

Average	1146 watts
Median	1100 watts
Max	2400 watts
Min	400 watts

Table 116: If the Microwave Oven is plugged in and power on to the charger all the time

	Number	Percentage
Yes	49	34
No	97	66
Total	146	100

Mobile Phones

The total number of mobile phones in surveyed households are 370.

Table 117: Number of Mobile Phones in use by Household Members

	Number	Percentage
0	35	18
1	61	31
2	46	23
3	25	13
4	14	7
5	8	4
6	6	3
7	0	0
8	0	0
9	0	0
10	1	1
Total	196	100

Table 118: If chargers are left plugged in and powered all the time

	Number	Percentage
Yes	24	15
No	141	85
Total	165	100

Tablet Computers

The total number of tablet computers in surveyed households are 173.

Table 119: Number of Tablet Computers in Households

	Number	Percentage
0	76	43
1	56	32
2	28	16
3	13	7
4	2	1
5	1	1
6	0	0
7	0	0
8	0	0
9	1	1
Total	177	100

Average	1.0 tablet computer
Median	1 tablet computer
Max	9 tablet computers
Min	0 tablet computers

Table 120: If chargers are left plugged in and powered all the time

	Number	Percentage
Yes	14	12
No	106	88
Total	120	100

Water Heaters

The total number of water heaters - solar water heaters, tank type water Heaters and 'instant on' water heaters - in the surveyed households are 148.

Table 121: If there is a Solar Water Heater

	Number	Percentage
Yes	130	65
No	69	35
Total	199	100

Table 122: Type of Solar Water Heater

	Number	Percentage
Tube	11	8
Flat	120	92
Total	131	100

Table 123: If there is an Electric Back-up Heater

	Number	Percentage
Yes	28	21
No	106	79
Total	134	100

Table 124: If there is a Tank Type Water Heater

	Number	Percentage
Yes	8	4
No	193	96
Total	201	100

Table 125: Electric or Gas Tank Type Water Heater

	Number	Percentage
Electric	5	71
Gas	2	29
Total	7	100

Table 126: If there an 'Instant on' Water Heater

	Number	Percentage
Yes	10	5
No	191	95
Total	201	100

Table 127: Electric or Gas Tank Type 'Instant-on' Water Heater

	Number	Percentage
Electric	5	56
Gas	4	44
Total	9	100

Fans

The total number of fans in surveyed households are 467.

Table 128: Number of Fans in Households

	Number	Percentage
No fans	33	15.9
1 fan	42	20.2
2 fans	58	27.9
3 fans	30	14.4
4 fans	20	9.6
5 fans	16	7.7
6 fans	5	2.4
7 fans	3	1.4
8 fans	1	0.5
Total	208	100

Average	2.2 fans
Median	2 fans
Maximum	8 fans
Minimum	0 fans

Table 129: Number of Different Types of Fans

	Number	Percentage
Celling fan	61	14.6
Table fan	71	17.0
Standing fan	271	64.8
Window or large floor fan	0	0
Wall mounted fan	10	2.4
Homemade fan	0	0
Other	5	1.2
Total	418	100

Table 130: Hours of Use per Day during Wet Season (December to March)

Hours of Use per Day	Number	Percentage
0	54	12
>0-6	206	45
7-12	164	36
13-18	23	5
19-24	12	3
Total	459	100

Average	7 hours
Median	6 hours
Maximum	24 hours
Minimum	0 hours

Table 131: Use hours per Day during Dry Season (April to November)

Hours of Use per Day	Number	Percentage
0	185	41
>0-6	176	39
7-12	66	14
13-18	5	1
19-24	24	5
Total	456	100

Average	4 hours
Median	2 hours
Maximum	24 hours
Minimum	0 hours

Table 132: Watts (nameplate)

	Number	Percentage
>0-10	1	0.3
11-20	4	1
21-30	7	2
31-40	44	12
40-50	169	46
51-60	62	17
61-70	50	14
71-80	12	3
81-90	1	0.3
91-100	9	2
101-200	4	1
201-300	1	0.3
Total	364	100

Average	55 watts
Median	50 watts
Maximum	300 watts
Minimum	10 watts

Table 133: Location of Fans

	Number	Percentage
Sleeping room	282	62
Eating room	19	4
Main living room with TV	139	31
Cooking area	11	2
Shop	0	0
Room used for other business purposes	0	0
Office for personal use	0	0
Other	2	0
Total	453	100

Cooking

It should be noted that the following categories were used for estimated usage:

- *Small*
 - Usage of around $\frac{1}{4}$ of the time or less/used only once in a while.
- *Medium*
 - Used for cooking from $\frac{1}{4}$ to half the time.
- *Large*
 - More than half the time, thus the main means for cooking.

