South Pacific Regional Environment Programme

SPREP Reports and Studies Series no. 70

Energy Audit of SPREP Buildings at Vaitele, Western Samoa

by
Greenpeace

Original Text: English

Published in Jan. 1994 by:
South Pacific Regional
Environment Programme
P.O. Box 240
Apia, Western Samoa

Printed by:
Commercial Printers
Apia, Western Samoa

p 38/93 - 2C

Printed with financial assistance from
Greenpeace

Layout: Wesley Ward, SPREP

USP Cataloguing-in-Publication Data

Greanpeace
Energy Audit of SPREP Buildings at Vaitele, Western Samoa / by Greenpeace. - Apia, Western Samoa : SPREP, 1994.

iv, 7p. : 29 cm - (SPREP reports and studies series ; no. 70).

ISBN: 982-04-0076-7

1. Energy auditing - Western Samoa I. South Pacific Regional Environment Programme II. Title III. Series

TJ163.245.E53 696'09'9614

South Pacific Regional Environment Programme

Energy Audit of SPREP Buildings at Vaitele, Western Samoa

Published in January 1994
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Foreword

Energy conservation and energy efficiency policies are essential for the economic and environmental development for Pacific Island countries. The impact of rising world energy prices is complicated by insecure energy resources in the region, so any relief from high energy costs is welcome. Energy conservation and efficiency policies could save vital foreign exchange for the region, and, environmentally, it is the best oil-import substitution option available.

These policies could also contribute by reducing greenhouse gas emissions which may increase global climate change. A commitment to energy conservation is in Article 4.1. of the United Nations Framework Convention on Climate Change which has been signed by most Pacific island countries and is now being ratified. However, few countries have yet to carry out this commitment.

Despite the advantages, SPREP member countries have not developed appropriate energy conservation strategies or policies to any significant extent.

The energy audit of the SPREP buildings is an small-scale example of identifying major sources of energy consumption and pinpointing areas of potential energy and cost savings. This can be carried out for any company, organisation or government.

The objectives of this project were to:

(a) highlight areas of excessive energy use and identify inefficiencies;

(b) identify and quantify major opportunities for reducing costs;

(c) establish a baseline from which cost and energy savings can be measured;

(d) provide information for the maintenance programme;

(e) inform SPREP member governments on examples like this for developing appropriate energy policies.

We are grateful and acknowledge Greenpeace New Zealand for their collaboration in this project, and also providing financial assistance.

Vili A. Fuavao

Director

Contents

Summary

Site and Location

This audit was carried out at the two buildings occupied by the South Pacific Regional Environmental Programme (SPREP) at Vaitele, Apia, Western Samoa.

Buildings Occupied

The two office buildings leased by SPREP total 640 square meters and accommodate 32 staff. They are part of a larger complex previously owned by the now defunct Western Samoa Copra Board. The National Disaster Committee use the two other large buildings within the complex as warehouses. One of these warehouses was a copra processing plant and contains heavy electrical equipment.

SPREP lease the office buildings for a short term.

Annual Cost of Energy

The only energy used on the site is electrical. The pre-audit electricity consumption was 125 Kwh per day, costing $17,338 per year. After the consultants arranged more suitable metering with the Electric Power Corporation, the daily rate dropped to 108 units per worth $14,980 per annum.

SPREP's energy usage is frugal, at 3.4 kwh of electricity per day per employee. The more so because two room conditioners use 64% of the total consumption.

Energy Cost Savings Identified

Estimated annual savings are:

EPC metering alterations	$2,300
Sub metering & invoicing Government	$500
Airconditioning maintenance and room sealing	$1,500

Overall Payback

Estimated payback of recommended measures is 4 months.

Institutional Difficulties

The building is temporary accommodation for SPREP therefore energy saving measures need a short payback periods.

The offices are not well designed either for natural cooling or for efficient airconditioning. Working conditions are uncomfortable on hot humid days. Resultant inefficient working would be costly. We recommend better housekeeping to improve air circulation, canvas awnings to shade the west and northern walls, and an awning to shade and prevent rainwater from entering the clerestory windows.

