CDIS-KARM

Handout for
CCFRA Food Service Panel
20th June 2006

FCSI
FOODSERVICE CONSULTANTS SOCIETY INTERNATIONAL
PROFESSIONAL MEMBERS

Design

Project Management

Peace of Mind
& Confidence

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"Changes in Design, Manufacturing & Procurement for Social, Environmental & Economic Profit"

A handout to accompany the Presentation to CCFRA Food Service Panel – 20th June 2006.

As an industry do we need to change?

As professional members of the FCSI, which is the Foodservice Consultants Society International the driving force here in the UK for the design and management of commercial catering operations, we were recently approached to write an article for a trade journal on Energy Savings in the Foodservice Industry.

While researching the article we discovered just how badly as an industry our performance is, which is quite surprising when you consider that any savings made in this area transfers directly to the financial bottom line resulting in higher profits. Caterers have a lot to gain from energy efficiency with savings of between 10 and 40% being achievable, this equate to 3-6% of the caterers operating costs, and with profit margins often in the same range a positive impact on profitability can be achieved.

As part of our research we discovered two areas of great concern, firstly the equipment and plant used within the industry in a large number of cases is only 50% efficient while the domestic market has to achieve 86% and secondly the driver when purchasing is a low capital cost with little or no consideration being given to the whole life-cycle costs which include energy consumption, labour, the related costs for any necessary consumables like cooking oil and detergents etc. It became very obvious that as an industry we need to instigate a number of changes in the way we operate and procure our equipment.

A large number of people already accept that Climate change is here with reports claiming that Greenhouse gases are at their highest levels with CO_2 emissions being the worst culprit and the UK government stating that a 3% rise in the planets temperature could trigger the melting of the Greenland ice cap with irreversible disruptions, concerns are starting to rise. Following publication of the article and against this background we have received numerous enquiries from people within the Catering industry asking for more information on what the industry is doing in order to save on energy costs and /or reduce the CO_2 emissions which are having such an effect on our environment. We decided, therefore, to call together a group of the UK's leading manufacturers of catering equipment for an inaugural meeting last March. The purpose of the meeting was to establish a pattern of what the great and good in our industry are currently doing to improve the current situation.

We soon realised that we were, collectively, creating more questions than answers and it was agreed that we would all meet every six weeks to move energy efficiency and sustainability further up the caterer's agenda. Everyone attending the inaugural meeting confirmed that as representatives of our industry, we are all keen to be proactive in helping the commercial caterer to move forward by becoming more economically, environmentally and socially efficient by developing improved equipment, working practices and methods of operation.

The first area of concern being considered is the cost of energy and the current price increases, with 25% not being unusual we asked if this is due to the current political situation throughout the world and once this settles down will energy prices then drop back to something like their previous levels.

Unfortunately we do not believe this to be the case for the following reasons; the global economy is changing with India and China bringing 2.5 billion people into the world economy which increases their requirement for oil. In the last seven years China has reduced her rural poor by 50% and last year (2005) used just under 9 million barrels of oil per day with a production level of just under 3.5 million barrels per day, a short fall of 5.5 million barrels per day. In 1994 China was almost self-sufficient in oil production and it is estimated that in 2031 at the current rate of growth she will require 99 million barrels per day, 14 million barrels more than the world's production in 2005.
In addition leading geophysicists predict that peak oil and peak natural gas is either currently occurring, or will have occurred by 2015. Peak oil is a phrase often used to describe the situation when global oil supplies reach a peak, following this peak oil supplies decrease and never rise again. Therefore we are moving from a buyers market where the supply is greater than demand to a sellers market where the supply is less than the demand.

Current estimates indicate that the hospitality industry is one of the largest consumers of energy within the commercial market place using £800m pounds worth per year and has one of the worst efficiency records. Many believe that if the industry is to become sustainable then it will need to reduce its energy consumption by 50% which is not surprising when it has been reported that it takes six barrels of oil to produce one barrel of food.

To start to improve the current situation within each individual facility or business we need to develop an Energy Strategy, this can be based just on energy efficiency or go further to incorporate the Triple Bottom Line approach which will not only save money but give us a competitive edge over our competitors as we will see later on. The triple bottom line means that the ultimate success of the business is not just measured by the traditional financial bottom line, but also by its social/ethical and environmental performance.

