Title of the submission	----------
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Company/organisation	thecentre:mk
Did this submission win an Association award?	YES ■ NO ☐
If "yes" which award did the submission receive?	British Institute of Facilities Management (BIFM)
When was the award received?	Month: Date: Year: 2009
If the award was sponsored, who was the sponsor?	

Executive and profile summary detailing a brief biography of the entrant to be used for presentation purposes, promotional activities and media releases (250 words maximum).

thecentre:mk is committed to the continual drive to improve the sustainability of the centre. One way we realised we could make a difference is by improving the way in which our company vehicles are powered.

Detailed description of the research/project initiative (1,200 words maximum)

thecentre:mk is a regional shopping centre situated in the heart of Milton Keynes. With over 240 stores, cafes and restaurants all under one roof, it is anchored by John Lewis, House of Fraser, Marks & Spencer and Next. As the premier shopping destination in the region between London and Birmingham, Cambridge and Oxford, thecentre:mk enjoys around 30 million visits every year and is unrivalled in its customer service. Included in the overall proposition are civic spaces and events venues; City Square and Middleton Hall which at 1800m2 is the largest shopping centre exhibition space of its kind in the UK, these spaces offer a varied programme of free events throughout the year, including bridal shows, fashion events, motor shows and the award winning Christmas display.

thecentre:mk is the unofficial heart of Milton Keynes acting as the town centre and generating pride in the city. As a result, thecentre:mk's commitment to Milton Keynes and its citizens are high on its priority list. This commitment to the city takes a number of forms; the most visually impactful is the use of the dedicated events space Middleton Hall for local events, there is also a number of fund raising activities for local charities undertaken by thecentre:mk staff. However, thecentre:mk also considers the environment and in 2002 began its recycling initiatives with the aim of acting as a beacon to the local community on the importance of everyone 'doing their bit'.

It was understood, that this commitment to the environment was a long term initiative aimed at influencing the city through thecentre:mk's actions and results.

thecentre:mk then came up with a definition of sustainability within which our initiatives should sit:

Sustainable practises at thecentre:mk are undertaken to ensure that our responsibility to the needs of our

community today will not limit us in the future from continuing to meet our needs as a business. We will strive to undertake all feasible means to limit our consumption and make the best of use of the resources we have.

Our recycling efforts began back in 2002 and as time has gone by thecentre:mk has continued to build on its successes showing consistent commitment to minimising impact on the environment. Starting with the 'easy pickings' thecentre:mk moved through the obvious operational streams and then into more difficult recycling areas.

thecentre:mk now looks beyond the obvious solutions for schemes which maximise the positive benefits of its recycling efforts. It was this motivation which led us to purchase and install a Biodiesel plant. Biodiesel is the ultimate in sustainability as it uses waste to create a useable product reducing demand on natural resources.

Throughout this initiative there has been constant information provided to our retailers and the wider general public. Without the support and buy-in of our retailers to provide the waste cooking oil this would not be possible.

STRATEGY & OBJECTIVES

It has been well publicised for a number of years now about the negative impacts vehicles are having on the environment. This year we have worked very hard to tackle the negative impacts associated with the vehicles we have on site. With the inception of biodiesel we found a solution to several issues we face on site.

The initial factors which prompted the research into biodiesel were the increasing cost into diesel and a desire to minimise the CO2 emissions generated by our vehicles. Given the considerable range of biodiesel options available in the market, we had to decide between purchasing in pre-made biodiesel or generation onsite.

While generating onsite had some safety precautions to take into account it also provides us with:

- Another recycling stream
- Continues to build our relationship with our retailers
- Allows us to be self sufficient
- Generation onsite does not require us to use virgin oil. The issue of virgin was particularly important to us because we did not want our actions to have a negative impact elsewhere.

In choosing to use our tenants waste cooking oil we have also discovered there are other operational benefits, for example - By now collecting our tenants waste cooking oil we now no longer have problems with it being in appropriately disposed of in our drains. The collection of cooking oil is totally flexible with tenants contributing the cooking oil when they are ready, promoting the scheme as a solution rather than a process enforced upon them which aid's tenant buy-in.