Table 1. Summary of Energy Audit

Annual Electrical Energy Consumption, kWh, Estimated	$9,000
Cost per Unit (including discount)	$0.38
Annual Cost, Estimated	$14,980
Period of Data	13/2/92 to 13/11/92

Recommendations

Install Appropriate Metering

The Consultant has already arranged the installation of suitable metering with the Electric Power Corporation. Registered daily electricity consumption immediately dropped 14%.

Estimated Annual Savings $2,300.00 **Cost:** $10.00

Install Accessible Metering

Install meters so they may be read at all times. Meters are now locked within a government building. When the Electric Power Corporation meter readers do not have access to the meters they estimate the reading based on past consumption patterns. This makes it difficult for SPREP to monitor electricity consumption.

Cost: $500.00 All costs are preliminary estimates only.

Meter and Invoice Government for Electricity Use

Install and label an accessible sub-meter to measure the consumption of electricity in the government buildings. Invoice Government of Western Samoa for sub-meter registration.

Estimated Annual Savings: $500.00 **Cost:** $100.00

Maintain Airconditioning Sets

Engage an airconditioning mechanic to clean dirt and dust from airconditioning filters and evaporative coils on a regular 2 monthly basis.

Estimated Annual Savings: $1,000.00 **Cost:** $500.00

Seal Airconditioned Rooms

Seal air leaks in the two rooms in which airconditioners are in regular use. Pay particular attention to reducing air leaks around the conditioner itself, and through the louvre blades of the windows.

Estimated Annual Savings: $500.00 **Cost:** $200.00

Install Canvas Awnings

Install canvas awnings to shade the north and west walls, and to prevent rain entry through the clerestory window. This measure is recommended to improve the working conditions of staff.

Cost: $5,000

Improve Housekeeping

Reduce the cluttered appearance of the office thus improving air circulation. Require the cleaner to adjust window louvres daily to increase air flow. This especially applies to the clerestory louvres.

Executive Summary

The only energy used at the SPREP office is electricity. The average consumption of electricity per employee is 3.4kW, worth $1.29. This despite of 64% of consumption used by two room airconditioners, and a further 23% used by office equipment, mainly computers.

The impression gained by the audit team is that SPREP management and staff are frugal with the use of electricity. Nevertheless there are areas of where expenditure may be reduced without inconvenience.

SPREP use the buildings temporarily. Any energy programme therefore requires a rapid payback period. Further the buildings are not well designed offices. The walls are not protected from the heat of the sun and the offices are uncomfortable for staff on hot humid days.

The Electric Power Corporation (EPC) meter measuring the electricity consumption of the SPREP offices was not matched to SPREP's electrical demand. The meter did not measure the SPREP leased area alone. The Audit Team has paid the required fee to the EPC and has supervised alterations to the metering. The registered consumption immediately dropped from 125 to 108 kWh per day.

We recommend metering alterations to meter the Governments's consumption in the National Development Committee's warehouses. Their consumption is now included in the SPREP meter. The meters also should be moved from the locked warehouse to a position where the EPC meter readers can read them. The present practice of the EPC basing invoices on estimated meter readings makes it difficult to monitor regularly SPREP energy usage.

Two of airconditioning sets use 64% of the total consumption. The Audit Team arranged for each of these airconditioners to be individually and temporarily metered.

As these airconditioners consume a large proportion of SPREP's energy we recommend that specific attention be given to their efficient operation. Both the airconditioners have dirty filters and evaporators and have not been maintained for a long time. Two monthly servicing by an airconditioning mechanic is recommended. In both airconditioned rooms a considerable amount of cooled air leaks to outside the room. The leaks should be sealed.

Office equipment uses some 23% of total consumption. However, the absolute consumption of this equipment is only about 24 units per day worth about $9.12. Given the amount of equipment in use, and its value and utility, we consider this expenditure is reasonable.

Lighting is nominal 40 Watt fluorescent, with 38 Watt tubes installed. Less than 10% of total consumption is lighting.

