CDIS-KARM

Design Consultants & Project Managers
In Catering & Associated Services

13 Lapwater Lane,
Holbeach, Spalding.
Lincolnshire. PE12 8ET
Tel: +44 (0) 1603 721701
Email: info@cdis-karm.com
Website: www.cdis-karm.com

USING TECHNOLOGY IN THE FOODSERVICE INDUSTRY TO MEET THE CLIENTS ECONOMIC, ENVIRONMENTAL & SOCIAL RESPONSIBILITIES

COOKING:

Cooking methods and habits, not technology represents the biggest potential for energy saving in the commercial kitchen; an American study has shown that some chefs use 50% more energy than others to cook the same meal. Chefs tend to leave hobs on full power to cook food for relatively short periods while using solid top hobs to boil products in the centre and simmer them by moving the pan to the edge of the heated area. By reviewing our methods of cooking and training our staff we could expect to make energy savings of around 60%, it is a matter of record that in a number of instances we only use 20% of the energy we pay for.

In real life this will not happen, so can we use technology within the design of the kitchen to discipline our staff and remove the possibility of wasting energy? At CDIS-KARM we believe this is an option, by using established technology together with Induction, accelerated cooking technologies and reviewing the production methods used while providing a good staff training programme then there is no reason why we cannot take that 60% energy saving for a spin. However a word of caution no one solution will meet all requirements and the design needs to be developed using a whole life cycle cost and performance strategy.

What is Induction Cooking? Induction technology has been in existence for more than 30 years and unlike other forms of cooking, heat is generated directly in the cooking vessel as opposed to being generated in the cooking appliance by using electrical elements or gas burners. The induction element is a powerful, high frequency electromagnet, with the electromagnetism being generated by sophisticated electronics in the coil located under the unit’s ceramic surface. When the cooking vessel is placed in the oscillating magnetic field that the coil is generating, the field transfers energy into the metal of the cooking vessel. That transferred energy causes the metal to become hot and heat the food. By controlling the intensity of the electromagnetic field, we can control the amount of heat being generated in the cooking vessel. For induction to work, cooking vessels manufactured of a ferrous metal must be used in order to sustain the required magnetic field.

An induction boiling table is faster and more energy efficient than a traditional electric boiling table and allows instant control of the cooking energy similar to a gas burner while providing a far more efficient transfer of energy than a gas flame. To better understand the difference between the heat sources:

The time required to boil one litre of water using 3Kwh of energy is as follows:-

- Induction 2 minutes 06 seconds
- Gas 3 minutes 40 seconds
- Electric 4 minutes 20 seconds

Energy used to deliver 1Kw of usable energy:-

	Connected load	Efficiency	CO_2 Emissions	Energy Cost
• Induction	1.19Kw	84%	0.51 kg/CO_2	0.101p
• Electric	1.67Kw	60%	0.72 kg/CO_2	0.142p
• Gas	2.22Kw	45%	0.41 kg/CO_2	0.089p

Because induction heats the cooking vessel itself, energy usage is greatly reduced as the majority of the heat generated passes directly into the food and is not wasted in heating the appliance or the surrounding air as shown in the time taken to heat one litre of water. From the running cost and environmental perspective just using the appliance energy usage natural gas in the United Kingdom is still the best option, however when we examine individual operations we achieve different results for example:-

Two natural gas solid top boiling tables used in a facility that operates for ten hours a day would use 137.8Kwh at a cost of £5.51p with CO_2 emissions of 25.49 kg/CO_2. While the same output could be achieved by using one four plate electric Induction boiling table using 30.8Kwh at a cost of £2.62p with CO_2 emissions of 13.24 kg/CO_2. In this case Induction is clearly the correct solution.

One natural gas open top burner used to provide 30Kwh a day would use 66.6Kwh at a cost of £2.66p with CO_2 emissions of 12.32 kg/CO_2. While one induction plate used to provide 30Kwh a day would use 35.7Kwh at a cost of £3.03 with CO_2 emissions of 15.35 kg/CO_2. In this case natural gas is the correct solution.

Another consideration to investigate at the design stage is how much of the menu can be cooked using steam instead of using induction, electric or gas boiling tables. Steam carries six times more energy than boiling water, so using saucepans on a boiling table is not the preferred option from an economic or environmental view point.

To further complicate the issue we must consider the quantities required and the other appliances available, it would not make sense to pan fry a hundred steaks in an hour using induction when we can cook them directly on the appliance. On the other hand it would be wrong to fire up a large appliance to cook two steaks an hour when we could cook them in a pan or on a contact grill. The energy usage for the complete operation has to be considered, in this case not just the cooking but also the washing-up of the pans.

It is becoming a must to consider and use the accelerated cooking technologies that are now available; this is often ignored because of the high connected energy load. What is often forgotten is the reduced cooking time. A 3Kw appliance used for 20 minutes uses 1Kwh while a 10Kw appliance used for 4 minutes uses 0.67Kwh. There are a number of other advantages that these technologies bring, we are only cooking when we have an order thus reducing food wastage, the customer is served with freshly prepared food of a consistent quality, appliances can often be programmed by the executive chef so the necessary skill base can be reduced at the point of service and in a number of cases the appliance can be fitted with a HACCP recording system.

When using induction and accelerated cooking technologies less heat is released via the appliances or directly into the kitchen, so it is highly likely that ventilation flow rates for extract and supply can be reduced. However it should not be forgotten that when food is

being cooked it will create grease laden vapours and smoke, also where there is incomplete degradation of certain organic materials carcinogenic fumes may be generated and these must be removed from the breathing zone of all staff and customers. Even if we are not cooking we still require twenty air changes per hour for food preparation, so the ventilation needs to be designed for all the catering areas and operations taking place using demand based technology.
General Considerations:

- Work to the smallest footprint possible – Every square meter of space will cost the client in excess of £1,500 to build without the equipment and up to £840 to refurbish without equipment when using an existing property. It should not be forgotten that for every 1.4m² used unnecessarily in the kitchen we have reduced the dining area by one seat which represents a daily income of between £35 and £100.
- To achieve the smallest footprint possible, ensure each appliance has multiple uses and the highest possible output for the footprint taken up.
- Select equipment that uses the least amount of energy per portion or meal and not on its connected load, while providing the lowest running cost and CO_2 emissions when examining its whole life-cycle model. (Remember the Landfill Tax; the UK government could police energy usage and CO_2 emissions in the same way.)
- Make sure that the food is cooked in the most energy and cost effective way while still meeting the paying customer's expectations.
- Select equipment and design systems that will minimise food wastage.
- Make sure that the design enables the operator to use a fully sustainable supply chain for the procurement of their food.

As previously stated, no one solution fits all and as can be seen from the above examples to deliver the perfect economic, environmental and social solution the foodservice consultant must investigate all energy sources and all the equipment that is available. Whilst we must use our previous experience, we must not be frightened to instigate change if after reviewing each of the operational requirements a more effective solution can be found that will meet the client's corporate responsibilities while meeting the paying customers' expectations.

Prepared by David C Clarke CFSP
For and on behalf of CDIS-KARM