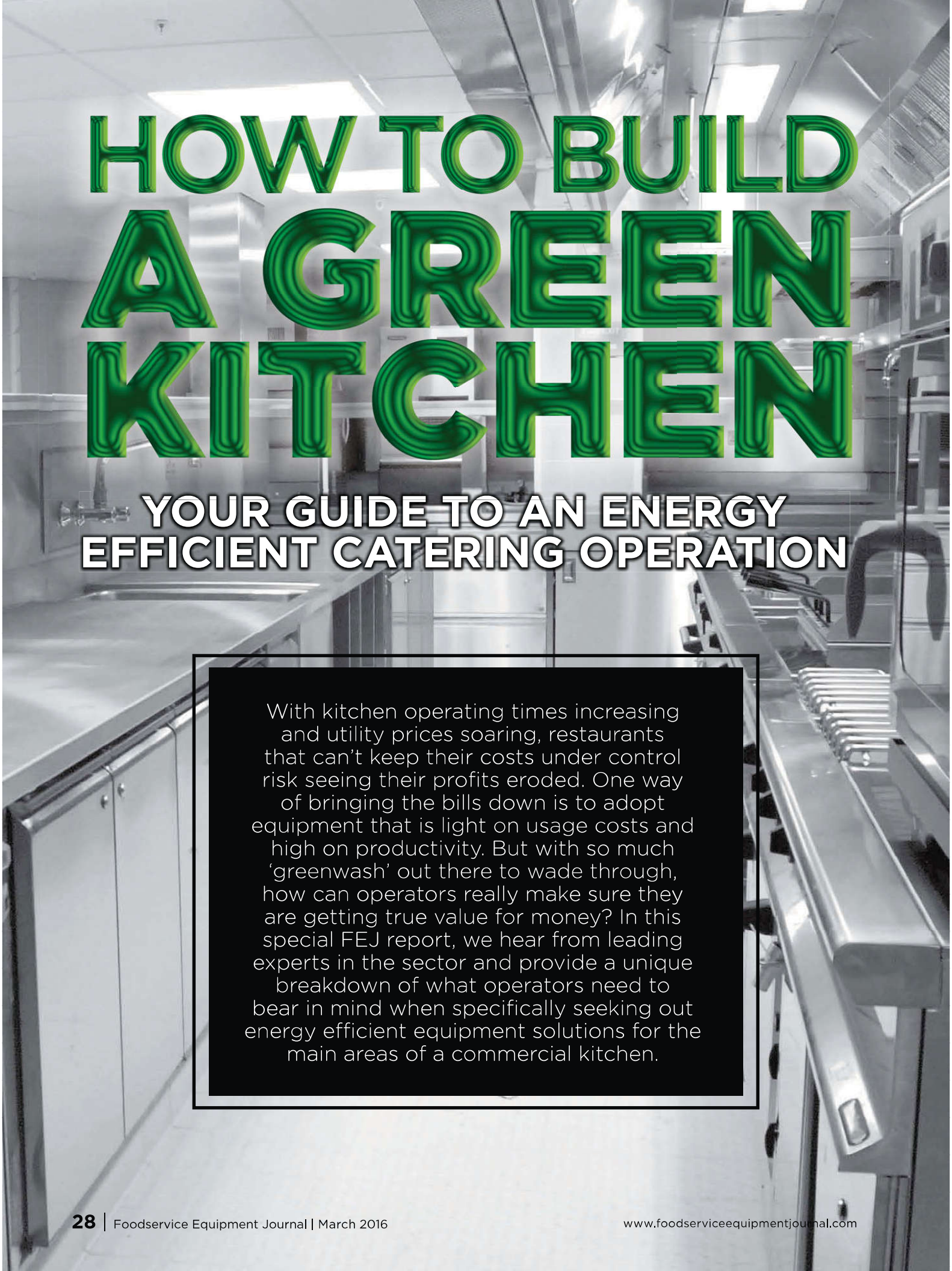


HOW TO BUILD A GREEN KITCHEN

YOUR GUIDE TO AN ENERGY EFFICIENT CATERING OPERATION

With kitchen operating times increasing and utility prices soaring, restaurants that can't keep their costs under control risk seeing their profits eroded. One way of bringing the bills down is to adopt equipment that is light on usage costs and high on productivity. But with so much 'greenwash' out there to wade through, how can operators really make sure they are getting true value for money? In this special FEJ report, we hear from leading experts in the sector and provide a unique breakdown of what operators need to bear in mind when specifically seeking out energy efficient equipment solutions for the main areas of a commercial kitchen.