A typical Energy Strategy should:

- State the person or persons responsible for the management of all energy related issues.
- Publish the benchmarks against which energy/water usage is to be measured in i.e. Kw/hr per cover, litres per cover, CO_2 Emissions per cover. Then at regular intervals inform everyone employed within the facility of how the performance measures up against the target and against other businesses or facilities of a like nature.
- Confirm that the relevant utility is being purchased from the supplier at a tariff that is best suited to the needs of the business and that this is monitored at regular intervals to make sure that this is always the case.
- Detail the energy/water required to deliver the business plan, while providing feed back so the business plan can be amended to take advantage of potential savings and marketing opportunities.
- Incorporate the necessary metering arrangements so that all utilities can be measured to enable the use of energy/water to be monitored and challenged.
- Provide guidance so that the structure and fit out of the premises always provides the most efficient use of energy/water.
- Provide detailed preventative maintenance schedules so that all equipment and plant is maintained to work at its maximum efficiency.
- Install a system to record and monitor all maintenance costs including preventative maintenance for the full life of the appliance. This allows its economic efficiency to be monitored and provides useful information when preparing life cycle costs for its replacement.
- Offer the facilities for all new equipment and plant requirements to be procured so that the most energy efficient option to deliver the statement of requirement is procured through life-cycle costing. Not like for like with the purchase price being the main and in some cases only driver.
- Make sure that all staff follows the basic principles of energy conservation: keep it clean, turn it down or shut it off.
- Control waste – introduce a policy of Reduce, Re-use, and Recycle.

With changes in technology and legislation, together with the changes in market trends detailed below the opportunity now exists to reorganise our businesses and steal a lead on our competitors while improving our profitability.

As governments become more involved in energy efficiency and sustainability it follows that all the outlets under their control i.e. hospitals, schools, defence establishments etc will have to be seen to be energy efficient and sustainable. If a facility is to be truly energy efficient and sustainable then it means that its supply chain has to follow the same criteria.

The demographic picture is changing, over the last 30 years the number of one person households has doubled to 12%, the number of households with no children has increased from 19% to 25% and the number of household's with

dependent children has reduced from 52% to 37%. By the year 2010 25% of the population in Europe will be over 65 years of age and 6% of the population will be over 80 years of age.

The market place at present claims to be following a sustainable life style with 63% of the population being prepared to pay a green tax, also when asked people claimed that they would spend on average £331.00 per year to help the environment. In addition 41% of all consumers follow a healthy eating regime and 42% rely on brands to guarantee the quality of the offer with the certain knowledge that their expectations will be delivered.

To achieve the savings of up to 40% a major change is required in the manufacture and procurement of plant and equipment. At present the main objective for a catering equipment or specialist manufacturer is to achieve a low purchase price for the appliance, with less importance being placed on its energy efficiency.

However things are starting to change with a number of appliances being redesigned by the leading manufacturers. To encourage this to continue and gather even more speed, caterers need to develop and change their procurement strategy by taking the decision away from individuals with limited objectives (price alone) and turn it into a team decision involving all of the necessary stakeholders.

The stakeholders will probably include some or all of the following, the client, the end consumer, marketing, operations, health & safety, planning authorities, local residents, engineering, suppliers, waste management, finance, procurement, the designers etc. Once we have all of their requirements we need to turn them into a schedule of requirement against which we can draw up a list of possible alternatives against each item.

Where we have a number of different alternatives we need to life-cycle cost each one, to achieve this we need to feed in the preheat energy, the idle energy rate, the heavy load energy efficiency percentage together with the production capacity. In addition we need to feed in the operating hours per day, the working days per year, with the number of preheats each day and the amount of food to be cooked. We then need to add the energy and water costs together with the lifespan in years.

From this we will obtain the total cost of the utilities to run the appliance for its full life span, this then needs to be supplemented by adding further information which will give us labour costs, consumables costs, maintenance costs and disposal costs. Now we can make a valued judgement as to which is the correct appliance or item to specify. We can now prepare a detailed specification to take to the market place.

Procurement has then to investigate the market place for the cheapest method of procuring the equipment and its installation, then if necessary life-cycle cost the alternatives that meet the specification.

Once procurement has a supplier, the equipment and its installation needs to be procured together with the necessary monitoring equipment to record and challenge the energy usage. On completion of the installation every thing needs to be commissioned to ensure that it is working to its best efficiency while meeting the operational requirements.
We then need to train the catering staff in the use of the equipment, when to use it and when to use an alternative piece of equipment together with how to operate it so that it performs to its best efficiency levels. At this stage it is most important that we do not forget to arrange training for the maintenance staff who will need to keep it functioning at it best performance levels. As a matter of course all staff should receive a level of refresher training at regular intervals which is structured to highlight when more in depth training is required.

At regular intervals monitor the equipments performance against the benchmarks set within the life-cycle costing together with the overall Kw/hr per cover and the CO_2 emissions per cover. This information should be published and explained to everyone employed within the facility.

The Five Key Drivers for Action:

Cost Saving:
The rising costs of energy, transport, waste disposal and raw materials are all helping to reduce our profitability.

Legislation:
Regulations to reduce emissions of greenhouse gases already exist and more are likely to appear, therefore we need to act as an industry before solutions are forced on us by people who do not understand our needs.

Competitiveness:
Sustainability and low carbon are concepts that are beginning to appear in consumer preferences and will influence the future market place.

Reputation:
Pressure from outside influences like the media combined with our own investors, employees and consumers for companies to take responsibility for the environment and economic consequences of climate change.

Opportunities:
As government, society and businesses move towards a more sustainable future with less carbon emissions they will only want to deal with like minded companies.