Some improvement in energy efficiency could be achieved using discharge lighting for security lighting. Because security lighting is little used we believe that substitution of the existing incandescent lamps is not justified unless circumstances charge and a higher level of security lighting is thought necessary.

The offices are uncomfortable in hot and humid weather, and the work efficiency suffers. We suggest the installation of canvas awnings on the north and west walls and over the clerestory windows together with better housekeeping, to maintain an uncluttered area. We believe this would significantly improve staff comfort at a small cost.

In total we recommend an expenditure of about $1,310 on energy measures for an annual saving estimated at $4,300. We further recommend the installation of canvas awning that we would expect to cost around $5,000.

Energy Analysis

Metering

Before this audit, the Electric Power Corporation meter matched the high electrical demand of the now defunct copra processing plant. The 5 amp current transformer meter had a multiplier of 40. It was therefore suitable for a maximum demand of about 140 kVA. The maximum demand of the SPREP installation is about one seventh of that figure. Thus the kWh meter ran at a very low speed. As kWh meters are inherently inaccurate at low speed they are always adjusted by the supply authorities to over read at low speed. A meter therefore probably reads high if a lightly loaded installation is connected to a metering system designed for a heavy load.

The audit team immediately contacted the EPC and paid the standard fee to have on appropriate metering system installed. EPC installed a 3 phase direct reading 40/100 amp meter. The result was an immediate drop in daily units used from 125 to 108, a saving of 14%. See Table 2.

The main meter is within a locked government building used as a warehouse by the National Disaster Committee. EPC meter readers do not have regular access to read the meter in the locked building. Their practice in such a case is to estimate the consumption based on past consumption patterns. As these estimates are not always accurate the resulting account can be misleading to management monitoring electricity use.

We recommended that SPREP use an electrical contractor to locate the meter to a position where it can be read by the EPC meter readers from outside the building.

They should also request their electrical contractor to check that the sub-meter measures the consumption of the government buildings. SPREP should then read the sub-meter about the time of the EPC meter reading and forward an invoice to Government at the pre-discounted rate for electricity, now 40 cents per unit.

Energy Trend

Main meter readings are detailed in Table 3. Record of EPC Main Meter Readings. We discarded readings before February because of the disruption of electricity by Cyclone Val. It is probable that irregularities in monthly readings are due to estimations by EPC meter readers (see Section 5.1).

The increasing electricity consumption over seven months probably reflected SPREP setting up in Apia.

The consumption registered on the old EPC meter between two recent readings actually taken by the meter readers averages 124.7 kWh per day. Current consumption is 107.7 kWh per day.

The probable distribution of energy consumption within the SPREP offices is given in Table 4. The consumption of the airconditioners in Room 5 and 19 was measured. The remaining consumption is calculated from name plate data using estimated load factors. As the survey took one day only there will be some inaccuracy in the estimated consumption. Nevertheless Table 4 provides a reasonable working assumption.

The final column lists the expected consumption of each item of electrical equipment in Tala per year. It is noteworthy that airconditioning uses 64% of the total, office equipment 23%, lighting 9% and others 4%.

As SPREP are occupying the buildings temporarily, we consider only those improvements that have a rapid payback period.

Airconditioning

Airconditioning uses 64% of the total of electricity consumed at the two SPREP buildings. Total annual airconditioning energy cost is $9,121. Refer Table 5.

Each of the two airconditioners in frequent use, Room 19 and Room 5, were metered by a kWh summation meter over several days. One airconditioner had an average consumption of 34 kWh per day and the other 36 kWh per day.

One of the frequently used airconditioners is in the computer maintenance room where it's use is justified by the preservation of equipment. The other is an office that has very limited natural cooling.

A small room airconditioner costs about $11.00 per day in electricity to run. We suggest there may be many reasons that would justify such expenditure. However the weighing of such benefits and costs are a management function.

Nevertheless an airconditioner is an energy intensive devise that requires constant care and maintenance to operate efficiently. Filters require regular cleaning and the evaporative coils need inspecting and cleaned when dirty. The air vent needs to be controlled so only a proportion of make up air from outside the room is cooled. Care must be taken to ensure that excessive cold air does not leak from the room.