COOKING SUITES

Cooking suites are the proverbial workhorses of most kitchens and, outside of refrigeration, they tend to be the pieces of equipment left running for longest. We've all heard tales of chefs switching on their ovens when they start their shift and not turning them off again until they leave, but aside from operating more economically there is still a lot more that operators can be doing to keep their energy bills down.

Given that cooking suite appliances are likely to be on all day, the main thing specifiers should look to do is consider the specific cooking processes that will be used day-in, day-out. This will provide an insight into how running costs can be reduced, says Stuart Flint, regional training and demonstration manager at Electrolux UK.

"For example, in the busiest kitchens it may be worth swapping gas hobs for an induction top as a way to avoid excess energy usage, since these can be more than 90% efficient. Of course, induction hobs also produce less heat, so less energy is used to lower the working temperature in the kitchen — providing a dual-benefit to kitchen operators."

£250m

THE AMOUNT THAT THE CARBON TRUST ESTIMATES THE INDUSTRY COULD SAVE FROM BETTER PRACTICES AND MORE EFFICIENT EQUIPMENT. THE FIGURE IS EQUIVALENT TO 30% OF TOTAL ENERGY USE.

3 KEY THINGS TO TAKE AWAY

- Match specific cooking processes to volume of usage to reduce energy where necessary, such as swapping gas hobs for an induction top.
- Consider flexible equipment that can be customised with efficiency in mind, such as pressure braising pans.
- Any inaccuracy when it comes to temperature control will lead to significant energy wastage over time.

Likewise, pressure cooking is another way that cooking suites can be customised with efficiency in mind, suggests Flint. "A pressure braising pan is a great example of how one piece of equipment can cater for a number of different needs — from roasting, browning, stewing, sautéing, boiling and braising — while offering significant savings in energy usage by giving operators the chance to literally turn the power off and continue cooking for almost an hour."

> "THE KEY THING TO CONSIDER WHEN SPECIFYING AN ENERGY EFFICIENT COOKING SUITE IS THE PRECISION WITH WHICH TEMPERATURE CAN BE KEPT"

Flint estimates that the newest type of tilting, boiling and braising pans on the market are capable of reducing energy consumption by up to 80% compared to traditional braising pans.

Another factor that can have a huge bearing on energy is temperature accuracy. With today's kitchens producing an ever-greater number of dishes, any inaccuracy when it comes to temperature control is a problem. Says Flint: "The key thing to consider when specifying an energy efficient cooking suite is the precision with which this can be kept. Not only does the precise temperature regulation in our Thermaline range give operators the control to ensure the best cooking results, but by allowing them to control the heat in 1°C increments, it ensures that no energy is wasted by heating equipment to a higher level than needed."

IN NO MORE THAN 50 WORDS, WHAT FEATURES OF A COOKING SUITE MOST DETERMINE HOW ENERGY EFFICIENT IT IS ACTUALLY GOING TO BE?

"There are various features that determine how energy efficient a cooking suite is going to be. The level of ventilation, the efficiency of any hobs or cooking tops and the precision of the temperature control can all impact a suite's efficiency."

COMBINATION OVENS

It is not an understatement to say that combi ovens have revolutionised the game for commercial kitchens, so much so that you'll struggle to find many mainstream operators that don't rely on one these days. There are lots of combi ovens to choose from and, in the main, most will do the job they are intended for. But how can you tell an efficient one from an inefficient one? Or ensure you are using it in the most efficient way?

