

Resource Efficiency and Cleaner Production (RECP) Programme

Case Study

Company name	Hotel 224 (Pty) Ltd.		
Sector	Tourism and Hospitality		
Company Contact	Name: Div Nel	Position: Managing Director	
	Email: Div.Nel@hotel224.com	Telephone: 012 440 5281	
Year joined NCPC Project	2015		
Year of interventions	2015/2016	Duration (months)	20
Utility Intervention	Electricity and Water		
Case Study Author	Gavin Graham		
Project Manager	Inga Magodla		

SUMMARY OF SAVINGS	
Total No. of Projects	6
Gross Monetary Savings	R 393,096
Top Resource Savings (in units)	61,606 kWh + 10,944kl
Total Investment	R 212,652
Overall Payback Period (in years)	0.5
GHG Emissions Reduction ²	59.018 tonnes

1. BACKGROUND

1.1 Company profile

Established in 1987, the hotel has developed along with the Jacaranda City. The Hotel 224 is a three-star accommodation in Pretoria. The Hotel is close to major corporations and business districts, as well as landmark structures such as the Union Buildings. Hotel 224 is an established privately-owned-and-managed business.

Website: <http://www.hotel224.com>

1.2 Plant profile

No. of employees: ~125

Trading Since: 1987

Departments: Housekeeping, Food & Beverage, Laundry, Maintenance, Front Office, Admin.

1.3 Project Description

Hotel 224 participated in a Group Cluster RECP Assessment of 10 Gauteng based hotels in between January and May 2015. The focus of the assessment was energy and water. Implementation of the Assessment recommendations started in March 2015 and were completed by October 2016.

2. THE ISSUE AND MAIN FINDINGS

2.1 General

- Resource Efficient and Cleaner Production (RECP) methodologies were used in carrying out the assessment. General Project Management techniques were employed in implementing recommendations.
- The assessment was carried out in February 2015. The baseline period was December 2013 – November 2014.
- Systems descriptions – The main systems consisted of:
 - Heating 34.0%
 - Refrigeration 18.7%
 - Lighting 15.6%
 - Equipment 14.2%
 - HVAC 9.9%
- Energy costs were of particular concern to the company and one of the main reasons the assessment was requested. Water consumption was also an area of unease.

2.2 Consumption patterns prior to assessment

Resource	Usage per annum (units)	Usage per annum (Rand)
Water and Effluent	21,138	R382,740
Energy – electricity	1,077,609 kWh	R 1,111,915
Energy – LPG	11,604 kg's	R 204,237
Waste generation	42,485 kg's	N/A

3. RECP IMPLEMENTATION

3.1 Details of assessment carried out

A Resource Efficiency and Cleaner Production assessment was conducted at Hotel 224 in Pretoria on 9 February 2015. The methodology included the compiling of detailed electrical and water balances and noting areas for increased optimisation. Areas for saving included electrical, water and materials.

3.2 Key findings of the assessment

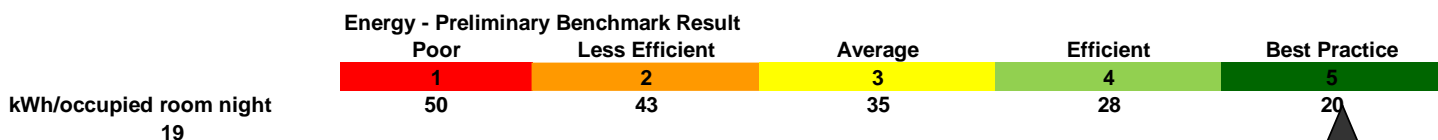
Overall Areas identified for resource saving included:

- >24% reduction in electrical energy usage and cost.
- In excess of 16% reduction in municipal water usage and costs.
- Fuel savings in excess of R5,000.
- Raw material and waste savings of in excess of R147,000.
- Savings were identified amounting to more than R640,000 per annum.

