Falkland Arms 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 Falkland Arms Pub 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. The Falkland Arms is a pub in Dorking located in a historic building with two chimneystacks and an outdoor drinking facility. The enterprise has already taken preliminary steps to reducing energy bills such as using thin film insulation on windows and compact fluorescent lighting.

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accurate, it should be taken into consideration that some of the information may be incomplete, inaccurate, or become out of date.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	Building Envelope	219	1444	4350	220	1.0
2	Lighting Control in Toilets	28	165	303	120	4.2
3	LED Lighting	168	978	1794	473	2.8
Total		415	2597	6447	813	2.0

* This factors in putting thin film insulation on kitchen windows, not replacing them with double pane. This is because this option is more feasible due to initial investment cost.

3. Energy Savings

a. Priority 1: Building Envelope

Inefficient building envelope or fabric can result in a loss of heating energy. The goal of upgrading building fabric is to separate outside air from infiltrating the building envelope. Large amounts of windows, holes or gaps in the building's exterior and poor quality windows can all contribute to compromising the effectiveness of the overall building insulation.

Site Specific Examples:

- The single-pane windows and backdoor in the kitchen can be enhanced for better insulation. There are two sensible options present here: Use thin film insulation over the windows or upgrade to double pane windows.

Old Window	New Window	Installation Cost	Price of Gas	Money Saved per Annum	kWh saved per Annum	kg CO2 Saved per Annum	Payback Period (years)
Single Pane w/o Thin Film	Single Pane /w Thin Film	100	0.034	97	2850	528	1
Single Pane w/o Thin Film	Double Pane /w thin film	2100	0.034	152	4468	828	13.8

- The chimneys to the fireplaces are a contributor to cold air infiltrating the building envelope. Consider attaining a chimney flue to stop cold air from entering the building. Also, look into a more elaborate scheme to block the fireplace entrance when it is not being used. Cardboard is a fairly good insulator however the current insulating scheme does not seem to fit the fireplace hole very well.
- Exterior doors and the door to the W.C. should all be checked to ensure that rubber seals are in place and are stopping cold air penetration to the bar/lounge area.

- The old ventilation fans should be removed/filled. These holes are approximately one square meter and are located near the ceiling, so any hot air collected is leaked out through these old holes.

Item and where its located Units =>	Quantity ea.	Est. Cost of Each Item £	Marginal Energy Saving/item W	Electricity/ Gas Cost £ / kWh	Annual Saving £	Total Investment £	Payback Period year	kWh saved kWh	Carbon Emission Reduction kg
Ventilation hole	2	20	500	0.03	81	40	0.5	1080	589
Exterior Doors	2	30	200	0.03	36	60	1.7	480	262
W.C. Doors	1	20	50	0.03	5	20	4.0	120	65
				Totals	122	120	1.0	1680	916

b. Priority 2: Lighting Control in Toilets

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:

- 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.

Light Bulb Wattage (W)	Sensor*	Number of Bulbs	Sensor price	Number of Sensors	Price of Electricity (£)	Total Cost	Current Spending	New Spending**	Savings per Year (£)	kWh Saved per Year (kWh)	Payback Period (years)	CO2 Savings per Year (kg CO2)
12	Motion Sensor	10	60	2	0.1	120	43	14	28	303	4.2	165

*Motion sensor price was estimated from prices on lightinguniverse.com/sensors_3146.html

**The new spending is based off the estimation that the lights will remain on for only a third of the time they are currently on

c. Priority 3: 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:

- All halogen spotlights and CFL bulbs can be replaced with lower wattage LED lighting where possible.

Old Light Bulb Wattage (W)	New Bulb Type	New Light Bulb Wattage (W)*	Price per New Bulb (£)*	Number of Bulbs Replacing	Price of Electricity (£)	Total Bulb Costs	Savings per Year (£)	kWh Saved per Year (kWh)	Payback Period (years)	CO2 Savings per Year (kg CO2)
50	LED	7	43	11	0.093	473	168	1794	2.8	978

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

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

4. Additional Considerations

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

Site Specific Examples:

- From brief conversation with Planning employees in the Pippbrook building, it seems as though the doors and windows located in the back of the building are not considered historic because they are located in the back of the building where they are not seen by the public. The staff offers free advice upon email containing a short description of the project including pictures of its location relative to the storefront.
- Fireplace heating is a very aesthetic and cozy option for heating, however much of the heat produced by the actual flame is leaked through the chimney. Another option would be to completely block up the chimney to stop cold air from infiltrating the building, however no fire will be present, and the pub may lose the cozy ambiance. The best option for fireplace heating is a wood pellet stove. This will keep the aesthetic of a fireplace however; will lose the sounds and actual feel of a raw fire. Not only will the sounds of a raw fire will be lost, you will also lose the cold draft present from the chimney, which would help increase the building envelope the same way the previous option would.

  There are two options with the wood pellet stove; one option is a standalone unit another is a unit that can be put in the chimney. The chimney insert is good as it will prevent drafts leaking out the chimney but you lose the use of the fireplace and will be a little more expensive than the standalone unit. The standalone unit will give you back the use of the fireplace but will require finding a location to put the unit in the room. Both options will hopefully help to supplement your current heating and enable you to lower your heating system and lower your heating bill.
- Some LED holiday lights are being used out in the garden. There are some that are not LEDs, consider replacing these with LED lights.
- Flush controllers for urinals in the Gentlemen toilets to sense motion or times used. A piece of technology you may wish to purchase that takes advantage of the ECA can be found here: http://goo.gl/yXELm. There is also another product from the same company with a few small changes that also applies, this can be found here: http://goo.gl/k9ADE.

Cost*	Number of units	Percent Savings**	Current Costs per year	Savings per year	Estimated payback
£350.00	2	30%	£500.00	£150.00	4.7
*Cost was estimated					
**Percent savings information from cistermiser.co.uk/IRC-Valve.aspx					

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.

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 to 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/