Well, if you forget about quality and reliability for a second, the very first thing to get right is the capacity of the oven. "It is important that you choose the most appropriate size to match the requirements of the operation," advises Marcel Vican, marketing and sales director at Retigo. "An unreasonably big combi oven will lead to higher initial costs as well as higher operation costs. In contrast, a combi with a capacity that doesn't meet the facility's requirements is going to lead to the higher usage of standard equipment in the kitchen to make up for it."

Vican says that energy efficiency is always a result of multiple factors when it comes to combi ovens. Units equipped with heat exchangers will noticeably reduce steam generation-related costs, while waste heat recovery systems and drain cooling systems also boost efficiency. Advances in cooking functions have a significant role to play, too, allowing product to be cooked at optimal temperatures even with different items in the chamber.

Thermal insulation performance and thickness, as well as the quality of the parts used and the heating management mechanisms within the system, will also play a big role in the final energy consumption, says Vican. He notes that price and unit weight will almost always give some insight to the true insularity, reliability and energy-saving capabilities of an oven.

"In theory, touching the combi oven housing or door glass at temperatures above 200°C should give you a pretty clear indication of what you need to know about the quality of the insulation," he says. "Combi ovens equipped with a ventilator fan break will decrease the energy loss when the door is open, while special heat reflection door glass layers reflects the heat back to the oven. Double- or even triple-glazed door glass will lead to higher efficiency."

Other energy-based influencers that operators might not be aware of include the proximity of high temperature cooking equipment to the combi oven. If this is installed next to the oven's control panel side, the fan that cools the electronics must run on a higher speed, consuming extra energy. Maintenance — a necessity for any appliance — can genuinely make a difference to the efficiency of a combi. For instance, heating elements coated in lime-scale are going to consume considerably more energy to reach temperature.

WHAT COMMON MISTAKES CAN OPERATORS DO DIFFERENTLY TO MAKE THEIR COMBINATION OVENS MORE EFFICIENT?

"The first thing is not to make the wrong choice at the outset. A low quality, poorly insulated oven that is the wrong size for the operation and absent of any advanced energy-saving technologies won't achieve the required results. Secondly, not all chefs use their combi oven to its full potential. For example, in some restaurants small quantities are being cooked frequently. Cooking in higher loads less often saves energy. Take a restaurant serving 50-150 covers per day, for example. Cooking in a combi and holding it, or using a small holding cabinet, can result in significant time and energy savings. This also helps when dealing with peak hours as it means you can keep diners served quickly."

> "AN UNREASONABLY BIG COMBI OVEN WILL LEAD TO HIGHER INITIAL COSTS AND OPERATION COSTS"

3 KEY THINGS TO TAKE AWAY

- Choose the size of combi that best suits the frequency and volume of your cooking requirements, avoiding under-utilisation where possible.
- Beyond automated energy-saving cooking techniques, assess the thermal insulation quality and thickness of a combi oven.
- Keep the combi maintained in line with the manufacturer's guidelines. With electric, gas and steam thrown into the mix, inefficiencies can creep in if parts aren't working to their full potential.

REFRIGERATION

Electrically-powered refrigeration equipment operating for 24 hours a day, 365 days a year, has the potential to consume bags of energy. In this context, the focus needs to move to using less energy within refrigeration systems to reduce both running costs and carbon emissions.

Technology has moved forward considerably over the last few years and it is now highly practical and cost-effective to utilise the free waste heat from a catering refrigeration system to produce hot water for the kitchen. Integrating this type of waste heat recycling system provides immediate savings by displacing the costs of gas or electric heating — the energy to make hot water is constantly produced by a refrigeration system but is currently sent to waste!

3 KEY THINGS TO TAKE AWAY

- A one-size-fits-all approach won't work. Match the demands of the application with the most efficient systems available.
- Waste heat from a catering refrigeration system can now be used to produce hot water for a kitchen.
- The phase out of ozone-depleting refrigerants means operators should look at natural refrigerants to avoid obsolescence.

One of the companies at the forefront of delivering highly efficient refrigeration solutions is Green Cooling. Director, Garry Broadbent, says that refrigeration systems must be correctly specified and designed to match the needs of the application as they simply don't fit into a 'one-size-fits-all' philosophy.

