

Petris Technology, Inc. Energy Consultation

Prepared For:

The Dorking Location of Petris Technology, Inc.

Prepared By:

Philip Gauthier, Anthony Gianfrancesco, Jillian Morang, Zhongjie Wu

24/04/11



1. Introduction

The purpose of this energy consultation was to discover potential areas of energy reduction and savings within Petris Technology, Inc building in Dorking. This consultation was conducted using a questionnaire and check list during a walk-through, with supplementary data on past gas and electric usage. BPG is an information management company with worldwide offices. Petris in Dorking shares a building with another company however; they have a separate electrical meter and do not use natural gas energy for anything.

The energy consultation, analysis, and report were completed by four American university students, for a project requirement for Worcester Polytechnic Institute. These students are working with the Mole Valley District Council to help reduce the carbon emissions of small and medium enterprises in the Mole Valley.

Notice: While there has been an effort made to ensure that the information contained in this report is accurate, it should be taken into consideration that some of the information may be incomplete, inaccurate, or become out of date. Therefore, Mole Valley District Council, Worcester Polytechnic Institute, and all associated persons do not provide any guarantees on the information provided in the following report.

2. Action Plan

The recommendations listed below are prioritized by payback period and estimated costs. Further explanations of each recommendation are provided.

Priority	Recommendations	Estimated Annual Savings			Estimated Costs (£)	Payback Periods (years)
		(£)	CO ₂ (Kg)	(kWh)		
1	Behavioral Changes	---	---	---	---	---
2	Envelope and Door Insulation	72	388	719	160	2.2
3	Lighting Control	26	140	260	600	23.1
4	LED Lighting	336	1832	3360	3252	9.7
Total		434	2,360	4,339	4,013	9.2

* I guess that it would take an electrician about five days at £100 a day to zone the lights, this is while he is rewiring the fixtures for LEDs. It will be around £500 a day if he were to do it on its own.

3. Energy Savings

a. Priority 1: Behavioral Changes, No Cost Solutions

Make sure that all radiators are unobstructed and kept on appropriate settings. Obstructed radiators are forced to work harder to heat a room resulting in higher energy usage.

Site Specific Examples:

- Some of the radiators in the building were obstructed by furniture or other items and should be moved accordingly if at all possible. See Figure 1 for an example. Desks in the office area were positioned in such a way that the backs of chairs were very close to the heater and absorbing all of the heat, consider arranging the office in a more radiator conscious floor plan.



Figure 1: Printer in front of a radiator

Turn off lighting and electrical equipment when it is unnecessary. Ensure that computers and lights are turned off when office is closed and when rooms are not in use.

Site Specific Examples:

- The kitchen light was left on all day when we went through the building. Consider imposing “light off hours” outside of lunch hours. Possibly, turn off lights after use during the hours of 11.00-14.00 to ensure that the fluorescent bulb life is not drastically reduced and excess energy is not being used.

b. Priority 2: Building Envelope

Instead of purchasing new windows, make the old ones work in a more efficient manner. Also ensure that doors are sealed to prevent cold air from infiltrating the inside of the building.

Site Specific Examples:

- The windows that surround the building can be more efficient with the aid of window insulation film. Specifically convection control film, which cuts down the amount of heat transmitted through the glass of the building. It can also prevent window condensation, another reason for heat loss. The windows in the conference room were not included in this due to it's spotty use. It should also be included in the thin film additions but it is not a first priority. This does include the windows in the server room however.

Energy Measure	Cost	Savings per year	kWh saved	CO2 saved (kg)	Payback Period (years)
Add thin film insulation	£80	£17.42	174	94	4.6

- The emergency exit door leading to the storage room/loading dock has large gap between the double doors. Consider filling in the gap with a door skirt or resizing the door. Also, the front door of the vestibule and the door leading to the office should also sealed to prevent cold air from the lobby infiltrating the office.
- A skirt on the door to the server room can help keep cold air inside that room and prevent potential leaks of air conditioned air. Though the daily heat loss may be minimal, the AC unit is running all day, every day to ensure that the computers and servers are kept cold. The savings here add up to a substantial amount.

