Case Study – S & F Finishing Services/Malaga Copy Centre

S & F Finishing Services/Malaga Copy Centre is a small business (<5 staff) located in the Malaga Business District. The business operates Monday to Friday and also every second Saturday, offering specialised printing and finishing services.

As a result of reviewing energy use and adopting efficient work practices, the business has made an estimated energy efficiency gain of 25% compared to 2008 and 2009. 19MWh of electricity was used each year in 2008 and 2009 and although energy use was similar during 2010, sales revenue increased by 30% on previous years.

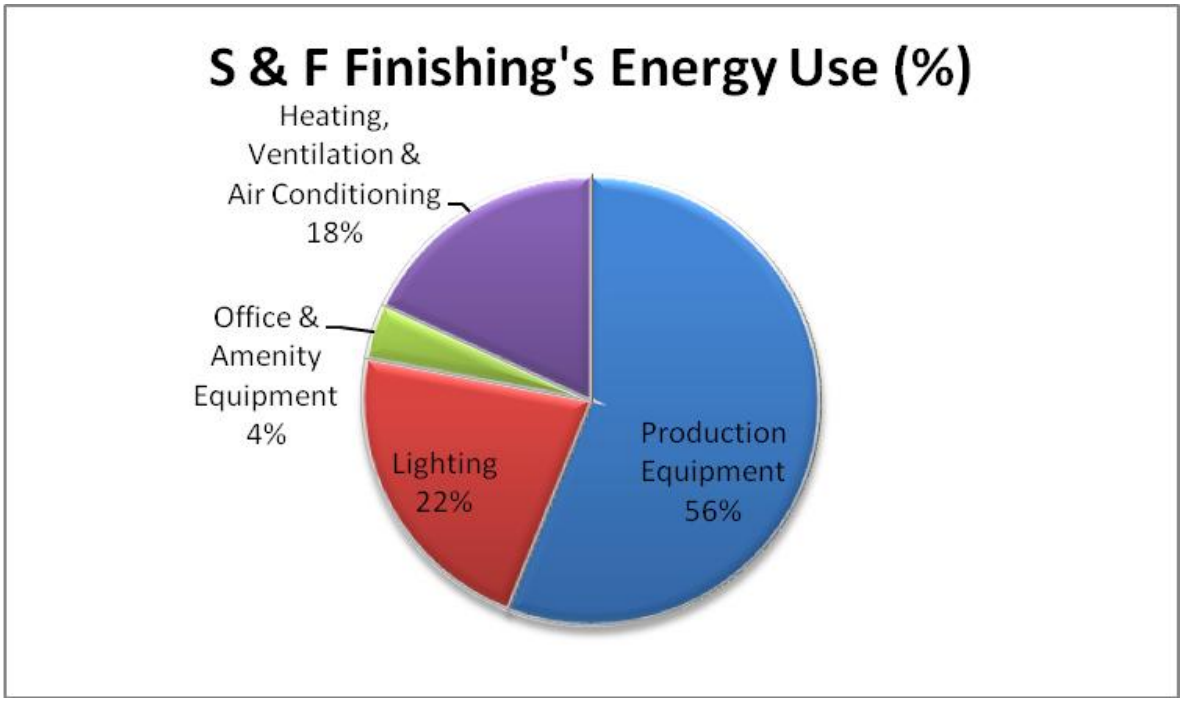
The business is located in the middle of a commercial block and consists of a reception area and counter, a main factory area and an upstairs office on a mezzanine floor. It is constructed of concrete walls and floors which offered good thermal mass, however the upstairs office was said to be uncomfortably hot in summer as this had no insulation and had unshaded, West facing windows which allowed heat in.

In March 2009, S & F Finishing Services was selected as a demonstration site for small printing businesses as part of Perth Region NRM's Development of Sector Specific Energy Management Action Plan Program.

A desktop and Level 2 Energy Audit of the business was conducted which identified ways in which the business could improve its energy use.

This involved collecting real-time, as well as historical, energy use data, the compilation of an equipment inventory, staff surveys and data analysis of this information.

An examination of energy use in the business was conducted by reviewing billing for a previous 24 months, conducting an equipment inventory as well as real time energy monitoring in combination with staff equipment use logs. Electricity use was categorised into the areas depicted in the following graph.