We noted elsewhere in this report that SPREP management has been frugal with the use of electricity. Possibly the waste of electricity that follows from inefficient airconditioning has been overlooked.

At the time of this audit the airconditioner filters were very dirty, as were the evaporative coils. On all airconditioners vents were fully opened to admit a maximum of make up air. All the airconditioned rooms required careful sealing to prevent the waste of cool air.

In the computer maintenance room, air was leaking around the airconditioner itself. The louvre blades also required sealing. This can be done by using a strip of adhesive foam along the outside top edge of each strip of glass.

Similar comments apply to Room 5. At the time of the inspection the audit team noted that the occupier of this office was absent, but the door was open with the airconditioner operating. We suggest a door closer be fitted.

Lighting

Lighting uses only about 9% of the total of electricity consumed at the two SPREP buildings. Total annual electricity cost for lighting at the two buildings is about $1,390. See Table 6.

Office lighting is mainly nominal 40 watt fluorescent with 38 watt tubes fitted. All fittings are clean. Incandescent lamps are within efficient desk lamps or are in areas where they are used infrequently. Security lighting is a combination of fluorescent and incandescent lighting. We were told that little security lighting is used. If circumstances change, and improved security lighting is needed, then consideration should be given to investing in a more efficient discharge lighting system.

The positioning of lighting switches was obvious, and their function was clear. The audit team did not see evidence of wastage. We do not recommend any further action on lighting.

Office Equipment

Office equipment uses 23% of the total of electricity consumed at the two SPREP buildings. Total annual energy cost is $3,205. Refer Table 7.

SPREP operate a high technology office. It is not surprising that the energy consumption of such equipment is a little high. The audit team noticed no wastefulness or inefficiencies in the area and offers no recommendations for improvement.

Building Utility

The SPREP office building has not been well designed for natural cooling, nor has it been designed for efficient airconditioning. The larger building has a clerestory window to aid ventilation. Unfortunately rain enters the open louvres of the clerestory window so many of these louvres are normally closed.

The sun's rays heat the northern and western walls of the buildings raising the temperature in these areas significantly. Air circulation is impeded by the storage of items in passageways. A less cluttered office will not only encourage air circulation but also give an impression of coolness.

As SPREP are in temporary occupancy of the buildings the audit team recommend shading of the walls to the north and west with canvas awnings. The clerestory window also should be sheltered by an awning to prevent the ingress of rain.

If SPREP are considering building a new office we suggest an early positive decision to either build a structure suitable for natural ventilation or alternatively suitable for efficient airconditioning.

Many new buildings in Apia have been designed for natural cooling but are later converted to airconditioning. This has lead to inefficient energy use.

With correct site selection, attention to air circulation and shading from the sun we believe that natural cooling can be a more comfortable and efficient working environment than an airconditioned space. An example of such careful design is the Pacific Forum complex in Suva.

Errata

Some tables were inadvertently misplaced from this report. They are included below:

On Page 5, *Metering*:

Table 2: *Meter Reading Calculations*

Meter	Date	Reading	Date	Reading	Day	Units/day
Main Meter (new)	22.10.92	0	13.11.92	2368.5	22	108
Main Meter (old)	09.09.92	9531	22.10.92	9665	43	125
RM 19 Airconditioner	09.11.92	18164	13.11.92	18232	2	34
RM 5 Airconditioner	09.11.92	5736	13.11.92	5808	2	36

On Page 5, *Energy Trend*:

Table 3: *Record of EPC Main Meter Readings*

Read Date	Prev. Read	Units Used	Days	Units/Day
11/03/92	13/02/92	1520	26	58
08/04/92	11/03/92	2360	28	84
08/05/92	08/04/92	3200	30	107
10/06/92	08/05/92	3360	33	102
08/07/92	10/06/92	2960	28	106
13/08/92	08/07/92	*** 4080	36	113
09/09/92	13/08/92	3400	27	126
15/10/92	09/09/92	*** 4080	36	113
22/10/92	15/10/92	512	7	73
16/11/92	22/10/92	*** 3696	25	148
Check Reading				
13/11/92	22/10/92	2368.5	22	108