Door	Energy Saving kWh	Annual Saving £	Total Investment £	Payback Period year	CO2 saved kg
Office to Docking Area	308	30.82	30	1	166
Server Room	175	17.52	15	0.9	95
Inner Vestibule Door	62	6.16	30	4.9	33
Total	545	54.5	80	1.5	294

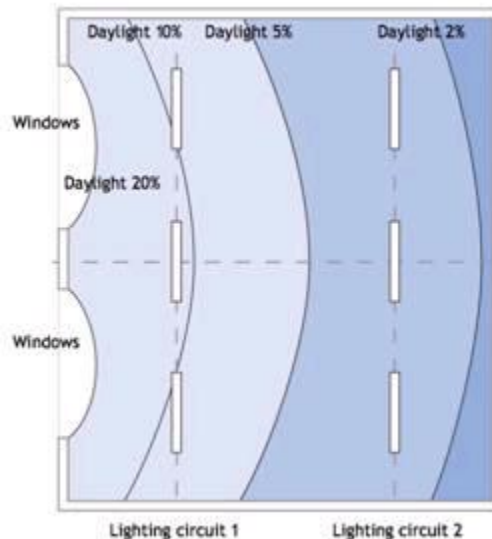
- Some of the rubber seals on the windows may be getting disconnected from the window pane. These require regular maintenance to ensure that cold air from the outside does not infiltrate the building's interior.

c. Priority 3: Lighting Control

Lights that are on when they are not needed consume extra energy. There are different situations which can result in lights being on, though they not needed. Timed lights, lights in often though not continuously used areas, or incorrectly zoned lights are some examples of why more lights may be in use than are needed.

Site Specific Examples:

- The lights in the open office areas of the building are zoned in square sections. These lights should be zoned such that the line of lights closest to the windows are one zone with subsequent zones moving further from the windows. If they are zoned in this manner, the lights closest to the windows can be turned off when the sun provides sufficient lighting, therefore saving energy. This means, with sufficient sunlight, approximately one eighth to one quarter of a large room's energy consumption can be cut, and one half of a small office can be cut.



Total Number of Bulbs in Zoning Area	Total Current kWh per Year	kWh saved if 1/8-1/4 of Lights are Turned Off	Money Saved per Year (£)	CO ₂ Savings (kg of CO ₂)
16	608	76-152	7.6-15.2	41-82

*This is if the lights are off for half a day on average throughout the year

- Toilettes are frequently used areas, where the lights are left on when no one is in the room. All the toilettes in the building should have motion sensors installed on the lights. This will save energy by turning off the lights when the room is not being used, while adding the convenience of having the lights turn on when someone enters the area. For added employee convenience with motion sensors, check to see if it has a timer.

Location	Total Number of Bulbs in Zoning Area	Watt of Bulb	Total Current kWh per Year	New Consumption with Technology	Money Saved per Year (£)	CO2 Savings (kg of CO2)	Cost of Appropriate Sensor (£) (£50 ea.)	Payback Period (Years)
Toilet	8	14	242	61	18	98	100	5.6

d. Priority 4: LED Lighting

Replace existing lights in the facility with newer lights. Many old lighting elements have become inefficient over the years. Replacing the existing elements with LED equivalents allows you to save significant amounts of money on your energy bill. If LED bulbs are not a viable option at the current time then CFL and fluorescent tubes can be used but make sure that the most efficient ones are in use i.e. T8 or T5's for fluorescent tubes and bulbs with high energy ratings of A or B should be used. The table below breaks down the recommended areas where lighting should be replaced with all the correlating information about payback periods and costs.

Site Specific Examples:

- When installing LED lighting, labor must be performed to bypass the ballast. A price of £4 per bulb has been added to the costs to factor this in.

New Bulb Type	New Watt* of bulb	Total Costs*	Savings per year**	Kwh saved per year	kg CO2 saved per year	Payback (years)
1200mm LED	15 W	2,820.00	298	2,980.00	1,625.00	9.5
590mm LED	8 W	432	38	380	207	11.4
		3,252.00	336	3,360.00	1,832.00	9.6

*All calculations are based off pricing and wattage from Halers Lighting 2011 Catalogue

**This is based off an electricity rate of 10p per kWh

4. Additional Considerations

These are items that should be considered to help increase energy savings.