A number of benchmarks based on international studies and standards¹ were investigated to attempt to provide 'best practice' for the relevant hotel size. Key areas which benchmarks were sought:

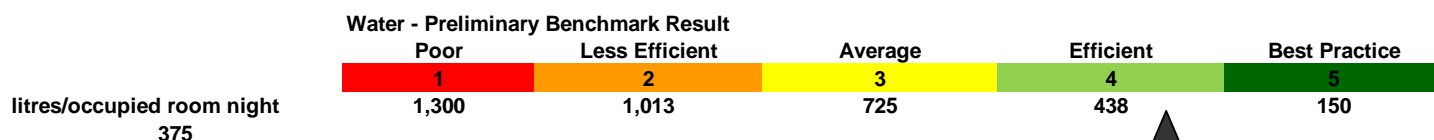
- **Energy Benchmark**

Energy consumption measured in kilowatt hours (kWh) was compared with occupancy (room nights). Good data was available for occupancy (room nights).



- **Water**

Municipal bills (checked against sub-meter readings) of potable water consumed in litres (l) was compared against occupied room nights as the water benchmark. Hotel 224 fared well, even though they had an on-site laundry.



- **Waste**

Actual figures for solid waste production were obtained from the Waste Management Service provider. This was compared per occupied room night. A total waste figure of 63,593 kg's for the year (average of 5,299kg's per month). Divided by average of 4,870 room nights per month equals 1.1kg/room night.

¹ UNEP - Tourism in the Green Economy; International Tourism Partnership – Environmental Management for Hotels; Earthcheck Global Database - White Paper on Water use in Tourism and the Green Globe Standard.

kg's/occupied room night	Waste - Preliminary Benchmark Result				
	Poor	Less Efficient	Average	Efficient	Best Practice
1.1	1	2	3	4	5
	4.0	3.2	2.3	1.5	0.6

4. HIGHLIGHTS OF THE INTERVENTIONS

Hotel 224 implemented six projects as part of their resource reduction initiatives, five of which were identified in the assessment.

The opportunities identified in the RECP Assessment was incorporated into the plans of the Management team’s planning and prioritised for implementation. Most projects were implemented based on existing maintenance and/or upgrading already planned by the company. These interventions were carried out over twenty months immediately following the assessment.

Over the period November 2015 to October 2016 (compared with the baseline of December 2013 to November 2014) the **total electricity consumption decreased by 3.4% (41,793kWh)**, while the total room nights sold increased by 0.2% (138 Room Nights).

Regression analysis using Electricity Consumption vs Occupied Room Nights has also been carried out and the correlation improved from 0.34 in 2013/2014 to 0.38 in 2015/16.

Multi-variant Regression was also carried out using the data provided. There was daily data available for the period Nov 2015 – Oct 2016. There was a good correlation of 0.80 using Weekly Occupancy, Heating Degree Days (HDD) and Cooling Degree Days (CDD). Unfortunately since this was not available for the baseline period, there was not anything to compare against to assess energy performance.

The savings were a result of the combination of the projects implemented. The savings provided immediate payback and significant reduction in electricity costs.