*** Estimated

On Page .5, *Energy Trend*

Table 4: Electricity use by Area

Appliance	Location	No.	Wattage	Load Factor %	KWH/ Day	$/Year
Building 1						
Fluorescent Light Single Tube	RM 1&2	7	50	12	1.01	$140
Ceiling Fans	RM 1&2	3	100	2	0.14	$20
Floor Fans	RM 1&2	2	100	2	0.10	$13
Table Lamp Superlux	RM 1&2	1	100	2	0.05	$7
Computer Emergency Power Supply	RM 1&2	1	4000	1	0.96	$133
Everex Computer	RM 1&2	1	300	10	0.72	$100
N.E.C. Computer	RM 1&2	1	300	10	0.72	$100
Ricoh FT 4480 Photocopier	RM 1&2	1	1200	1	0.29	$40
Sharp SF 8300 Photocopier	RM 1&2	1	1500	1	0.36	$50
Gestetner 5270	RM 1&2	1	470	0.05	0.01	$1
NEC Silentwriter 2 Printer	RM 1&2	1	500	1	0.12	$17
Fluorescent Light single tube	Rm 3	7	50	12	1.01	$140
Ceiling Fans	RM 3	3	100	2	0.14	$20
Table Lamp	RM 3	1	100	2	0.05	$7
Incandescent Lamp (Toilet)	RM 3	4	240	2	0.46	$64
Computers	RM 3	5	300	16	5.76	$799
HP Printer	RM 3	1	850	2	0.41	$57
HP Jet 111P Printer	RM 3	1	1000	2	0.48	$67
IBM 6747 Typewriter	RM 3	1	500	5	0.60	$83
Water Cooler (Springwater)	RM 3	1	250	12	0.72	$100
Refrigerator (shacklock)	RM 3	1	200	15	0.72	$100
Microwave Oven (Panasonic)	RM 7	1	1400	2	0.67	$93
Fluorescent Lights single tube	RM 9&10	3	50	10	0.36	$50
Ceiling Fans	RM 9&10	2	100	2	0.10	$13
Floor Fans (Portable)	RM 9&10	1	60	2	0.03	$4
Wall Incandescent	RM 9&10	1	60	2	0.03	$4
Incandescent (Toilet)	RM 9&10	2	120	2	0.12	$16
Table Lamp	RM 9&10	1	20	2	0.01	$1
Refrigerator	RM 9&10	1	135	15	0.49	$67
Air Conditioner	RM 9&10	1	2200	0.05	0.03	$4
Fluorescent Lights	Passage	3	50	12	0.29	$40
Fluorescent Lights	R 11	2	50	12	0.29	$40
Ceiling Fans	R 11	1	100	2	0.05	$7
Table Lamp	R 11	1	20	2	0.01	$1
Voice Recorder	R 11	1	60	0.01	0.00	$0
Computer	R 11	1	200	3	0.14	$20
Fluorescent Lights	R 20	3	50	5	0.18	$25
Ceiling Fans	R 20	1	100	1	0.02	$3
Printer Pace Setter	R 20	1	200	1	0.05	$7
Fluorescent Lights	R 19	2	50	12	0.29	$40
Computer	R 19	1	200	10	0.48	$67
Telecom Distribution Frame	R 19	1	494	12	1.42	$197
Air Conditioner	R 19	1	3300	40	31.68	$4,394
Fluorescent Lights	R 21	2	50	1	0.02	$3
Ceiling Fan	R 21	1	100	1	0.02	$3
Fluorescent Lights	R 12	11	50	12	1.58	$220
Ceiling Fans	R 12	7	100	1	0.17	$23
Computers	R 12	6	300	10	4.32	$599
Hewlett Packard Laser Jet III	R 12	1	850	2	0.41	$57
Hewlett Packard Series Ii	R 12	1	850	2	0.41	$57
Table Lamp	R 12	1	100	1	0.02	$3
Toilet	Estimated	1	60	1	0.01	$2
Strong Room	Estimated	1	60	1	0.01	$2
Fluorescent Lights	RM 18	2	50	12	0.29	$40
Ceiling Fan	RM 18	1	100	2	0.05	$7
Table Lamp	RM 18	1	100	1	0.02	$3
Computer	RM 18	2	300	10	1.44	$200