The coldroom itself must be of adequate specification in terms of providing the highest level of practical insulation to reduce the cooling demand, but more importantly the 24/7/365 energy consuming electrically-powered refrigeration equipment must be efficient and correctly specified. The specification of the refrigeration design must take into account the demands of the application and match those demands with the most efficient system available. "A good example of this approach would be to look at a kitchen with three coldrooms and to consider the specification of a single centralised refrigeration system instead of three separate individual refrigeration units," explains Broadbent.

> "IT IS NOW HIGHLY PRACTICAL TO UTILISE THE FREE WASTE HEAT FROM A CATERING REFRIGERATION SYSTEM TO PRODUCE HOT WATER FOR THE KITCHEN"

"The single centralised unit would have the capability to operate efficiently on minimum load with an inverter-driven compressor system, modulating to very efficiently match the actual cooling load of each coldroom. This design can provide energy savings of more than 20% per year in comparison to the three individual standalone refrigeration units, and this is achieved simply by minimising unnecessary energy use by good design."

Operators can benefit from existing UK tax allowances on the capital cost of energy efficient refrigeration cabinets, but Broadbent notes that achieving the most optimal solution boils down to having a full understanding of a kitchen's refrigeration demands from the outset.

"A kitchen refrigeration energy survey would obviously include the cooling requirements, but also the kitchen's hot water requirements, as the objective of any project should be to achieve the maximum level of efficiency from the cooling and heating system as a whole by recycling the free waste heat from refrigeration to provide hot water."

HOW CAN AN OPERATOR 'FUTURE-PROOF' THEIR REFRIGERATION SYSTEMS TO ENSURE THEY REMAIN 'GREEN' FOR THE NEXT FIVE TO 10 YEARS?

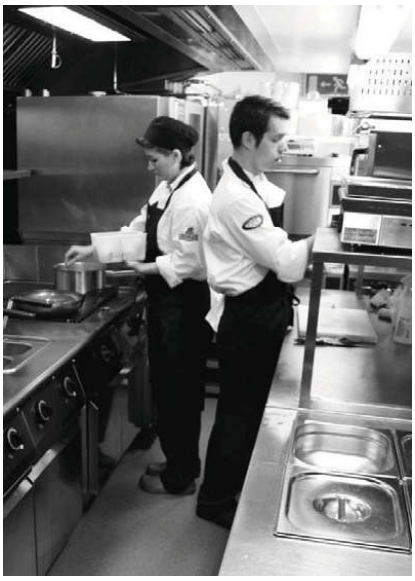
"This really is a key question and it could easily fall into the 'elephant in the room' category. From now until 2030 there will be an accelerating focus on removing ozone-depleting refrigerants from all industries and applications. Put simply, this means that refrigeration equipment could be installed now and yet during its operational life (to allow it to remain functional) it could require costly and time-consuming modifications or at worst become obsolete due to the refrigerant used within the system being phased out. A number of high ozone-depleting refrigerants are used within foodservice refrigeration systems, so operators can 'future proof' their installations by simply selecting systems with a natural refrigerant that does not present the risk of phase-out."

KITCHEN EXTRACTION & FILTRATION

According to the Carbon Trust, ventilation systems account for 18% of a kitchen's energy consumption, so extraction and filtration is naturally a major component for any operator with designs on developing a green kitchen to consider.

All commercial kitchens within the UK have to comply with the DEFRA Guide, which lays out certain levels of filtration and odour control that must be adhered to if operators are to avoid a visit from their local EHO.

But when it comes to solutions that filter and control oil, smoke and grease, what kind of features should an operator be looking for with sustainability in mind? "The only really effective filtration method for the particulate phase of a commercial kitchen's exhaust is to use an electrostatic precipitator or ESP filter," insists Chris Jarman-Brown, global development manager at Purified Air.



3 KEY THINGS TO TAKE AWAY

- Site surveys will establish exactly which filtration system is required to match the habits and profile of the operator.
- Electrostatic precipitators will filter out oil, grease and smoke within the commercial kitchen exhaust to sub-micron levels.
- Regular servicing and maintenance will prevent filter systems from losing efficiency due to contamination.