Electricity

Table 134: Electric Cooking Unit in Households

	Number	Percentage
Yes	103	50
No	104	50
Total	207	100

Table 135: Estimated usage of Electric Cooking Unit

	Number	Percentage
Small	41	40
Medium	34	33
Large	28	27
Total	103	100

Gas

Table 136: Gas Cooking Unit in Households

	Number	Percentage
Yes	166	80
No	42	20
Total	208	100

Table 137: Estimated usage of Gas Cooking Unit

	Number	Percentage
Small	23	14
Medium	31	19
Large	110	67
Total	164	100

Kerosene

Table 138: Kerosene Cooking Unit in Households

	Number	Percentage
Yes	1	0.5
No	201	99.5
Total	202	100

Table 139: Estimated usage of Kerosene Cooking Unit

	Number	Percentage
Small	0	0
Medium	1	100
Large	0	0
Total	1	100

Wood

Table 140: Cooking with Wood in Households

	Number	Percentage
Yes	119	57
No	89	43
Total	208	100

Table 141: Estimated usage of Wood

	Number	Percentage
Small	51	48
Medium	43	40
Large	13	12
Total	107	100

Other Cooking Fuels

Table 142: Cooking with Other Fuels in Households

	Number	Percentage
Yes	23	11
No	181	89
Total	204	100

Note that 17 out of the 23 that answered ‘Yes’ they do cook with other fuels, specified the fuel as charcoal.

Table 143: Estimated usage of Other Fuels

	Number	Percentage
Small	18	82
Medium	2	9
Large	2	9
Total	22	100

Multiple Cooking Fuels

Table 144: Total Number of Cooking Fuels Used in Households

	Number	Percentage
Zero cooking fuels	4	1.9
One cooking Fuel	59	28.1
Two cooking Fuels	91	43.3
Three cooking Fuels	53	25.2
Four cooking Fuels	3	1.4
Total	210	100

Average	2 cooking fuels
Median	2 cooking fuels
Max	4 cooking fuels
Min	0 cooking fuels

Televisions

The total number of TVs in surveyed households are 219.

Table 145: Total Number of TVs in Households

	Number	Percentage
No TVs	31	14.9
1 TV	142	68.3
2 TVs	29	13.9
3 TVs	5	2.4
4 TVs	1	0.5
Total	208	100

Table 146: Location of TVs

	Number	Percentage
Sleeping room	49	23
Eating room	3	1.4
Main living room	162	75
Cooking area (Kitchen)	1	0.5
Shop	0	0
Room used for other business purposes	0	0
Office for personal use	0	0
Other	1	0.5
Total	216	100

Table 147: Approximate Year Obtained

Period	Number	Percentage
1998-1999	1	0.5
2000-2004	2	1
2005-2009	9	4.5
2010-2014	69	34.8
2015-2017	114	57.6
2018	3	1.5
Total	198	100

Oldest from	1998
Newest from	2018
Average age	4 years
Median age	3 years

Table 148: Obtained new or used

	Number	Percentage
New	193	89
Used	24	11
Total	217	100

Table 149: Obtained Locally or Overseas

	Number	Percentage
Locally	103	48
Overseas	112	52
Total	215	100

Table 150: Type of Monitor

	Number	Percentage
Flat screen	203	94
CRT	13	6
Total	216	100

Table 151: Screen Size

Diagonal in Inches	Number	Percentage
1-10	4	2
11-20	37	17
21-30	29	13
31-40	73	34
41-50	52	24
51-60	18	8
61-65	4	2
Total	217	100

Average	34 inches
Median	32 inches
Maximum	65 inches
Minimum	5 inches

Table 152: If there is a Satellite or Cable Box

	Number	Percentage
Yes	75	35
No	141	65
Total	216	100

Table 153: TV Remote Control Unit

	Number	Percentage
Yes	181	83
No	37	17
Total	218	100

Table 154: Watts

	Number	Percentage
20-50	26	25
51-100	37	36
101-200	24	24
201-300	13	13
301-384	2	2
Total	102	100

Average	108 watts
Median	80 watts
Max	384 watts
Min	12 watts

Table 155: Hours of use per day during the week on Schooldays

	Number	Percentage
0	52	24
1-6	138	65
7-12	17	8
13-18	5	2
19-24	1	0.5
Total	213	100

Table 156: Hours of use per day during the week on School Holidays

	Number	Percentage
0	56	27
1-6	121	57
7-12	28	13
13-18	3	1
19-24	3	1
Total	211	100

Table 157: Hours of use on Saturdays

	Number	Percentage
0	47	22
1-6	150	69
7-12	19	9
13-18	0	0
19-24	1	0
Total	217	100

Table 158: Hours of use on Sundays

	Number	Percentage
0	50	30
1-6	139	83
7-12	25	15
13-18	2	1
19-24	1	1
Total	167	100