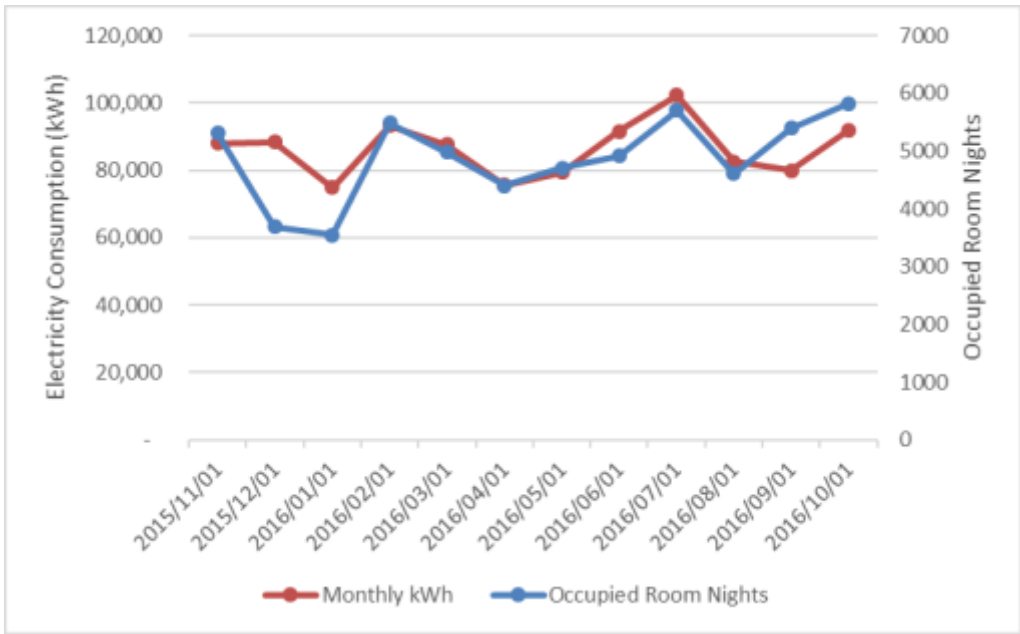


Figure 1. Hotel 224 Monthly Electricity Consumption and Occupied Room Nights Nov 2015-Oct 2016

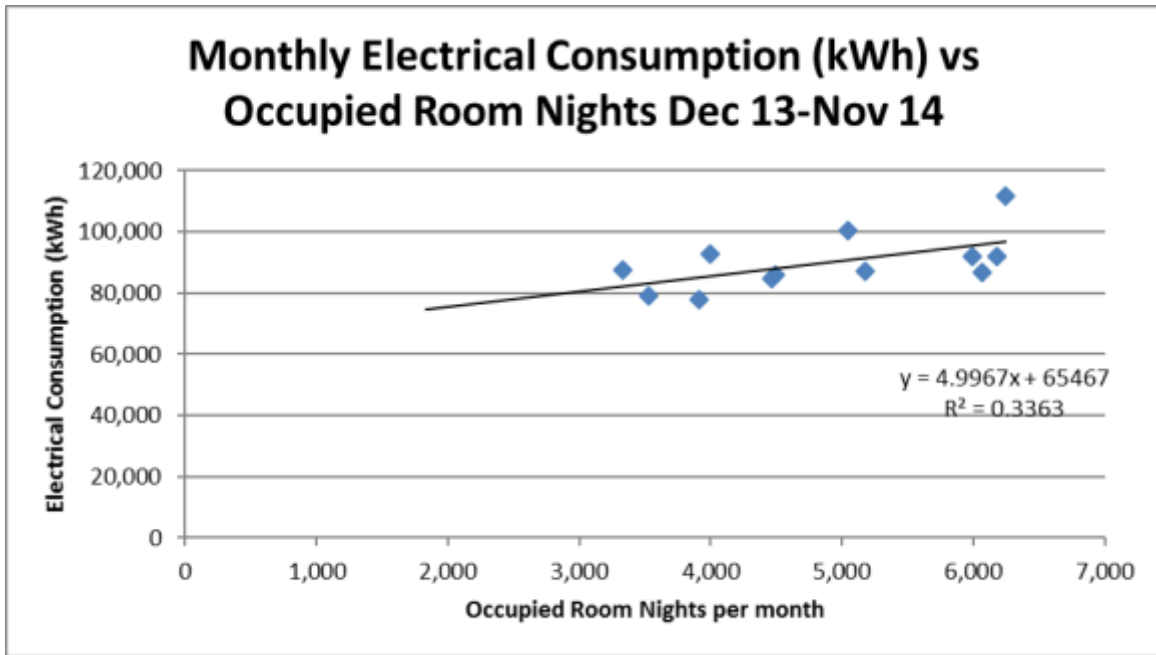


Figure 2. Hotel 224 Monthly Electricity vs Occupancy Regression Dec 2013-Nov 2014