A Typical Case Study.

A typical kitchen operated within the public sector to provide three meals a day for two hundred people over a one hour service period for each meal, is entitled to the following prime cooking equipment.

- One Gas Bratt Pan
- Two Gas Deep Fat Fryers
- One Electric Filter Unit
- One Gas Salamander
- One Electric Six Grid Combination Oven
- One Electric Ten Grid Combination Oven
- One Gas Open Top Range
- One Gas Solid Top Range
- One Electric Pressure Steamer
- One Electric Tilting Kettle

The energy required to power this equipment is 69Kw's of electricity and 173Kw's of natural gas and on average it will have an hourly usage of 43Kw's of electricity and 108Kw's of gas giving a daily usage for electricity of 339Kw's and 858Kw's of gas.

In addition to the energy used for cooking we need to extract 3.72m^3/sec of air and bring in 3.16m^3/sec of supply air, this will require 19Kw's of power everyday to power the fans and on average 143Kw's of heat generated from natural gas to power the heater battery to temper the incoming air (this will be much higher in winter and very much lower in summer).

This means that in total the cooking operation is consuming 358Kw's of electricity and 1,001Kw's of natural gas per day to provide 600 meals; therefore the energy used per meal is 2.27Kw's with an emission of 0.592Kg/ CO_2 per meal.

The energy cost to run this operation is between £51.93 and £42.30 per day depending on the energy supplier used and the tariffs offered.

As the above facility has reached the end of its working life and is being refurbished. We can either proceed as in the past by issuing procurement with a specification for the listed equipment which they will ask the market place to price and offer similar alternatives to reduce the purchase price or we can involve all the stakeholders and start afresh.

All the relevant stakeholders should be approached to feed in their requirements and what they expect to achieve from the new facility, a sample of which is detailed below:

The Client:

To meet the service requirement at the lowest cost possible while being socially and environmentally aware.

The Consumer:

To be able to purchase freshly prepared, quality food at a value for money price which supports a healthy eating diet and has the minimum effect on climate change.

Marketing:

We need to offer a consistent, high quality product, at a value for money price, which has been produced using sustainable, energy efficient methods and is a favourite with the healthy eating consumer who now accounts for 41% of the potential market.

The Operator:

To have equipment that is reliable, fit for purpose, easy to use and clean while being suitable for producing a quality product that consistently meets the consumers expectations. Also the equipment should provide the features necessary for reducing operating costs.

Health & Safety:

The layout and equipment must institute safe systems of work reducing the risk of lifting heavy items, carrying hot liquids, working with hot oils, slips and trips while maintaining a suitable working climate. The facility must also reduce the risk of fire to a minimum with a suitable means of fire detection and suppression being provided.

Planning Authority & Local Residents:

To meet the requirements of current building and planning regulations while minimising the effect on the local community with special attention being given to noise and odour pollution.

Engineering:

The equipment needs to be energy efficient, easy to maintain and clean, with the facility having sub meters fitted to the key areas to enable the energy usage

to be monitored. A system of fat, oil and grease management must be incorporated to protect the drainage system while not interfering with the operation of the facility. Also the facility should minimise the amount of conditioned air that is drawn into the kitchen extract system and in addition the risk of damage to adjacent services from heat and fire needs to be minimised.

Supplier:

To allow time for the training of both the operational and maintenance staff to ensure that the equipment is correctly used, while the installation should provide for easy cleaning, easy maintenance and the reduction of misuse.

Waste Management:

Reduce the amount of food waste and used cooking oil to a minimum level, with all packaging being recycled or reused. .

Finance:

To pay the lowest price possible for a facility and equipment that is fit for purpose and will meet the design criteria of lasting ten years. Life-cycle costing will only be considered when the pay back period is ideally within a three year period; however this may be extended to five years in special circumstances.

Procurement:

To use a supply chain that is limited in size while providing continuity so that advantageous purchasing agreements can be negotiated.

Design:

To develop the above into a statement of requirement and encapsulate it within the design to provide good ergonomics that meets the requirements of all the current legislation and regulations.

The Statement of Requirement with Proposed Design Solutions:

The equipment is to be fit for purpose and capable of meeting the service requirement for a minimum of ten years.

All the equipment selected is heavy duty catering equipment that has been designed and certified by the manufacturers as being suitable to last for the ten year life-cycle period with spare parts being readily available.

The facility is to be constructed and equipped using sustainable, energy efficient equipment and material while being socially acceptable to investors, staff, consumers and local residents.

The specification for the construction of the facility has been drawn up using the Green Guide to Specifications and the National Green Specification – Greenspec Checklist. In addition all the equipment specified has been evaluated to ensure that it provides the service requirement using the lowest amount of potable water, with the lowest Kw rating per meal and the lowest CO_2 emission level per meal.

The facility is to be constructed and equipped at the lowest price possible while delivering the above two items.