Table 159: Satisfied with Unit

	Number	Percentage
Yes	204	94
No	14	6
Total	218	100

Table 160: Plans to Replace

	Number	Percentage
Yes	13	6
No	201	94
Total	214	100

Table 161: DVD Player

	Number	Percentage
Yes	54	25
No	161	75
Total	215	100

Table 162: Number of DVDs played each Week

	Number	Percentage
0	16	36
1	9	20
2	10	23
3	4	9
4	1	2
5	4	9
Total	44	100

Average	1.3 DVDs played each week
Median	1 DVD played each week
Max	5 DVDs played each week
Min	0 DVDs played each week

Table 163: Game Console in Household

	Number	Percentage
Yes	25	12
No	190	88
Total	215	100

Table 164: Hours a Week Game Console is used

	Number	Percentage
1-10	33	97
11-20	0	0
21-30	1	3
Total	34	100

Average	2.4 hours a week
Median	1 hour a week
Max	30 hours a week
Min	0 hours a week

Table 165: If the Equipment above is Left Connected to the Power all the time

	Number	Percentage
Yes	76	37
No	127	63
Total	203	100

Annex E: Comparison of Direct Survey Costs associated with Energy Household Surveys in Pacific Island Countries

Country	Year	Focus	Total Number of Households Surveyed	Key Partners	Estimated Direct Costs per Household (US\$)	Notes
Fiji	2005	Rural areas	2387	Department of Energy & ESCAP	26	Cost estimate reflects technical assistance provided pro bono by lead consultant (100 days in total).
Samoa	2007-2008	Rural and urban areas	324	Electric Power Corporation (EPC) & UNDP	76	Cost estimate does not reflect significant in-kind contributions from the Samoa Electric Power Corporation (EPC).
RMI	2008	Urban areas (two main atolls)	480	Economic Policy, Planning and Statistics Office & UNDP	62	Cost estimate does not reflect significant technical assistance provided by UNDP (39 days in total) as well as travel costs associated with trip to Majuro (June/July 2008).
Cook Islands	2011	Outer island (small, very remote atoll)	30	Energy Division & UNDP	334	Cost estimate does not reflect significant technical assistance provided by UNDP (20 days in total). In addition it should be noted that: i) the survey was not the only purpose of the trip undertaken in February 2011; and ii) air travel to Rakahanga from main island Rarotonga is extremely expensive.
Vanuatu	2013	Urban areas (Port Vila & Luganville)	1438	Department of Meteorology, Department of Energy, Vanuatu National Statistics Office, ADB, GEF, GIZ & UNDP	22	Cost estimate does not reflect technical assistance provided by UNDP (15 days in total).
Tuvalu	2014	Urban areas (Funafuti)	434	Department of Energy, Central Statistics Division, Government of Australia, SPC and UNDP	15	Cost estimate does not reflect: i) significant in-kind contributions from the Department of Energy and the Central Statistics Division; and ii) significant technical assistance provided by UNDP (estimated to be 40 days in total) as well as travel costs associated with two trips (in August 2013 and August 2014).

Nauru	2015	Urban areas (all of Nauru)	286	Department of Commerce, Industry & Environment (CIE), Bureau of Statistics, IUCN, UNEP, GEF and UNDP	99	Cost estimate does not reflect: i) significant in-kind contributions from IUCN; and ii) significant technical assistance provided by UNDP (estimated to be 40 days in total) as well as travel costs associated with trip in September 2013.
Kiribati	2016	Urban areas (South Tarawa and Kiritimati Island)	983	Energy Planning Unit (EPU), National Statistics Office (NSO), Government of Australia and UNDP	25	Cost estimate does not reflect: i) significant in-kind contributions from Government of Kiribati; and ii) significant technical assistance provided by UNDP as well as travel costs associated with two trips to South Tarawa and one trip to Kiritimati Island.
Niue	2018	Urban areas (de facto all of Niue)	210	Ministry of Infrastructure and the Statistics and Immigration Office, Government of Australia and UNDP	70	Cost estimate does not reflect: i) significant in-kind contributions from Government of Niue; and ii) significant technical assistance provided by UNDP as well as travel costs associated with two trips to Niue.

As can be seen above, the costs per household vary significantly between surveys. Among other factors, it appears unit costs depend on:

- Economy of scale (i.e. the total number of households surveyed);
- 'Cost of doing business' in a particular country; and,
- Specific survey sites, including whether survey units are: i) concentrated (like in the RMI and Tuvalu surveys); ii) dispersed (like the Samoa survey); or iii) remote (like the Cook Islands and Kiribati survey).