Site Specific Examples:

- Consider adding zoning to the lighting fixtures when the rewiring needs to be done for the LED additions. This way labor costs will be reduced and payback period for these suggestions will be lessened.
- It was brought to our attention that the heating system is sometimes left on overnight. This is a large amount of energy wasted since electric heaters are being used. There are two options to reduce energy bills. The first of which is to install timer switches on the wires that power the heater. The other option is to go for night storage heaters.
- The reason night storage heaters have been suggested is because night storage heaters consume most of their energy at night. In conjunction with your AC unit and server room, it may help lower electricity bills if you switch to economy 7 readings. I'm not sure how it will work due to the current linkage with BPG upstairs though. Talk to an energy consultant from one of the companies listed in Appendix B to cover your options.

5. Brief Summary

In summary it can be seen that while this building is already doing very well in energy efficiency, there are still areas which can be improved to help reduce energy usage. Many of these steps are of a higher cost or more difficulty, but will be worth the change due to the amount saved on energy bills. Some savings opportunities in this report have not been quantified due to the large amount of variables present in the calculation. Carefully read over the report and take advantage of the most useful suggestions first. We recommend that you seek the opinion of another expert to check our numbers and suggestions. Good luck and happy savings!

Appendix A

Enhanced Capital Allowance (ECA)

ECA allows for companies who are investing in energy saving technologies to receive a tax relief on their profits for the year based on the amount they spent on the energy saving technologies. This provide companies to have additional capital to be able to put energy saving equipment in that would normally be too expensive so that both the environment and the company are able to benefit quicker from their investments.

There are currently many energy saving technologies out there for the many different sectors of a business from lighting, to HVAC, to pipe insulation, to motors, etc. The technologies for these sectors can often provide great energy savings but can cost more than a business is willing to spend. The ECA then provides a company with additional capital so that they can benefit from the savings of the energy efficient technology.

About ECA: This link provides more information on why the ECA was started and some of the key features that it has.

<http://www.eca.gov.uk/etl/about/>

How ECA works: This link breaks down how exactly the ECA works and how much money a person may see from claiming an ECA.

<http://www.eca.gov.uk/etl/about/How+does+the+ECA+scheme+work.htm>

Benefits of ECA: This link provides more information how claiming an ECA can benefit a business from cash-flow boost and lower energy costs.

<http://www.eca.gov.uk/etl/about/Value+and+Benefit.htm>

Finding Eligible Technologies: This link provides the information on the various technologies that are currently out there that an ECA can be claimed for. <http://www.eca.gov.uk/etl/find/>

There are a few technologies that are not listed as they are very variable or too numerous in type. More information on how to check if the technology is eligible for a company to claim an ECA is provided in the link below. In many cases if a contractor is hired to complete the work they should be able to provide information on whether or not an ECA can be claimed.

<http://www.eca.gov.uk/etl/claim/non-listed.htm>

Claiming an ECA: This link provides information on how and where to claim an ECA.

<http://www.eca.gov.uk/etl/claim/>

Appendix B Choosing the right electricity Company

This basic guide has been written in order to provide small businesses with a means to negotiate electricity prices. According to the figure below, gas prices and electricity prices are rising at an increasing rate. The figure shows average electricity prices from the company Powergen, one of the “Big 6” utility companies.