Production Equipment – The main area of energy use, it is estimated that production equipment used approximately 11MWh a year. Of this, the main use was to operate two printing presses (54%), collating equipment (25%), other printers and photocopiers (13%) and die cutting equipment (7%). One of the printing presses was installed in February 2009 and as such, the use of this machine is not captured by the billing periods examined in the baseline year. This has allowed for an increase in production while the extra energy use has been absorbed by the energy saving actions implemented in the business.

Lighting – Provided mainly by fluorescent tube lights and mercury vapour lights, lighting for the workshop accounted for approximately 88% of lighting costs.

Heating, Ventilation & Air Conditioning – The workshop was serviced by an Evaporative ACU (14%) while the reception utilised reverse cycle ACUs (84%) and another reverse cycle ACU serviced the upstairs office which was occupied two days a week (2%). Electricity use increased in warmer months mainly due to use of the reverse cycle ACUs.

Office & Amenity Equipment – The remaining equipment accounted for a small percentage of energy use. The main electricity use in this category was for the operation of a refrigerator (53%), computers and monitors (26%) and a small, infrequently used air compressor (10%).

Recommendations from the Energy Audit:

Following the Energy Audits, recommendations for more efficient electricity use included:

- *Developing an Energy Policy and Energy Action Management Plan* – No cost. This tracks and develops a system for managing energy use.
- *Staff education and engagement* – No cost.
- *Turning off or down appliances* – No cost. This involved work planning to reduce equipment stand-by time for the guillotine and collating equipment, turning lights off in unoccupied areas and enabling energy saving modes on electronic equipment such as photocopiers, monitors and computers.
- *Using energy efficient equipment* – This involved upgrading some equipment as well as moving towards electronic rather than electromagnetic equipment.
- *Improving building design* – Some no cost actions include closing doors to air conditioned areas, using appropriate thermostat settings on ACUs (24^{o}C-26^{o}C in summer and 18^{o}C-20^{o}C in winter). Some actions involve some capital outlay and these include installing external shading on west facing windows and installing suitable installation in the upstairs office and workshop.
- *Improving lighting efficiency* – Actions include de-lamping in excessively lit areas and utilising more energy efficient lights (T5 fluorescent lamps or LEDs), using more natural lighting in the workshop, installing separate switches for low occupancy areas and the better positioning of light fittings above equipment and work stations.

The actions taken by Felicity Orr, the owner of S & F Finishing Services following a presentation of the results of the Audit to her and the receipt of the Energy Audit Report are listed in their categories below.

Production Equipment – Plate making (both computerised and photographic) has been outsourced, therefore reducing associated cost with repairing old equipment as well as the electricity use to operate and cool the plate makers.

The Guillotine has been upgraded to a more efficient, electronic model which uses less than half the electricity of the old guillotine.

One of the photocopiers has been upgraded to a newer, more energy efficient model and stand-by modes have been enabled.

Work planning and increased staff awareness has led to less equipment being left on stand-by during the day.

Lighting – The Mercury Vapour lamps in the workshop are left off except early in the morning or on overcast days. Sufficient daylighting is available from the skylights most of the time of the year, and task lighting, fluorescent tubes suspended over work stations, supplement the natural lighting perfectly.

Heating, Ventilation and Air Conditioning – Consideration is being given to providing insulation for the upstairs office although this area is currently infrequently occupied.

Insulation for the upstairs office area is also being investigated to reduce the use of air conditioning during summer. Another option would be to relocate this work station downstairs into the existing office area to negate the need to operate the extra air conditioning unit.

Increased thermostat settings are used in summer.

External shades are being investigated to reduce heat loading in the Reception and upstairs office areas.

Office & Amenity Equipment – Compressed air use for cleaning equipment has been minimised. The use of high velocity, low flow nozzles is being investigated and will be used to further minimise compressed air use when it is necessary to clean equipment where access is restricted.

Energy saving modes on equipment has been enabled and where possible, equipment is left off until needed.

Consideration is being given to replacing the existing large, old fridge with a smaller, newer energy efficient model. The current fridge is quite big for the number of staff that it services.

In an effort to improve the overall sustainability of the business, Felicity has also successfully applied for and achieved Level 2 Green Stamp Accreditation for the business. The Green Stamp program is an environmental best practice program co-ordinated by the Printing Industries Association of Western Australia (with support from the WA State Government) and is awarded to printing businesses that minimise waste to landfill and hazardous substance use as well as improve the efficient use of water and electricity in the business.

The use of Natural Power is also being considered by the business. This would further reduce or eliminate greenhouse gas emissions associated with electricity use in the business.