Biodiesel Objectives

- Lower fuel emissions
- Lower fuel costs
- Increase centre sustainability
- Mitigate the issues of inappropriate oil disposal
- Power a generator to charge electric vehicles

IMPLEMENTATION

After detailed research into all biodiesel options we settled upon using our tenants used cooking oil. This decision was based on:

- The ease of generation;
- Safety implications;
- How and where this would be stored;
- Whether there were any other potential associated implications of our decisions.

We discovered that one site can produce 2500 litres of biodiesel before you begin to pay duty on the fuel. We found that the biodiesel would have no negative impacts on our vehicles; in fact, because it is a cleaner fuel it can lubricate an engine and will clear out the dirt particles of the diesel fuel. It is also stable enough to store for periods of time so long as it is in an environment which is not particularly cold, above 10oc is sufficient.

We purchased our biodiesel plant from www.greenfuels.co.uk. It is a self contained unit which runs with a compressor. In total the capital cost of the equipment came to £2000 which was funded by splitting the expense between the three departments which require the biodiesel to run their vehicles maintenance, security and cleaning. In order to run the process we need to use the chemicals methylate and methanol; if you take into account the running costs, including electricity and chemicals, the biodiesel costs 10p per litre to produce.

In order for the whole system to work we had to generate interest from our tenants and encourage them to provide us with their waste cooking oil. Following face-to-face communication with targeted tenants, response for the scheme was strong with several of biggest retailers signing up for regular collections. These retailers included Wagamama, Giraffe, and John Lewis who all support the scheme due to the ease of collection and ethical drivers behind the project. Several of our restaurants have contracts already in place for oil collection however now we can offer them this service should they ever face temporary issues.

Keen to use the Biodiesel produced efficiently any excess fuel not used in the company vehicles is scheduled to be used to power a generator which charges up the four carbon neutral Electric Vehicles (EV) which collect the recycling (including the waste cooking oil) from the tenants. This will generate a recycling circle, where the EV's will collect the waste cooking oil, which will be used to produce Biodiesel, which in turn will run the generators to power the EV's.

Word Count: 1161

How the submission addresses each or some of the criteria for the Award for Excellence - a brief statement for each of the criteria is required (total 2,500 words maximum, per criteria).

The criteria are:

- **Innovation**

With the peak in oil and fuel prices during the summer of 2008 thecentre:mk recognized the potential within the business to reduce the costs of fuelling its fleet of company vehicles whilst also enhancing the sustainability of its transportation. The system designed and put into place at thecentre:mk has been planned to maximize the potential of the available resources within the shopping centre - including shopping centre staff, companies operating within its boundaries and the waste products.

Inspiration for the project came from staff members who had become aware of the increased interest in biodiesel in the past few years. Whilst the idea appeared on the surface to be novel and sympathetic to the company's ethos there were numerous questions as to its validity for this organization. Further extensive investigation proved that for thecentre:mk, and seemingly other organizations with a readily available source of waste cooking oil, the implementation of biodiesel at the site was not as unrealistic or complex as first perceived.

Biodiesel has been heralded as one of the best current alternatives to petroleum based fuels, however, thecentre:mk did not want to simply import pre-produced biodiesel to the site to fuel the vehicles. This strategic decision was based on a number of factors; of the feedstocks available for biodiesel production waste cooking oil is currently considered one of the best options and thecentre:mk wanted ensure that the biodiesel used within the company vehicles came from the best sustainable sources. Furthermore, a greater benefit associated with the use of waste cooking oil as a feedstock is that it negates many of the negative issues associated with virgin oil feedstocks. With virgin oil feedstock production there are issues such as land use change, loss of food crops and loss of biodiversity. This issue was key to thecentre:mk which did not want to cause far greater problems globally without for the sake of short term gains - in particular, land use change plays a large role in the relative carbon emissions associated with the bio-diesel use as discussed below.