Once the equipment had been selected to meet the service requirement and achieve the energy efficiency per meal rating at the lowest emission levels, the specification was then compared to other manufacturers equipment with full life-cycle costs applied. Using the three year pay back period the cheapest option was specified.

The facility and equipment must be capable of batch cooking fresh foods in both large and small quantities.

Alternative equipment was investigated to provide a solution to meeting this requirement in place of the conventional range, salamander and fryer without resorting to the use of microwave cooking which destroys what small amounts of nutrients are left within our food.

The proposed solution is to reduce the amount of conventional boiling tops, delete the salamander, high pressure steamer and general purpose ovens while replacing them with the new generation of gas combination ovens using various sizes. This will enable batch cooking to be carried out in large or small quantities using one oven to cook different foods at the same time as there is no transference of taste or smell when using this method. In addition the combination oven retains more of the energy generated which means that the energy is used to cook the food and not wasted by discharging it to the surrounding atmosphere.

It was also proposed that we move away from conventional deep fat fryers to the new high efficiency type with an inbuilt filtering system, this allows us to use the shorter cooking and faster recovery times to achieve greater production during busy periods or provide the opportunity to expand the range cooked during slower periods allowing us to shut down one of the fryers.

When different methods of cooking have been considered a full life-cycle cost analysis has been carried out to find the most efficient and economic method.

The food produced must be of a consistent high quality and suitable for a healthy eating diet.

The combination ovens specified have 350 cooking programmes with up to 12 steps per programme which means that the executive / head chef can have the ovens programmed to his exact requirements so that the same quality of product will be achieved every time and will not be reliant on which oven or which member of staff produces the product. This means that the salamander can be deleted as the oven will grill with the same level of control.

The ovens will provide a superb quality product and when used to grill meat products they will remove the risk of generating cancerous chemicals which are caused when burning animal fats which can happen relatively easily when grilling meats with a salamander or chargrill.

To overcome the concern regarding Trans fats which are raised considerably when the frying medium is contaminated, we have specified new high efficiency gas fryers with built in filtration systems as this reduces the trans fat content by over 40% which in turn reduces the overall fat content of the product by just under 5%. The fast recovery ensures a consistently high quality food product which is both crisp and moist.

The food produced must represent value for money; therefore the equipment should include any features that would reduce the operating costs.

All the equipment specified is well insulated to retain the heat and fitted with thermostatic controls. In the case of the combination ovens and fryers they are the latest manufacturer's designs which are very energy efficient, the ovens having a demand related energy supply by using a modulating, high performance blower burner system together with a high performance steam generator and the fryers having pre-mix burners in place of the standard atmospheric burners.

The equipment must be reliable.

All the equipment specified is from the industries leading manufacturers using engineering solutions which have been well tried and tested over many years, this even applies to the ovens and fryers which have been developed using the technologies developed and tested over a long period of time by other businesses for markets outside of the catering industry.

The equipment must be easy to use.

All the equipment has been selected for its self explanatory controls for every day use, which are easy to read and use with clear text and markings. In addition a training programme will be implemented prior to the facility going live and will continually be updated throughout the life of the facility with toolbox

training sessions taking place on a monthly basis. As and when the toolbox sessions highlight the requirement for more in depth retraining, then the appropriate sessions will be arranged.

The equipment must be easy to clean.

The conventional equipment is relatively easy to clean using current cleaning methods; however the combination ovens have an automatic cleaning system with six unsupervised cleaning stages that can be carried out overnight. The fryers have no old fashion cool zones and are fitted with built in filters to make cleaning of the unit and oil very easy.

The equipment should be easy to service and maintain with spares readily available.

All the equipment is from leading manufacturers who have a full service back-up organisation with full access to all spares and consumables which enable them to carry out repairs and preventative maintenance. The equipment is laid out so that the set-down benches can be removed to gain full access to all serviceable areas on each appliance and when this is not possible the equipment will have castors fitted. All the equipment can be disconnected from the service distribution unit by using the quick disconnect fittings and/or the electrical plugs and sockets.

The facility should be fitted with sub meters to the key areas so that energy usage can be monitored and challenged.

The catering facility is being fitted with its own electric, gas and water meter for the equipment and separate sub meters for the lighting, heating and ventilation plant.

The layout and equipment must institute safe systems of work, reducing the risk of lifting heavy items, carrying hot liquids, working with hot oils, slips and trips.

The equipment has been laid out to give good ergonomics while minimising the risk of repetitive strain injuries. In addition the combination ovens, tilting bratt pan and tilting kettle will greatly reduce the need to lift heavy pans of hot liquids as suitable trolleys will be used for loading, unloading and transportation of the raw and cooked products. To avoid slips and trips a non slip quarry tile floor has been provided with special drainage outlets designed to cover the zones used for empting the bratt pan and tilting kettle together with special drainage outlets positioned to the rear of all the combination ovens, in all cases the floor will fall to drain to avoid wet floors while making sure that mobile equipment is level or falls away from the operator. The fryer filter system is built into the fryer and can be used by pressing a button even when the oil is hot; this avoids having to use a mobile filter unit which has to be connected to the fryers with flexible hoses.

