

ELF FARM SUPPLIES MUSHROOM SUBSTRATE PLANT, MULGRAVE ENERGY EFFICIENCY PLAN

11 INTRODUCTION

Elf Farm Supplies operates a mushroom substrate plant at 108 Mulgrave Road, Mulgrave. As part of managing the costs of substrate production, the company seeks to minimise energy consumption. This will become of heightened importance from 1 July 2012 with the introduction of a carbon tax that will add to the cost of energy consumed at the plant. This plan indicates the measures that are in place to manage energy consumption at the substrate plant.

12 ENERGY CONSUMPTION

The substrate plant consumes energy in the form of diesel fuel, electricity and natural gas as follows:

- D diesel – front end loaders, tractor, blending machine, backup generator, forklifts;
- D electricity – fans, pumps air conditioning plant, general power and lighting;
- D natural gas - boiler

The measured annual energy consumption at the present rate of production (1000 tonnes of Phase 1 substrate per week) and projected consumption for each stage of the approved expansion is shown in the table below, sourced from the Environmental Assessment (Perram & Partners 2010).

Table 1 ANNUAL ENERGY CONSUMPTION

Fuel Type	Production Rate			
	Existing	Staged Expansion		
	1,000 (t/week)	1,600 (t/week)	2,400 (t/week)	3,200 (t/week)
Diesel (kL)	135	216	276	336
Electricity (kWh)	3,000	4,800	6,720	8,640
Natural Gas (GJ)	810	1,296	1,944	2,592

13 ENERGY EFFICIENCY MEASURES

Elf Farm Supplies has progressively modified its operations over time to increase the quality of the product, improve efficiency of production and minimise environmental impacts. One of the most fundamental gains from this process has been a reduction in the time taken to process a batch of substrate. This has reduced the cost of production and in particular reduced energy consumption per tonne of substrate.

The Company currently utilises various technologies and techniques to monitor and improve the efficiency of energy consumption on site.

Projects completed since June 2009 include:

- D Energy efficient Powerpax chillers complete with supervisory control system - This system regulates the chillers, pumps and cooling towers to ensure the lowest cost of chilled water is achieved. The system only supplies the amount of water necessary for plant usage. The system also provides live monitoring of its power usage.
- D Variable speed drives - The majority of plant fan and pump drives are controlled by frequency drives (there are over 70 VSDs installed on the site). The frequency drives control electric motors to ensure smooth speed ramp up and down. The use of VSDs result in low inrush currents and less reactive power generation.
- D Production batching - Elf Farm Supplies has split the production schedule to process two batches of compost per week. This step has resulted in lower peak electrical loads on any one day.
- D Power Factor correction - equipment has been installed to minimise the amount of Reactive Power generated at the site. Elf Farm Supplies has improved its power factor from 0.86 to 0.99, a gain resulting in lower plant electricity requirement and reduced energy losses in the supply system.
- D Phase 2/3 tunnel exhaust damper technology - Elf Farm Supplies has developed an automated method of controlling tunnel pressure. This has been achieved by monitoring and controlling the exhaust dampers. As a result, tunnels no longer experience high energy losses due to large surges in tunnel pressures. This design is now being installed in new plants around the world.
- D Phase 2/3 tunnel cool down procedures have been staged to minimise peak cooling requirements.
- D The new blocking shed cool room utilises chilled water from the efficient plant chiller system rather than costly air conditioning units.

- D The process computer systems prioritise the use of cooler outside (fresh) water before using chilled water to cool the Phase 2/3 tunnels. Again the result is lower electricity usage.
- D Phase 1, 2 and 3 process control monitoring has been updated with the latest software to improve control and reporting functions.
- D Electricity bills are now reviewed monthly and gas bills quarterly to monitor energy consumption. Daily electricity data is also available from the electricity supplier.

Projects underway or being investigated include:

- D Level 3 supervising control for further streamlining of the Process Computers with the chilled water system.
- D Blocker oven temperature control to be improved.
- D Investigate alternative product cooling techniques including the possible combination of liquid nitrogen and cool room cooling methods.
- D Explore the viability of using heat energy from the Phase 2/3 building loft area to improve the visibility in Phase 1 and pre-wet workspaces.
- D Investment in smart electricity meters to provide live power usage.
- D Review pre-wet and Phase 1 material movements with a view towards future designs to minimise energy requirements.

The Company will continue to monitor advances in the industry world wide and experiment locally with new technology and techniques to improve production. As before, savings in energy consumption will invariably accompany improvements in processing.

In addition, driven by increasing costs for energy, the Company will undertake the following steps:

- D periodically review each of the processes at the substrate plant to consider how these can be accomplished with greater energy efficiency; and
- D raise awareness of energy efficiency among employees, clients and suppliers.

14 RENEWABLE ENERGY

1.4.1 Solar Power Generation

Various buildings within the substrate plant have a large roof area which could potentially be utilised for solar panels, subject to structural assessment. Elf Farm Supplies will periodically review the cost effectiveness of solar power generation, particularly in light of the increasing cost of electricity. Should solar power generation prove to be cost effective, considering all relevant factors, the company will move to introduce solar panels at the plant.

1.4.2 Low Grade Heat

Air that has been warmed during the Phase 1 composting process is exhausted via the chimney. The potential to capture some of the energy from the exhausting air and use it within the plant is not considered viable for the following reasons:

- D there is limited need for low grade heat at the plant, largely confined to heating the office space in winter;
- D removing energy from the exhausting air may change its dispersion characteristics and hence invalidate odour projections and may alter the efficiency of the bioscrubber; and
- D it would be difficult to retro-fit a heat exchanger in the existing gas flow path either before or after the bioscrubber.

The company does however, use the heat generated in the Phase 1 tunnel roof to warm water that is pumped through the working floor of the Phase 1 building to help improve visibility. As indicated above the company is investigating utilising low grade heat from the loft of the Phase 2/3 tunnel building.

1.5 MONITORING

Elf Farm Supplies will compile energy consumption data annually. Annual energy results will be reviewed against annual production data to confirm that energy efficiency is being maintained or improved. Should a decline in efficiency be revealed, the reason for the decline will be investigated, having regard to the introduction of new plant included in the staged expansion.

Should the investigation reveal that part of the process is becoming less energy efficient, potential improvements will be considered and implemented if cost effective.

This plan will be periodically reviewed when the environmental management system for the substrate plant is reviewed.