Carbon Footprint of thecentre:mk bio-diesel

The use of waste cooking oil allows for the division of the energy demands and production emissions; from the growth of the crop and the processing, between the oils two lifecycle processes: in cooking and fuel production. For the purposes of this investigation the assumption has been made that there has been zero depletion of the carbon stock. This decision has been based on the absence of either land-use change to grow the oil product or the future change of land to grow the product. This is the secondary function of the cooking oil and this crop has been allowed to fulfill its primary function as a food crop first as opposed to being diverted away from this function.

The overall emissions generated from the collection, processing and disposal of the byproducts of the waste cooking oil at thecentre:mk is **1.258 kg of CO2 eq.** per litre of biodiesel produced. This figure represents a 52% reduction in the emissions factor to that of petroleum diesel when directly compared and is a considerable decrease for thecentre:mk but, and is the result of favourable conditions for onsite production. Not to say that the absence of such conditions elsewhere make the scheme unsuitable for replication but future installations must be aware of the variance in carbon emission reductions dependant on their own production systems. The emissions of the onsite production, inclusive of all stages, are limited through the: use of electric vehicles, close proximity collection, processing and by-product disposal. Guidance for this method of calculation has been taken from the Renewable Fuels Agency technical guidance for carbon reporting.

The calculations for this total value have been broken down into the three contributory factors in the following sections (Transportation, Processing and Disposal).

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Transportation

The waste cooking oil at thecentre:mk is provided by the restaurants of which there are three key suppliers of cooking oil with other outlets choosing to contribute on a more ad hoc basis. The processing of the cooking oil into biodiesel takes place in a dedicated room in the Food Centre which separate building across for the main centre itself; a round journey to collect the oil and return for processing is 2.5 km in length.
These oil collections are conducted by electric utility vehicles which operate off four 12V batteries and these batteries are charged overnight either directly from the grid or by a generator run on the produced biodiesel (this has clearly only been possible since biodiesel production at the centre begun).

Each charge of the batteries requires 45kWh of electricity. Currently the emissions factor for UK grid electricity in CO_2 equivalents is 0.50748 kilograms per kilowatt hour (DEFRA, 2009). To consider the emissions of one litre of biodiesel the energy demand has initially scaled up to consider the amount necessary to collect sufficient oil for 1000 litres. If one of the utility vehicles were to complete all trips then it would need to be charged three times to cover the 50 kilometres necessary, at a consistent speed without a reduction in power to the vehicle. This gives a total emission of 68.51 kg of CO_2 eq. for 1000 litres; per litre of biodiesel produced this is a total of 0.685 kg of CO_2 eq.

Processing
The initial contribution to the carbon footprint of the processing of the oil is the electricity consumption of the biodiesel unit throughout the production. While the plant does not require power for the full 15 hours the reaction is taking place it does require electricity to operate for nine hours. Both the heater band and the compressor require 1.5kW to operate but the two do not run together at any point so the consumption does not exceed 1.5kW an hour.
The total energy for the biodiesel unit per run generates 6.85 kg CO_2 e. q. based on power being necessary for nine hours. The heater band contributes 3.04 kg CO_2 e. q. and the compressor will generate 3.81 kg CO_2 e. q. This overall contribution from the electrical input breaks down to 0.137 kg CO_2 eq. per litre of biodiesel produced.

Also required in the production of biodiesel are the two chemicals, methanol and potassium hydroxide. For each production run 8.5 litres of methanol is required and this makes the greatest input to the emissions from the processing of the waste cooking oil. The emissions factor for methanol is 2.75 kg CO_2 e. q. per kilogram of product used (RFA, 2009).

8.5 litres methanol x 0.79 density methanol = 6.715 kg methanol

6.72 kg methanol x 2.75 kg CO_2 e. q. per kilogram of product = 18.48 kg CO_2 e. q.