The facility must achieve a suitable working climate, without wasting any air that has been conditioned.

The kitchen ventilation system has been designed using the thermal convection coefficients for each appliance providing the minimum flow rate to meet current legislation. This has been balanced with the make-up supply air to provide a 15% negative pressure within the kitchen area.

Reduce the risk of fire to a minimum with a suitable means of fire detection and suppression being provided.

The ventilation canopy is fitted with a fire suppression system that protects the individual appliances, the grease plenum within the canopy and the extract ductwork spigots. The fire suppression system is linked to the fire alarm system and when activated will shut down the electric, gas and supply fans leaving only the extract fan to run which will clear the smoke while pulling the fire suppressant into the ductwork.

Minimise the risk of damage to adjacent services from heat and fire.

All the ductwork is fitted with cleaning access doors at regular intervals to enable the system to be cleaned every three or six months depending on use. In addition all mechanical and public health services are to be insulated to avoid them heating up or cooling down the item being carried or affecting any neighbouring services. In all cases the services will be suitably spaced with any necessary separation and will be contained within the stainless steel service distribution unit in the kitchen area.

Incorporate within the facility a fat, oil and grease management system that protects the drainage system without interfering with the operation of the facility.

The proposal is to use a biotechnology system which is the most eco friendly way of treating light fat, oil and grease that is washed down the drains during normal catering operations.

The maintenance issue is important and is a prime consideration for using the New Grease treatment system as it removes the risk of disrupting the kitchen and surrounding areas during the working day. It also feels appropriate to adopt a biotechnology solution to the problem of grease control on such an environmentally progressive project.

The project must be designed to comply with all the regulations and legislation that effects the construction, fitting out and operation of the facility.

The design is to be carried out using the latest English and European legislation for food hygiene while complying with the planning and building regulations together with any legislation affecting the supply and installation of all services and equipment.

Minimise the effect the facility has on the local community with extra attention being given to noise and odour pollution.

The proposal is that this refurbishment project is undertaken using the BREEAM or DREAM assessment to give an excellent rating to ensure that the design is sustainable and energy efficient. In addition the Defra risk assessment for odour and noise pollution shall be carried out to ensure that the design achieves a low impact risk with a score below twenty points.

Provide adequate training to both operating and maintenance staff to enable the facility to operate to its economic and efficient criteria.

A training programme for both operational and maintenance staff will be implemented prior to the facility going live and will continually be updated throughout the life of the facility with toolbox training sessions taking place on a monthly basis. As and when the toolbox sessions highlight the requirement for more in depth retraining, then the appropriate sessions will be arranged.

The equipment and facility must be designed to minimise the damage caused by misuse.

Set down areas have been provided throughout the layout and drop down doors have been replaced with side hinged or sliding doors so that they have to be hand operated to open or shut.

Reduce the amount of waste food generated.

All the equipment has been selected to allow batch cooking in large or small quantities to minimise food and energy wastage.

Minimise the use of cooking oil.

The fryers selected use on average a third less oil then the previous models with fewer oil changes.

Ensure that all waste when possible is reused or recycled.

At the same time as these proposed works are being carried out the waste strategy is being changed to a system where all food waste is dewatered ready for composting with all other waste being sorted and collected at the point of

use in the required waste streams, glass, metal, plastics, black bag waste, paper and card.

In an ideal situation life-cycle costing should provide a pay back within three years but may be extended to five in special circumstances.

The life-cycle pay back period to cover the additional equipment cost is less than twelve months and is well within the three year period.

Limit the supply chain in size while providing continuity with suppliers.

The supply chain is limited to four suppliers and one installer.

Provide a design which encapsulates all of the above and combines them with good operating ergonomics.

The layout takes into account the stakeholders requirements which developed the schedule of requirements which in turn generated the design solution.

The prime cooking equipment required to provide the three meals a day for two hundred people over a one hour service period for each meal is as follows.

- One Gas Bratt Pan
- Two New High Efficiency Gas Fryers
- Two New Generation Gas Combination Ovens (6 grid)
- Two New Generation Gas Combination Ovens (10 grid)
- One Gas Open Top Boiling Table
- One Gas Tilting Kettle.

The energy required to power the equipment is 2.57Kw's of electricity and 182.3Kw's of natural gas and on average it will have an hourly usage of 1.59Kw's of electricity and 113.03Kw's of gas giving a daily usage for electricity of 12.72Kw's and 904.24Kw's of gas.

In addition to the energy used for cooking we need to extract 2.84m^3/sec of air and bring in 2.41m^3/sec of supply air, this will require 15.92Kw's of power everyday to power the fans and on average 136Kw's of heat generated from natural gas to power the heater battery to temper the incoming air (this will be much higher in winter and very much lower in summer).

This means that in total the cooking operation is consuming 28.64Kw's of electricity and 1,040.55Kw's of natural gas per day to provide 600meals; therefore the energy used per meal is 1.78Kw's with an emission of 0.351Kg/ CO_2 per meal.