Table 4: Electricity use by Area (cont'd)

Appliance	Location	No.	Wattage	Load Factor %	KWH/ Day	$/Year
Building 1 (cont'd)						
Fluorescent Lights	RM 15	2	50	12	0.29	$40
Ceiling Fans	RM 15	1	100	5	0.12	$17
Coffee Mate	RM 15	1	750	1	0.18	$25
Computer	RM 15	1	300	7	0.50	$70
Fluorescent Lights	RM 16	2	50	12	0.05	$7
Ceiling Fans	RM 16	1	100	2	0.05	$7
Fluorescent Lights	RM 17	2	50	12	0.29	$40
Ceiling Fans	RM 17	1	100	2	0.05	$7
Table Lamps	RM 17	1	100	1	0.02	$3
Computer T1200Xe	RM 17	1	300	10	0.72	$100
Fluorescent Lights	Garage	2	50	5	0.12	$17
Incandescent	Garage	2	60	2	0.06	$8
Security Lights	Garage	6	60	10	0.86	$120
Incandescent Lamps	RM 4	1	60	1	0.01	$2
Building 2						
Security Lights (Incand)	Library	3	60	10	0.43	$60
Fluorescent Lights	Library	5	25	5	0.15	$21
Water Jug	Library	1	1800	0.05	0.02	$3
Incandescent Light	Library	1	60	1	0.01	$2
Fluorescent Light	RM 4	2	50	10	0.24	$33
Air Conditioner (3300 watts?)	RM 4	1	3300	3	2.38	$330
Printer Epson LQ-1170	RM 4	1	1000	1	0.24	$33
Fluorescent Lights	RM 5	4	50	10	0.48	$67
Air Conditioner (3300 watts?)	RM 5	1	3300	40	31.68	$4,394
Sharp SF 7800	RM 5	1	1350	3	0.97	$135
Hewlett Packard Laser Jet III	RM 5	1	850	1	0.20	$28
Computers	RM 5	5	300	3.9	1.41	$196
Tyypewriter AEG Olympia	RM 5	1	30	1	0.01	$1
Table Lamp	RM 5	1	100	1	0.02	$3
				Total	102.29	$14,188

On Page 6, *Airconditioning:*

Table 5: Airconditioning Electricity Use

For Lights Only	Location	No.	Wattage	Load Factor %	KWH/ Day	$/Year
Building 1						
Air Conditioner	RM 9&10	1	2200	0.05	0.03	$4
Air Conditioner	RM 19	1	3300	40	31.68	$4,394
Air Conditioner (3300 W?)	RM 4	1	3300	3	2.38	$330
Air Conditioner (3300 W?)	RM 5	1	3300	40	31.68	$4,394
					65.76	$9,121

Percent of total SPREP Electricity Use = 64%

On Page 6, *Lighting*:

