

The Vineyard Energy Consultation

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1. Introduction

The purpose of this energy consultation was to discover potential areas of energy reduction and savings within The Vineyard's building. This consultation was conducted using a questionnaire and check list during a walk-through, with supplementary data on past gas and electric usage. The Vineyard is an independent wine merchant, which occupies the lower floor of a recently renovated historic building.

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accurate, it should be taken into consideration that some of the information may be incomplete, inaccurate, or become out of date.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 (tonnes)	(kWh)		
1	Behavioural Changes	-	-	-	Minimal	Immediate
2	Seal holes on the wall	6	21	38	10	1.7
3	Replace cabinet bulbs	186	676	1239	189	1.0
4	Replace ceiling bulbs	534	2081	3817	876	1.6
Total		726	2778	5094	1075	1.5

3. Current Use and Potential Savings

This is a breakdown of your current costs and what your expected cost may be with these recommendations.

Category	Energy Consumption		Costs		CO ₂ Emissions	
	kWh/year	%	£/year	%	CO ₂ (tonnes)	%
Electricity	13,194	56%	1,979	56%	7,194	79%
Natural Gas	10,372	44.0%	1,556	44%	1,921	21%
Total	23,566	100%	3,535	100%	9,115	100%
Projections	23,566		3,535		9,115	

4. 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. Also a radiator that is left on its maximum setting will never turn off and over heat a room. Keeping radiators unobstructed and at a setting of 3 to 4 you will save energy and money.

Site Specific Examples:

- The radiator near Mr. Hodges' desk had boxes piled in front of it. If possible boxes should be kept away from the radiators.

b. Priority 2: 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. When purchasing light bulbs, be sure to compare the color temperature and luminosity. In order to attain the appropriate amount of lighting having additional fixtures installed may be necessary. The new light bulbs may qualify for an ECA, see Appendix A to see if it applies.

Site Specific Examples:

- All fluorescent lights should be replaced with lower wattage LED light tubes.

Old Light Bulb Wattage (W)	New Bulb Type	New Light Bulb Wattage (W)*	Price per New Bulb (£)*	Number of Bulbs Replacing	Total Bulb Costs	Total Costs Including Labour***	Savings per Year (£)	kWh Saved per Year (kWh)	Payback Period (years)	Payback Period Including Labour Costs (years)***	CO2 Savings per Year (kg CO2)
50	LED	7	7	30	210	330	592	3,947	0.4	0.6	2,152
20	LED	5	7	27	189	297	186	1,239	1.0	1.6	676

50	LED + Fixture	7	37	18	666	738	355	2,368	1.9	2.1	1,291
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*All calculations are based off pricing and wattage from NET LED

**If you do not know the average price of your electricity use .1 £

***This calculation is base off an insulation cost estimate of £ 4 per light bulb. A professional quotation should be acquired.

c. Priority 3: Envelope and Insulation

Holes in the envelope of a building result in drafts causing the heating system to overwork.

Sealing holes in the envelope of the building will reduce energy bills, because the heating and ventilation systems won't have to work as hard to maintain the temperature of the building. Even though you have some insulation during winter, adding better insulation will reduce the amount the room needs to be heated.

Site Specific Examples:

- There is an old ventilation duct, outside of the water closet, which is not sufficiently insulated. Consider adding insulation to the gap between the metal plates.



Figure 1: Ventilation duct needing to be insulated

d. Priority 4: Replace Refrigerators

Using a larger number of smaller refrigerators can consume excess amounts of power. Having more refrigerators also occupies extra floor space, due to their stout construction. Replacing multiple refrigerators with one larger unit would take up less floor space because the one unit will be taller, versus wider.

Site Specific Examples:

- The refrigerator, freezer, and combination unit can be reduced to a single unit. To replace the current configuration, with a similar one, would cost around £200 for each new unit. These replacements would total 350 liters in storage capacity and have an average annual consumption of about 550 kWh per year. When replacing the three current units, look for a single combination unit with similar or larger capacity and less annual consumption.

e. Energy Saving in Future Plans

The following are suggestions for the future. When making an addition or change to the building, have energy consumption in mind.

Site Specific Examples:

- Refer to Appendix B for a document explaining how to shop around for energy companies.
- The room near the water closet may be transformed into a small office in the far future. This will require additional heating to be installed in the area. An energy conscious, but initially expensive, decision would be to use a steam radiator instead of an electrical heating unit.
- After discussion with the planning personnel at the MVDC Pippbrook offices, we were advised that a canopy in front of your business would be a violation of the historical legislation you must comply with.
- Look into getting window insulation film to help improve your building's window insulation.

5. Brief Summary

In summary it can be seen that there are a number of ways to save energy for this building. Many of these savings are from behavioral changes such as making sure people turn lights off, having radiators not be obstructed, and having radiators on appropriate settings. Other changes require some capital but can result in great savings such as the LED lighting, which can save £800/year. Taking these steps and more will help to reduce your energy bill and save you money.

Appendix A

How going Green can save you Money!

Enhanced Capital Allowance (ECA)

ECA allows for companies, who are already investing in energy saving technologies, to receive a tax relief. This is a percentage based on the amount spent on these technologies in the past year. This percentage is then tacked on the current year's profits and is deducted from the total tax payment. This provides companies with additional capital, allowing them to purchase energy saving equipment that would normally be too expensive. Through ECA both the environment and the company are able to benefit quicker from their investments.

There are currently many energy saving technologies available for the different areas within a business including lighting, HVAC, pipe insulation, motors, etc. Installing these technologies will have great energy savings, but can cost more than a business is willing to spend. ECA provides a company with additional capital, so that they are more willing to invest in these technologies, and can sooner benefit from the savings of the energy efficient technology, as well as help reduce the carbon emissions of the company.

About ECA: This link provides more information on why ECA was started and some of its key features.

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

How ECA works: This link breaks down exactly how 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 on 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 as the technology has to fall within certain criteria. In many cases if a contractor is hired to complete the work they will 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/>

Here is an article pertaining to amending or claiming first year assets:

[CA23187](#)

When thinking about installing new energy efficient equipment always ask about ECA and if the new product will qualify.

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.

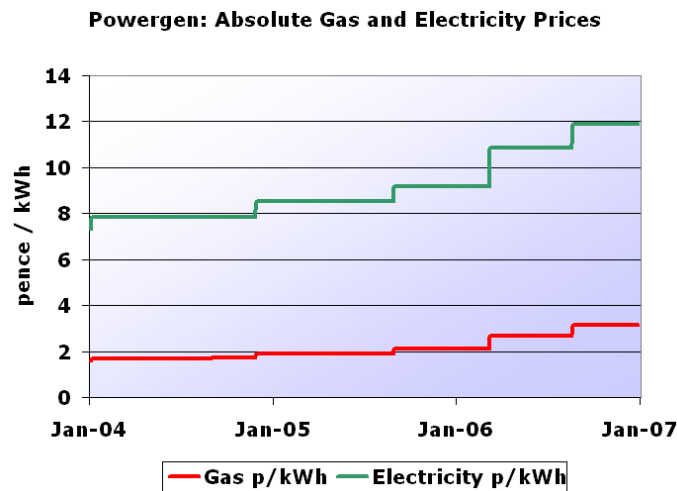


Figure 2: Quarterly comparison of electricity prices from Powergen¹

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

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

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
uSwitch	0800 051 5492