This shows a saving of 21.3% in energy and a saving of 40.6% in carbon emissions.

The energy cost to run this operation is between £31.43 and £25.75 per day depending on the energy supplier used and the tariffs offered.

This shows a saving of between £20.50 and £16.55 per day which represents a saving of 39.1%.

The increase in capital cost to provide the revised option over the original option is £1,302.50 which represents 2.5%. Using a saving of £16.55 per day this means that the pay back period is 79 working days.

As an industry can we afford not to change?

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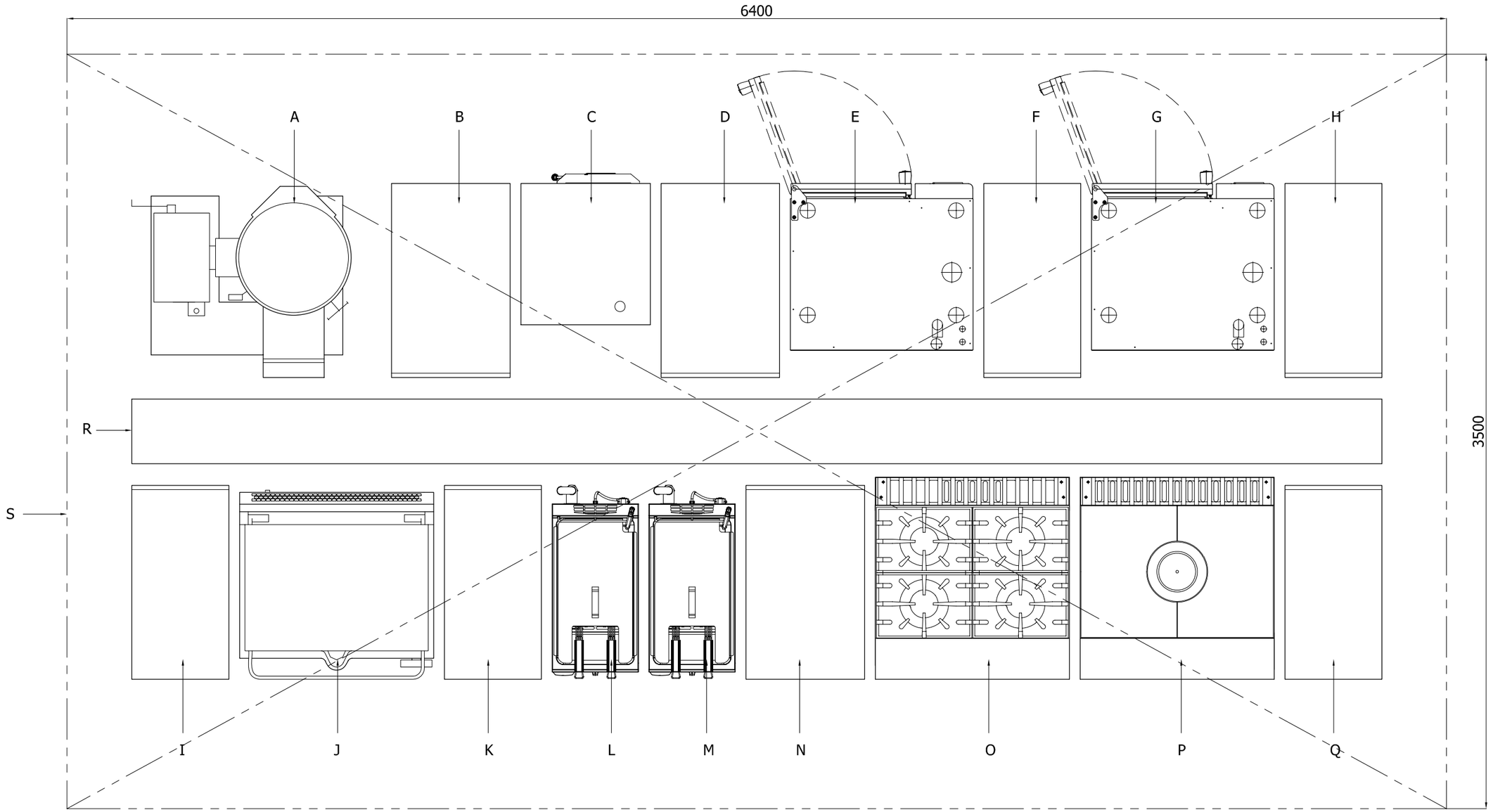
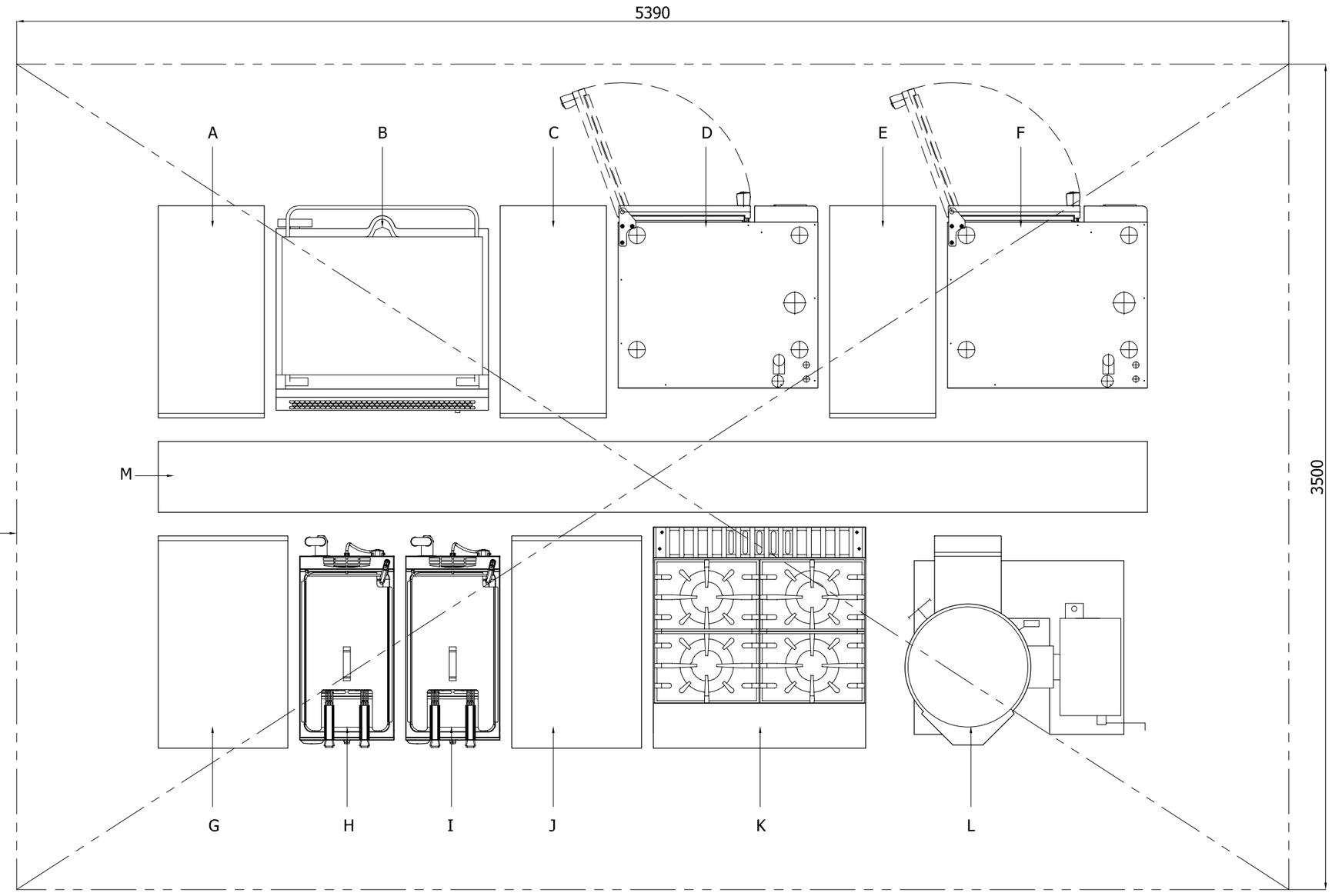