Table 6: *Lighting Electricity Use*

For Lights Only	Location	No.	Wattage	Load Factor %	KWH/ Day	$/Year
Building 1						
Fluorescent Light Single tube	RM 1&2	7	50	12	1.01	$140
Table Lamp Superlux	RM 1&2	1	100	2	0.05	$7
Fluorescent Light single tube	RM 3	7	50	12	1.01	$140
Table Lamp	RM 3	1	100	2	0.46	$64
Incandescent Lamp (Toilet)	RM 3	4	240	2	0.46	$64
Fluorescent Lights single tube	RM 9&10	3	50	10	0.36	$50
Wall incandescent	RM 9&10	1	60	2	0.03	$4
Incandescent (Toilet)	RM 9&10	2	120	2	0.12	$16
Table Lamp	RM 9&10	1	20	2	0.01	$1
Fluorescent Lights	Passage	3	50	12	0.43	$60
Fluorescent Lights	R 11	2	50	12	0.29	$40
Table Lamp	R 11	1	20	2	0.01	$1
Fluorescent Lights	R 20	3	50	5	0.18	$25
Fluorescent Lights	R 19	2	50	12	0.29	$40
Fluorescent Lights	R 21	2	50	1	0.02	$3
Fluorescent Lights	R 12	11	50	12	1.58	$220
Table Lamp	R 12	1	100	1	0.02	$3
Toilet	Estimated	1	60	1	0.01	$2
Strong Room	Estimated	1	60	1	0.01	$2
Fluorescent Lights	RM 18	2	50	12	0.29	$40
Fluorescent Lights	RM 15	2	50	12	0.29	$40
Fluorescent Lights	RM 16	2	50	12	0.29	$40
Fluorescent Lights	RM 17	2	50	12	0.29	$40
Table Lamps	RM 17	1	100	1	0.02	$3
Fluorescent Lights	Garage	2	50	5	0.12	$17
Incandescent	Garage	2	60	2	0.06	$8
Security Lights	Garage	6	60	10	0.86	$120
Incandescent Lamps	Rm 4	1	60	1	0.01	$2
Building 2						
Security Lights (Incand)	Library	3	60	10	0.43	$60
Fluorescent Lights	Library	5	25	5	0.15	$21
Incandescent Light	Library	1	60	1	0.01	$2
Fluorescent Light	Rm 4	2	50	10	0.24	$33
Fluorescent Light	RM 5	4	50	10	0.48	$67
Table Lamp	RM 5	1	100	1	0.02	$3
				Total	**9.52**	**$1,320**

Percent of Total SPREP Electricity Use = 9%

On Page 6, *Office Equipment*:

Table 7: *Office Equipment Electricity Use*

Office Equipment	Location	No.	Wattage	Load Factor %	KWH/ Day	S/Year
Building 1						
Computer Emergency Power Supply	RM 1&2	1	4000	1	0.96	$133
Everex Computer	RM 1&2	1	1000	3	0.72	$100
NEC Computer	RM 1&2	1	300	10	0.72	$100
Ricoh FT 4480 Photocopier	RM 1&2	1	1200	1	0.29	$40
Sharp SF 8300 Photocopier	RM 1&2	1	1500	1	0.36	$50
Gestetner 5270	RM 1&2	1	470	0.05	0.01	$1
NEC Silentwriter 2 Printer	EM 1&2	1	500	1	0.12	$17
Computers	RM 3	5	300	16	5.76	$799
HP Printer	RM 3	1	850	2	0.41	$57
HP Jet 111p Printer	RM 3	1	1000	2	0.28	$67
IBM 6747 Typewriter	RM 3	1	500	5	0.60	$83
Voice Recorder	R 11	1	60	0.01	0.00	$0
Computer	R 11	1	200	3	0.14	$20
Computer	R 19	1	1000	2	0.48	$67
Telecom Distribution Frame	R 19	1	494	12	1.42	$197
Computers	R 12	6	300	10	4.32	$599
Hewlett Packard Laser Jet III	R 12	1	850	2	0.41	$57
Hewlett Packard Series Ii	R 12	1	850	2	0.41	$57
Computer	RM 18	2	300	10	1.44	$200
Computer	RM 15	1	300	7	0.50	$70
Computer T1200Xe	RM 17	1	300	10	0.72	$100
Building 2						
Printer Epson LQ-1170	RM 4	1	1000	1	0.24	$33
Sharp SF 7800	RM 5	1	1350	3	0.97	$135
Hewlett Packard Laser Jet III	RM 5	1	850	1	0.20	$28
Computers	Rm 5	5	300	3.9	1.40	$195
Typewriter AEG Olympia	Rm 5	1	30	1	0.01	$1
				Total	**23.10**	**3203.37**

Percent of Total SPREP Electricity Use = 23%