Results of Actions Taken:

Since the initial desktop Audit was completed in June 2009, the business has expanded and taken on another staff member as well as adding a second printing press.

Use of the second, smaller two colour Heidelberg GTO press has increased and this is used every day for the majority of the day and as such, electricity use compared to the period before this unit was installed in February 2009 could reasonably have been expected to increase.

Examination of Synergy billing indicates that, despite the addition of the two colour press and extra workloads which has resulted in an increase in staffing levels, electricity use has remained the same since the period prior to the Desktop Audit (the benchmark period).

While it is still too early to see the results of the actions taken to reduce electricity use (many of the recommendations related to actions that will reduce the use of electricity to provide cooling in summer), the reduction in energy use for some areas of business operations can already be quantified.

Lighting – The mercury vapour lights in the workshop have not been used since April 2010. This action alone has resulted in an estimated reduction of 3,000 kWh every year. This will result in a financial saving of $650 every year based on the current electricity tariff rate of 21.6753 cents/kWh and reduce Greenhouse Gas emissions from the business by 2,790kg of CO^2.

Equipment – Platemaking equipment previously accounted for a very small amount of electricity use at S & F Finishing (estimated at approximately 220kWh/annum) however maintenance costs for this infrequently used equipment was high. This equipment also emits heat and required the use of the upstairs reverse cycle air conditioning unit during summer to keep the platemaker cool. The use of this air conditioner will, as such, also be reduced as a result of platemaking operations being outsourced. Financial savings of $50 every year (based on tariff rate of 21.6753 cents/kWh) are expected and further saving can be expected in summer due to reduced HVAC use. Approximately 200kg of $CO^{2\text{-}e}$ emissions will be abated every year.

The new Guillotine is expected to reduce electricity use by approximately 825kWh/annum. This equates to an annual financial saving of $180 and a reduction of 770kg of $CO^{2\text{-}e}$.

Staff at S & F Finishing ensure that equipment is not automatically turned on at the start of the day and left to idle. While it is not practical to turn some equipment off after each use (the printing presses take approximately 10 minutes to warm up), staff are encouraged to plan work so that machinery idling time is minimised. Some equipment such as collating and cutting equipment is turned off after use. In the reception area, energy saving modes on the photocopiers have been enabled which allows this equipment to enter sleep and stand-by modes at the earliest opportunity. The savings from this have not been quantified.

Heating, Ventilation and Air Conditioning – It is still too early to gauge the annual reduction in energy use to run HVAC equipment. HVAC accounted for approximately 18% of S & F Finishing's electricity use prior to the Level 2 Audit which was finalised in December 2009 and communicated back to Felicity in January 2010. Since the results of the Level 2 audit were presented, electricity use in February – April 2010 was significantly lower than the corresponding periods in 2009 despite more equipment and staff operating in the business.

While some of this reduction is attributable to the previously mentioned actions, the increase in thermostat settings during summer and reduced use of HVAC to cool the often unoccupied upstairs office is considered to be the main reason for the reduced energy use. Further savings are expected during the 2010/11 summer if insulation and external shades are installed as planned.

Conservative estimates of a reduction in the order of 1,000kWh per annum are expected following the setting of reasonable thermostat settings, reduced HVAC use, relocation of the upstairs office to the ground floor (will negate the need to operate one ACU in summer) and ensuring that entries (doorways) to areas serviced by reverse cycle air conditioners are closed when the units are operating. This would save the business $220 in energy costs and reduce $CO^{2\text{-}e}$ emissions by 950kg every year. Further savings in HVAC could be achieved by providing external shading to the West facing windows of the business and by installing insulation to the ceiling space of the upstairs office.

The following table summarises the estimated quantified reductions in electricity use at S & F Finishing Services to date:

Action	**Annual kWh saving**	**Annual $ savings**	**kg CO_2^{-e} reduced**
Elimination of Mercury Vapour lamp use	3,000	650	2,790
Outsourcing platemaking	220	50	200
New Guillotine	825	180	770
Improved use of ACU in summer	1,000	220	950
TOTAL SAVING	**5,045**	**$1,100**	**4,710**

The savings in electricity use has meant that usage has remained consistent even with the addition of a two colour press to the business and the employment of an extra staff member.

While electricity use has remained similar to previous years, sales revenue for the business in 2009/2010 increased by 30% on the 2008/09 revenue.

December 2010