To produce one litre of biodiesel the methanol contribution is 0.369 kg CO_2 e. q.

The quantity of potassium hydroxide catalyst used depends on the quality of the oil used, because thecentre:mk uses the same sources for their oil the average amount of catalyst necessary for their reactions has been calculated to be 0.34 kg. The potassium hydroxide has an emissions factor of 2.43 kg CO_2 e. q. per kilogram of product used which produces 50 litres of biodiesel.

0.34 kg potassium hydroxide x 2.43 kg CO_2 e. q. per kilogram of product = 0.83 kg CO_2 e. q.

Per litre of biodiesel produced this is a contribution of 0.016 kg CO_2 eq.

In total one run to process 50 litres of the waste cooking oil into biodiesel has a carbon intensity of 26.16 kg CO_2 e. q. or 0.522 kg CO_2 eq. per litre.

Disposal

The disposal of the glycerol by-product is carried out by the main waste contractor at thecentre:mk, Crawleys. They transport containers of the glycerol by diesel run lorries to an Energy from Waste plant which is a round journey of 54 kilometers from the centre of Milton Keynes. The waste collection company uses 17 ton rigid HGV vehicles which emit 0.94405 kg CO2 eq. per vehicle km (DEFRA, 2009) based on the UK average of a 55% load. For one collection of 200 litres of the glycerol the disposal contributes 50.98 kg CO2 eq. which is the amount of glycerol produced per 1000 litres of biodiesel production.

Therefore the disposal of the glycerol contributes 0.051 kg CO2 eq. per litre of biodiesel produced.

Use in the company vehicles

For the previous financial year 2008/2009 the total emissions from the company vehicles came to a total of 10,485 kg CO2 eq. Through the implantation of the biodiesel system at thecentre:mk, the company aimed to see a major cut of 25% in the emissions associated with the fuel used in the company vehicles.

It is necessary to run two thirds of the company vehicle fleet on the 50:50 biodiesel blends. This makes a sizeable contribution to the emissions of the vehicles. The proportion of the diesel emissions for these vehicles will be forecasted based upon the emissions related to the fuel consumption of the previous financial year.

- For security this is a forecasted diesel emission of 2,412 kg CO2 eq.
- For maintenance this is a forecasted diesel emission of 1,480 kg CO2 eq.

- The biodiesel component of the fuel blend shall contribute 1,150 kg CO2 eq. for security
- The biodiesel component of the fuel blend shall contribute 706 kg CO2 eq. for maintenance

The overall emissions for these two departments totals

- 3,561.73 kg CO2 eq. from security
- 2,185.60 kg CO2 eq. from maintenance

Finally, the cleaning department has chosen to implement neat biodiesel fuelling in their vehicles, so all emissions for this department result from the biodiesel. These vehicles are forecasted to contribute 1,287.46 kg CO2 eq. to the overall emissions of the company fleet.

In total for the financial year 2009/2010 the company vehicles are forecasted to emit a total of 7034 kg CO2 eq. This represents an emissions total reduction of one third, 33% from those in the previous financial year. This saving means that the company will comfortably satisfy their target for emissions reduction.

The biodiesel system installed at thecentre:mk represents a relatively low cost solution to the organizations fuelling needs. These benefits are possible whether there is a waste cooking oil source available directly associated within the organization or from a local source. However, it is necessary that the oil source be gained either freely or at a low cost in order to ensure that the production costs remain low to generate the desired financial gains (this is covered in more depth within Corporate Outcomes).

- **Advancement of FM**

The Biodiesel project has promoted facilities management excellence within the company through:

- Highlighting the benefits of a strong united team of staff, and allowing them the opportunity to voice ideas about facilities improvement from their grass roots view of facilities management. One of the strongest benefits of this initiative is showcasing the importance of good facilities management and the impact it can have. The Biodiesel and the subsequent recognition it has gained has serviced as a focal point for

team building and thecentre:mk's environmental initiatives. This resulted in feedback from the Sunday Times Best Green Companies awards which highlighted the staff engagement in environmental initiatives – this staff engagement was fuelled by the success of Biodiesel.