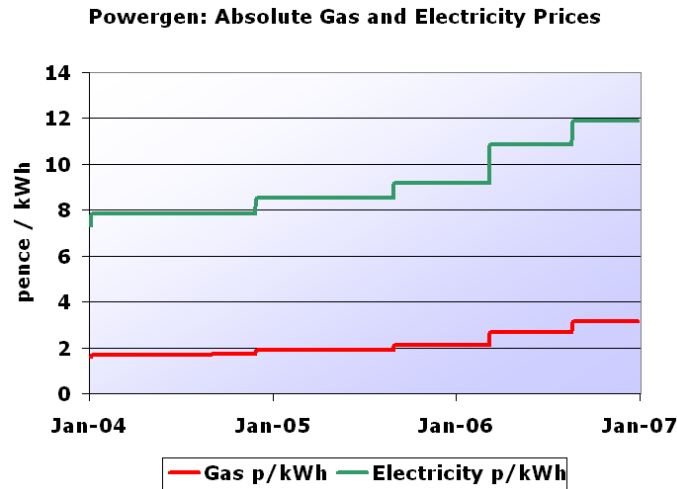


Figure 2: Quarterly comparison of electricity prices from Powergen¹

Though the plot only shows prices for Powergen, when one company increases their prices, the others usually follow in a relatively quick time period.

The worst way to pay for energy is through a **non-contracted agreement**, or **tariff rate**, with variable pricing for estimated units of electricity used. The best is a **contract** with a locked electricity rate for an agreed amount of time. Choosing the time period of the contract can be tricky because longer contracts will have a higher price per kilowatt hour (kWh) in an attempt to factor in the rising electricity prices. The most common advice is to go with the longer contract unless the price is significantly higher than the short-term rate.

There are two types of billing options for a contracted electricity agreement, these are **debit** and **quarterly** bills. Debit billing, usually the cheaper option, allows the energy user to pay a fixed rate every month, while quarterly billing allows the user to pay a variable bill, bill dependent upon energy use, every quarter.

These billing statements include two types of fees, the **price per unit** and the **standing price**. The standing price is a charge per day and can vary based on the electricity company, but should not be the major factor in making a decision. The price per unit is how much an electricity company charges for

¹ Figure from: http://uk.theoildrum.com/uploads/465/cv_powergen_gas_elec.png

a kWh. Since not all energy companies raise their prices at the same time, shopping around is very important.

Energy companies will allow separate pricing for electricity used during the day and electricity used at night, known as **Economy 7** or **Economy 10**, provided the correct meter is installed. Generally, Economy 7 is most beneficial when less than 75% of the total electricity used in total is during the day. The typical hour for which Economy 7 starts is 21.00-6.00, 0.00-7.00 or 1.00-8.00, this depends on service area and energy provider. Be sure to ask an energy consultant about both Economy 7 and Economy 10 and whether it is right for you or not. For more information on Economy 7 please visit: <http://www.uswitch.com/gas-electricity/economy-7>

The best type of meter for Economy 7 pricing is a smart meter, which takes half-hourly or hourly readings. **By the year 2020, all businesses will be required to have smart meters.** Usually these are not free but can be paid for incrementally through the standing charge portion of an electricity bill. Since smart meters cost around £100, an increased standing charge of 30p a day will accumulate to a smart meter after one year. This smart meter will be purchased by the building owner and will belong to them, not the electricity company. The purchased meter can be used if the electricity company is changed, provided the new electricity company supports smart metering. Most of the “Big 6” electric companies support smart metering, be sure to ask upon calling. Most of these major electricity companies also do a combined gas and electricity bill. Be sure to ask if this lowers the price at which energy is purchased.

A list of the biggest electric companies has been provided below to facilitate comparative pricing.

Company Name	Phone Number
E.ON	0800 051 5517
Powergen	0800 051 0760
British Gas	0800 480 0202
EDF	0845 366 3664
Scottish and Southern Energy	0808 156 0056
Npower	0845 270 0926
Scottish Power	0800 980 2476

A list of impartial websites for advice on finding a cheaper company or energy saving advice is also provided.

Website Name	Website Address
Consumer Focus: Energy Watch	http://www.energywatch.org.uk/
Surrey Business Link	http://www.businesslink.gov.uk/south_east.html
uSwitch	http://www.uswitch.com/electricity-gas/

After research on comparative prices has been done, a free energy consultant can be contacted. They will find the cheapest electricity available and use the prices you found to possibly find better deals.

Company Name	Phone Number
Business Advisory Service	0845 180 0700

Blue Mark Consultants	0800 987 5505
Quaestor Cost	0800 970 0432