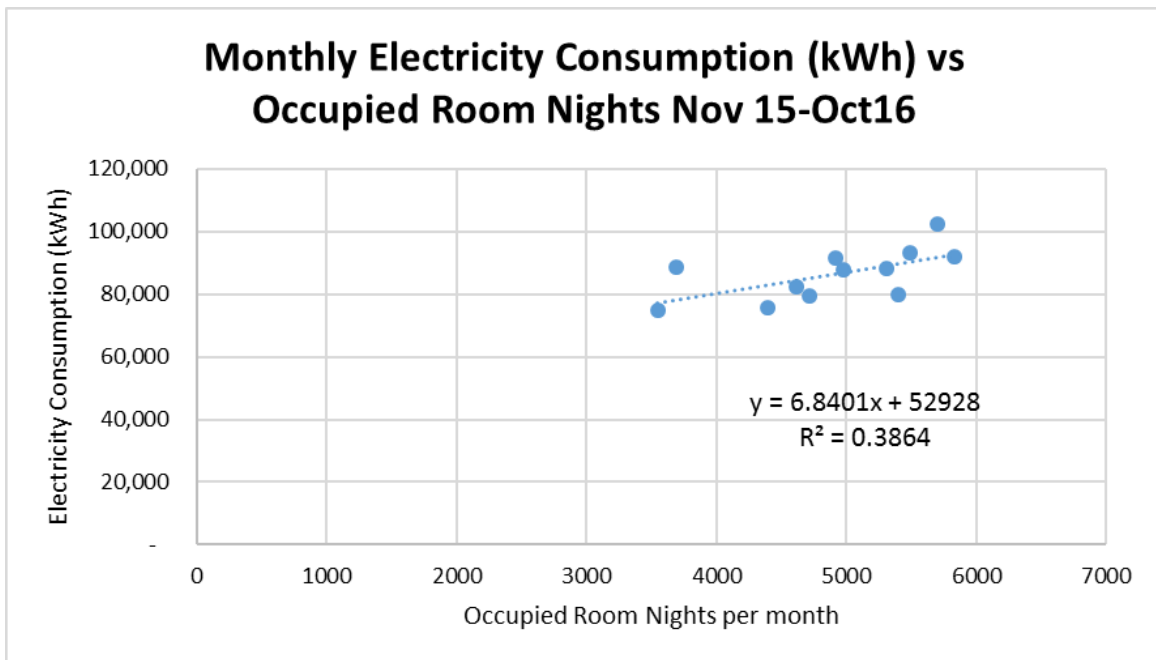


Figure 3. Hotel 224 Monthly Electricity vs Occupied Room Nights Regression Nov 2015-Oct 2016

Savings of 107,493 kWh were calculated using the Regression formula: $y = a \cdot \text{HDD} + b \cdot \text{CDD} + c \cdot \text{days}$ using the monthly data supplied.