TRADITIONAL LAYOUT

EQUIPMENT SCHEDULE	
A	Electric Tilting Kettle
B	Set Down Bench
C	Electric Pressure Steamer
D	Set Down Bench
E	Electric 6 Grid Combination Oven
F	Set Down Bench
G	Electric 10 Grid Combination Oven
H	Set Down Bench
I	Set Down Bench
J	Gas Bratt Pan
K	Set Down Bench
L	Gas Deep Fat Fryer
M	Gas Deep Fat Fryer
N	Set Down Bench
O	Gas Open Top Range
P	Gas Solid Top Range
Q	Set Down Bench
R	Service Distribution Unit
S	Ventilation Canopy

REVISED LAYOUT



EQUIPMENT SCHEDULE	
A	Set Down Bench
B	Gas Bratt Pan
C	Set Down Bench
D	Gas 6 & 10 Grid Stacked Combination Ovens
E	Set Down Bench
F	Gas 6 & 10 Grid Stacked Combination Ovens
G	Set Down Bench
H	Gas High Efficiency Fryer
I	Gas High Efficiency Fryer
J	Set Down Bench
K	Gas Boiling Table
L	Gas Tilting Kettle
M	Service Distribution Unit
N	Ventilation Canopy

SOCIAL, ENVIRONMENTAL AND ECONOMIC EFFICIENCY IN COMMERCIAL CATERING.

