

# Denbies Energy Consultation

---

**Prepared For:**

**Victor Maguire**

**Prepared By:**

**Philip Gauthier, Anthony Gianfrancesco, Jillian Morang, and Zhongjie Wu**

**24/04/11**



## 1. Introduction

The purpose of this energy consultation was to discover potential areas of energy reduction and savings within the Denbies Wine Estate. This consultation was conducted using a questionnaire and checklist during a walk-through, with supplementary data on past gas and electric usage. Denbies is a large facility with many different things inside of it. There is a electrically powered train, a retail store, an office building, conference rooms, vehicles to provide tours of the estate, and many other things.

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. This report will lack in specific examples due to the short amount of time we spent in each room. This report consists of observations we picked up on while we were walking through the facility.

**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accurate, it should be taken into consideration that some of the information may be incomplete, inaccurate, or become out of date.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. Energy Savings

### a. Behavioral Changes

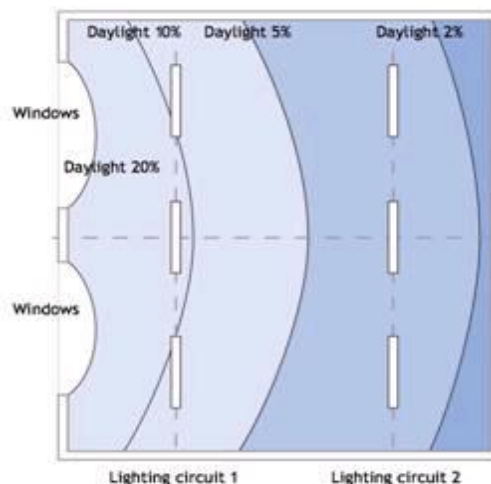
**Behavior changes may seem small at the time of implementation, but they can add up to make a large difference in the long run.** Make sure that all radiators are unobstructed and kept on appropriate settings. Obstructed radiators are forced to work harder to heat a room resulting in higher energy usage. 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. Turning off unnecessary lighting or choosing to work in the dark are more type of behavioral changes that can occur.

### b. Lighting Control

**Lights that are on when they are not needed consume extra energy.** There are different situations that can result in lights being on, though they are not needed. Timed lights, lights in 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.
- 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.



### c. Energy Efficient Lighting

**Replace existing lights in the facility with newer, more efficient 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. All fitting types except for large warehouse high-pressure sodium bulbs should have LED equivalents.

### d. 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 double-pane windows and glass doors can be enhanced for better insulation. There are two options present here: Use thin film insulation over the windows, use low e-coating, or upgrade to windows that contain low-e coating within them. The low e-coating is specifically for the windows in the restaurant area because you had advised us that it becomes terribly hot there in the summer.
- Exterior doors and the door to the W.C. should all be checked to ensure that rubber seals and gaskets are in place so that they can stop cold air penetration to the inside of the building.

### e. Additions to Building Management System

#### **Adding controls or sensors to a BMS will allow it to work less and, therefore save energy.**

Controlling the air flow and temperature in a building, especially a larger one, can be stressful and time-consuming for the facilities staff. The BMS is an automatic control that handles most of the managing load with timers and electronic thermostat settings. When the BMS has more information, it can work in a more efficient manner and help cut costs. Some devices can be added to the BMS to help it work in a smarter manner.

#### Site Specific Examples:

- Oxygen sensors measure the amount of oxygen extracted from a room, with these linked to a BMS, it could make way for a closed loop ventilation system. When the system senses a low-level of oxygen in the air, the outside air vent will open allowing for fresh air to mix in. When the vent is closed, old air is reused to make the system work less hard.

## f. Downsize/Condense Energy Using Products

**Using any number of smaller refrigerators instead of an equivalent sized unit consumes excess amounts of power.** Having more refrigerators also occupies extra floor space, due to their geometry. Replacing multiple refrigerators with one larger unit would take up less floor space because the one unit will be taller instead of three wide small units. This can be extended to any energy using product that can be compacted, such as lighting if an area is over lit take light bulbs out or put a lower wattage one in.

## 3. Additional Considerations

These are items that should be considered to help increase energy savings, though they may not seem practical at the time. New technology is being developed every day and the costs of consumable energy are rising. These are also put in place to start you thinking about more ways to save on energy consumption too.

### Site Specific Examples:

- 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>.
- Consider hybrid vehicles for the outdoor tours to cut down on fuel costs and emissions. Since tours are most likely conducted at a slow and constant speed, a hybrid would be a good fit for this kind of scenario.
- Also, the diesel vehicles that tour the Denbies facilities can be run on used vegetable oil. A simple kit can be bought so that the trucks can be converted to a completely non-diesel machine. Also consider this to reduce fuel prices.
- Consider the purchase of a Power Perfector or voltage optimizer. This makes equipment run on a lower voltage. Energy using products such as refrigerators and lighting are known to work on a lower voltage. There may be problems with other kinds of equipment however. Projectors are notorious for not being compatible at a lower voltage. Other things such as the train tours are performed on and kitchen equipment may not work. Consult an electrician about such a product as you may be able to save a large amount of money.
- Obtain monitoring equipment similar to what Biwater, above the National Rail Dorking train station. They have equipment which monitors water usage, electrical usage, and gas usage for the whole building on a half-hourly basis and displays it in their lobby for patrons to see. This helps energy savings because it allows you watch your consumption in real time and turns saving energy into a game.

#### 4. 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. Savings opportunities in this report have not been quantified due to the large amount of variables present in the calculation that could not be observed during the quick walk-through performed. We suggest that you take advantage of the most useful suggestions first with the quickest payback period. 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 provides companies with 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/>