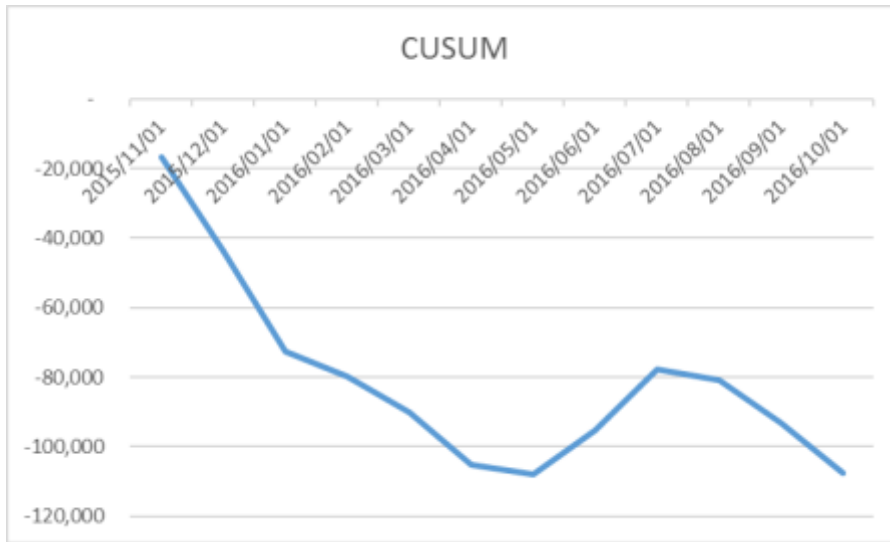


Figure 4. Hotel 224 Savings CUSUM based on monthly data

4.1 Resource use implications

Resource	Intervention	Utility saving (Units)	Investment (ZAR)	Savings (ZAR/year)	Payback (months / years)	Period	GHG Emission Reduction (kg CO _{2e} /yr)
Energy – electricity	Online Sub-Metering and Reduce Peak Demand	13 kVA	R 61,504	R 25,128	2.4	Oct 2015	0
Energy – electricity	Replace Incandescent Lamps with LED	17,232 kWh	R 28,200	R 22,366	1.3	Mar 2015	16,508 kg
Energy – electricity	Install Motion Sensors	2,746 kWh	R 2,400	R 3,564	0.7	Mar 2016	2,630 kg
Energy – electricity + Water	Fitting Low Flow Shower Heads	41,628 kWh + 1,104 kl	R 53,200	R 80,691	0.7	Jun 2015	39,880 kg
Water	Reduce Municipal Water Consumption	9,840 kl	R 52,500	R 237,636	0.2	Sept 2016	
Materials + Waste generation	Refillable Soap and Shampoo Dispensers	305 kg	R 14,848	R 23,712		Mar 2016	

5. SELECTED SYSTEM OPTIMISATION INTERVENTIONS

LIGHTING RETROFIT

Replace Incandescent + Halogen lamps with LED	
Cost Savings	R 22,366
Energy Savings	17,232 kWh
Cost of Project	R 28,200
Payback Period	1.3 years
tCO ₂ Savings	16.5 Tonnes

Lighting retrofits were carried out in various areas of the hotel to remove the remaining incandescent and halogen lighting. 236 older technology incandescent and halogen lamps were replaced with more efficient LED technology. This project was completed in March 2015. Cost savings of over R22,000 were achieved through this project.



Figure 6. Original incandescent lighting



Figure 5. Retrofitted more efficient LED lighting

MOTION SENSOR INSTALLATION

Motion Sensor Installation

Cost Savings	R 3,564
Energy Savings	2,746 kWh
Cost of Project	R 2,400
Payback Period	0.7 years
tCO ₂ Savings	2.6 Tonnes

6 motion sensors were installed in the Kitchen Stores and Luggage Stores to avoid lights being left on when unoccupied. Cost savings of over R3500 were achieved through this project.

DEMAND MANAGEMENT AND ONLINE METERING

Demand Management and Online Metering

Cost Savings	R 25,128
Demand Savings	13 kVA/month
Cost of Project	R 61,504
Payback Period	2.4 years
tCO ₂ Savings	-

Online meter installation was completed at Hotel 224 in October 2015. The cost of the meters was R35,800 and there is a R2142/month charge for ongoing monitoring and reporting. The 2014 average Monthly Maximum Demand was 230 kVA. This has been reduced to an average of 217 kVA for 2016, a saving of 5.8% or 13 kVA/month at the current cost of R159.60/kVA. This equates to a conservative average monthly saving of R2,094. Submeters were installed for the Laundry and Water Heating. The Laundry has been closed during peak times.