LIFE-CYCLE AND ENERGY COST CALCULATOR:

Appliance Details:

User Inputs:				
Oven Performance.				
	Preheat Energy		Kw/hr	Total amount of energy consumed by the appliance as it heats from ambient room temperature to a ready to cook condition.
	Idle Energy Rate		Kw/hr	The rate of energy consumed while the appliance is holding or maintaining a stabilized temperature.
	Heavy-Load Energy Efficiency		%	Efficiency is the percentage of energy delivered to the food product divided by the amount of energy consumed by the appliance during the heavy-load cooking test.
	Production Capacity		Kg/hr	Production capacity is the maximum production rate of an appliance while cooking a specified food product in accordance with the heavy-load cooking test.
	Average Water Consumption Rate		m^3/hr	Water consumption rate is the amount of water that the appliance consumes in an hour during the heavy-load cooking test.
Oven Usage.				
	Operating Hours per Day		Hrs/day	Operating hours is the number of hours that the appliance is used within a 24hr period and is taken into account for each of the results shown below.
	Operating Days per Year		Days/year	Operating days is the number of days that the appliance is used within a 12 month period and is taken into account for each of the results shown below.
	Number of Preheats per Day		Per Day	The number of preheats is the number of times that the appliance is heated up from ambient in a 24hr period and is taken into account for each of the results shown below.

Prepared by: David C Clarke FCSI

SOCIAL, ENVIRONMENTAL AND ECONOMIC EFFICIENCY IN COMMERCIAL CATERING.

LIFE-CYCLE AND ENERGY COST CALCULATOR:

Appliance Details:

	Amount of Food Cooked per Day		Kg/day	The amount of food cooked is the total amount cooked in a 24hr period and is taken into account for each of the results shown below.
Utility Cost and Lifespan.				
	Electric Cost per Kw/hr.		£/Kw/hr	The cost of electricity per Kw.
	Water / Sewer Cost per M³		£/m³/hr	The cost of water and sewage disposal based on a m³ of water consumed.
	Lifespan of Oven in Years		Years	Lifespan equals the number of years the appliance is expected to be in use. This will vary depending on the quality of the appliance, the operating environment and usage pattern.
		Calculate		

Results: Energy Cost.				
	Annual Energy Consumption Kw/hr.		Kw/hr	The total yearly energy consumption in Kw/hr.
	Annual Water Consumption M³.		m³/hr	The total yearly water consumption in m³.
	Annual Energy Cost	£0.00		The total cost of the energy used per year.
	Annual Water Cost	£0.00		The total cost of the water consumed and the sewage disposal per year.
	Lifetime Energy Cost	£0.00		The total cost of the energy used for the lifespan of the appliance.
	Lifetime Water Cost	£0.00		The total cost of the water consumed and the sewage disposal for the lifespan of the appliance.

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SOCIAL, ENVIRONMENTAL AND ECONOMIC EFFICIENCY IN COMMERCIAL CATERING.

LIFE-CYCLE AND ENERGY COST CALCULATOR:

Appliance Details:

Input Additional Costs.				
	Labour Costs.	£0.00		The total cost of the labour to use and clean the appliance over a twelve month period.
	Cost of Consumables.	£0.00		The total cost of the consumables required to operate and clean the appliance over a twelve month period.
	Maintenance Costs	£0.00		The average cost of the preventative maintenance and service costs of the appliance for a twelve month period.
	Disposal Costs per Year for Waste Generated	£0.00		The total disposal costs of the consumables used to operate and clean the appliance over a twelve month
	Initial Cost of the Oven.	£0.00		The total cost of procuring and installing the appliance including all transport costs etc.
	Disposal Cost of the Oven.	£0.00		The total cost of decommissioning and disposal of the appliance including all transport costs etc.
		Calculate		

Results: Total Life Costs.				
	Lifetime Energy Cost	£0.00		The yearly cost projected over the lifespan of the appliance.
	Lifetime Water Cost	£0.00		The yearly cost projected over the lifespan of the appliance.

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LIFE-CYCLE AND ENERGY COST CALCULATOR:

Appliance Details:

	Lifetime Labour Cost	£0.00		The yearly cost projected over the lifespan of the appliance.
	Lifetime Consumables Cost	£0.00		The yearly cost projected over the lifespan of the appliance.
	Lifetime Maintenance Cost	£0.00		The average yearly cost projected over the lifespan of the appliance.
	Lifetime Disposal Cost of Waste Generated	£0.00		The yearly cost projected over the lifespan of the appliance.
	Initial Cost of Oven	£0.00		Transferred from above.
	Disposal Cost Of Oven	£0.00		Transferred from above.
		Calculate		

Total Cost:	**£0.00**	The total estimated cost for procurement, operating, maintaining and disposal of the appliance over its full life-cycle. (Consideration should be given regarding a cradle to cradle procurement strategy as against a cradle to grave procurement strategy.)

The purpose of this calculator is to estimate the energy and life-cycle costs associated with the appliance.
Not only can it be used to compare two different models of the of the same appliance it can be used to compare two different appliances doing the same job.

The calculation is based on the procedure used by The Food Service Technology Centre in the USA.

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