- By looking beyond the conventionally considered assets of an operation to make the most of any available resources within an organization. Facilities Management has a reputation for being a process driven arena, however, the ability to think creatively on a logical basis is vital to the progression of the industry. Biodiesel is a perfect example of Facilities Managers on the ground working within guidelines to invoke a forward thinking idea.
- Through showing that whilst long term strategic planning is crucial to development it can lead to smaller changes implemented on a trial basis which can ultimately bring about fundamental development of the operations. In this instance, the introduction of biodiesel led to the electric vehicles and the generator creating a interconnected lifecycle between the three initiatives.
- That having a certain ethos at the heart of an organization can generate a stronger commitment to change then multiple competing ideas.
- Sustainability is achievable. The Biodiesel initiative provided proof to the shop floor staff who were working on the other environmental initiatives that success is achievable.

- **Corporate outcomes**

At the heart of the corporate strategy at thecentre:mk is the definition of sustainability designed by the centre management team.

Sustainable practices at thecentre:mk are undertaken to ensure that our responsibility to the needs of our community today will not limit us in the future from continuing to meet our needs as a business. We will strive to undertake all feasible means to limit our consumption and make the best of use of the resources we have.

The definition of sustainability was designed to give a basic framework in which the company should operate. It not only defines the way in which day to day operations should proceed at the centre but also has given the staff at the centre an understanding of the central theme which drives these operations. Better understanding from the staff leads to stronger commitment within this body to the company goals. It also provides the staff with a point of stimulation from which they can make suggestions for further improvements which can be made by the company; allowing all members of the team to be part of the evolution of the company and to play a role in the positive changes it makes.

We are now able to produce bio diesel at a cost of 10 pence a litre. The return on the investment fluctuates with the price for petroleum diesel which has seen another steady climb in price. As is known the increase in price being felt in the UK is partly the result of the weakness of the pound against the dollar. However, much of the price increase has been artificially driven. One of the benefits to the bio diesel system is the impact of such events upon the company is less keenly felt in relation to our reduction in reliance on petroleum fuels.

Importantly with the announcement of the new budget within the UK a further three pence per litre tax is to be added to petroleum fuel prices. This increase was not anticipated when the system was introduced by the company but again it is reducing the impact this would have were to still fuel the entire fleet solely with petroleum fuels. Nonetheless we are still reliant on a certain level of diesel use as we do not run our entire fleet on neat bio diesel.

During the initial phases of testing as we gradually introduced the biodiesel to the vehicles we were seeing a saving of around £60 a month. Now we are using the biodiesel in all the vehicles; given the variation in our running practices dependant on vehicle type mentioned in the innovation section, we save closer to £150 a month. This has given us a payback period of 20 months. This payback is based upon the production cost and the purchase of the diesel to form the blend for the security and maintenance vehicles.

- I don't think the biodiesel does affect our bottom line, nor should it. Not really sure what to say, if anything about this.

- **Contribution to Global FM's mission**

The greatest strength to the biodiesel system at thecentre:mk is its relative simplicity. The basic system for biodiesel production is a low cost investment, especially when compared to other forms of renewable energy production systems. The technology is very basic and required little to no specialist knowledge by those who use it. Although there was a certain element of trial and error in setting up the oil processing this as much to do with the quality of the waste cooking oil affecting the necessary proportions of chemical reactants as it was the need for the operating staff to learn the system.

It is helping the recognition of facilities management globally through:

- Promotion of the simplistic approaches which can be taken towards facilities improvement which generate significant changes and benefits
- It shows the weight of benefit in having facilities managers in place which understand an organization inside out and can make informed suggestions for improvement based upon familiarity to the organisation as opposed to a generalized cross board approach
- Highlighting the positive going on in facilities management at all scales

Word Count: 2738/12500

Any supporting documentation is to be attached to your submission.

A statement from the FM Association in support of the submission

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