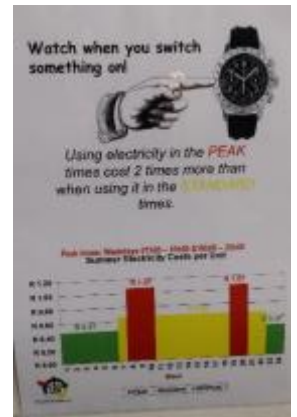


Figure 7. Awareness poster in Laundry

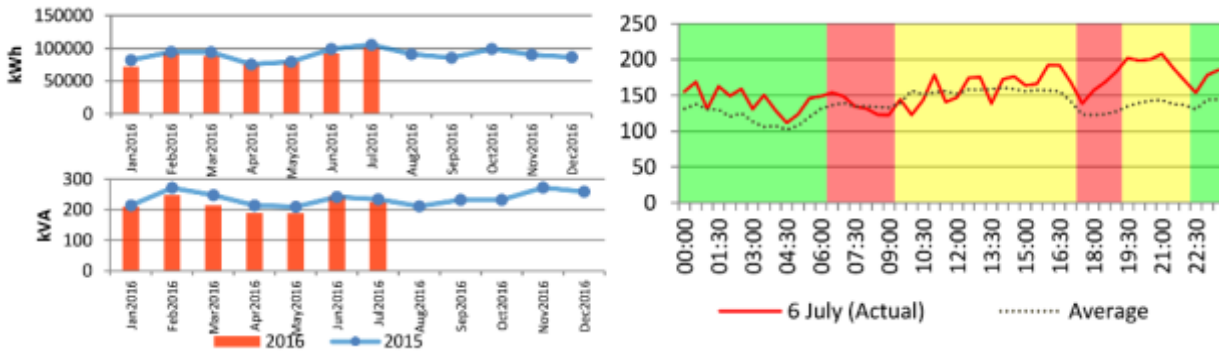


Figure 8. Online Metering report prepared by Energy Resource Optimisers CC

REDUCE POTABLE WATER CONSUMPTION

Reduce Potable Water Consumption	
Cost Savings	R 237,636
Water Savings	9,840 kl
Cost of Project	R 52,500
Payback Period	0.2 years
tCO ₂ Savings	-

Hotel 224 installed a borehole on their property in September 2016. This feeds the hot water system of the hotel. The quality of the water is excellent and is effectively of drinking water standard (and is regularly tested). Initial indications are that savings of 820kl per month are being achieved. With a combined water and sewerage cost of R24.15/kl (R18.29 for water + R5.86 for sewerage) this results in a cost saving of around R19,800 per month. In addition to this, demand taps have been installed in staff areas to further reduce water consumption.



Figure 10. Borehole position at the side of the hotel



Figure 9. Borehole controller

FITTING LOW FLOW SHOWER HEADS

Fitting Low Flow Shower Heads	
Cost Savings	R 80,691 (Water + Electricity)
Water Savings	1,104 kl/annum
Energy Savings	41,628 kWh/annum
Cost of Project	R 53,200
Payback Period	0.7
tCO ₂ Savings	39.9 Tonnes

Low flow shower heads had been installed in some of the rooms, but were rolled out in the rest of the hotel. Flow rates were reduced - some to even as low as 3l/min on the upper floors of the hotel. An additional benefit is reduced hot water usage, which increased the savings by R54,029 per annum.



Figure 9. Low flow shower heads installed

REFILLABLE SOAP AND SHAMPOO DISPENSERS

Refillable Soap and Shampoo Dispensers	
Cost Savings	R 23,712
Waste Savings	0.46 tonnes
Cost of Project	R 14,848
Payback Period	0.6 years
tCO ₂ Savings	-

Hotel 224 used an average of around 3,800 soap and shampoo hospitality containers a month. 70% of the hospitality containers were refilled, but this still cost Hotel 224 R2.78 for each container. 64 rooms were fitted with Refillable Soap Dispensers at a cost of R232 each. Following 8 months of running the trial the running costs of the rooms fitted with these was R10,185 / annum (vs R33,897 should conventional hospitality containers have been used), which equates to a saving of R23,712 / annum. The remaining 160 rooms are now planned to have the units installed over the next few months.



Figure 9. Refillable soap containers

6. ADDITIONAL PROJECTS

- Environmental information and training for staff
- Identified toilet leaks were repaired and feature as an ongoing maintenance item.

7. BENEFITS & LESSONS LEARNED

7.1 Impacts

- The interventions were essential to assist the company reducing costs and remaining viable.
- The savings did not have an impact on direct and indirect job retention/creation or the company gender profile.
- With an increasing focus on resource efficiency, this has reduced wastage and improved quality.
- The hotel is now using significantly less water, with a 25% reduction (21,382 kl) in water usage noted comparing the period Apr 2015-Mar 2016 to the same period the previous year.

7.2 Challenges

- Tough trading conditions due to poor economic growth and pressures on the hospitality industry.
- The existing heat pumps were incorrectly sized and need to be replaced prematurely – at significant expense.

8. FUTURE INTERVENTION / PLANS

8.1 Any future plans

- Food waste from the kitchen is being investigated to be beneficially used.
- Rainwater recharge of borehole is to be investigated, but may be challenging due to constrained urban nature of the site.
- The heat pumps are in the process of being replaced and a more efficient and reliable system which should be installed in the near future.

8.2 Conclusion

Hotel 224 are an efficient urban hotel, which runs on a high average occupancy. They have shown enthusiasm and eagerness to implement opportunities, despite a challenging operating environment.