WHAT IS THE MOST UNIQUE INNOVATION IN EXHAUST FILTRATION SOLUTIONS FROM AN ENERGY-SAVING PERSPECTIVE THAT IS AVAILABLE RIGHT NOW?

"If ozone is being used to control the malodours of any particular system then the operator should consider a unit that can mount outside of the extract duct. Purified Air's UVO range of units do just that and because the ozone is generated from the ambient air around the unit and not from the air inside of the extract duct, the unit stays cleaner for longer. This means less servicing will be needed to maintain the unit at its optimum efficiency."

> "IF OZONE IS BEING USED TO CONTROL THE MALODOURS OF ANY PARTICULAR SYSTEM THEN THE OPERATOR SHOULD CONSIDER A UNIT THAT CAN MOUNT OUTSIDE OF THE EXTRACT DUCT"

"We manufacture ESP units that have been exclusively designed to filter — down to sub-micron levels — the oil, grease and carbon particles (smoke) within the commercial kitchen exhaust. Our ESP units will filter out up to 98% of all particulates in the air that is drawn through them, the filtered particulates, collect on the plates within the ESP collection cell and slowly run down to collect in the sump at the bottom of the ESP unit ready to be cleaned out and disposed of."

Jarman-Brown says all that can be achieved with incredible efficiency. Its largest unit, for instance, only uses 50 watts or 0.2 amps of power, which is less than an old-fashioned 60 watt light bulb. And because of the way that it charges its collection plates, ozone is also generated.

Operators should start by carrying out a site survey so that the correct system can be specified for each individual system. Both cooking methods and the type of food being cooked will have a bearing on the system specified.

"As every kitchen is different, so too is the exhaust filtration and odour control system that will be needed," remarks Jarman-Brown. "Because of this, we have designed units to run within air flow parameters. The volume of the air travelling through the exhaust is measured in metres cubed per second, (M3/s) and depending on this flow rate different sizes of unit will be used."

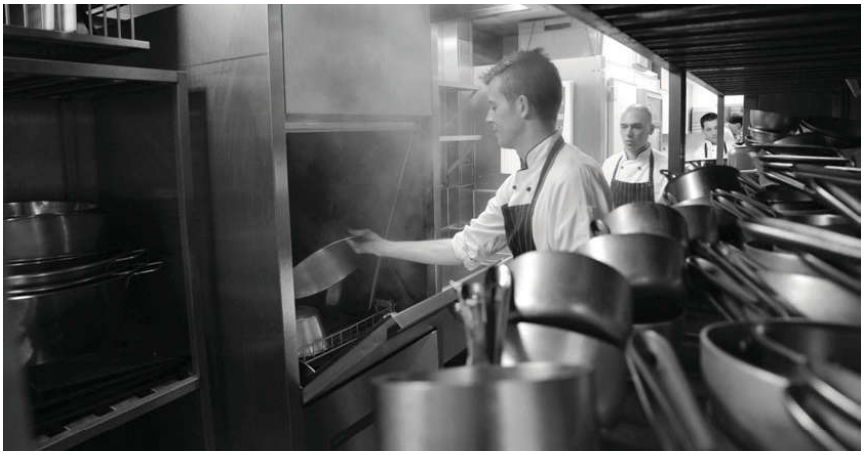
Once a system has been fitted it is paramount that it is regularly serviced or its efficiency will slowly reduce and eventually fail completely. These systems will then need deep cleaning to get them back up and running, which can often include replacement parts that have failed completely due to contamination. "A regularly-serviced filtration and control system will run very efficiently and cost-effectively, extending the life of not only the mechanical components of the system but also the passive filtration such as carbon filters," says Jarman-Brown.

WAREWASHING

Warewashing can be a significant consumer of energy for the average restaurant, but there is no single magic bullet that can lead to operating more sustainably. However, employing class-leading machines that are at the vanguard of energy efficiency, training staff on correct usage and safeguarding high performance and operational longevity by putting a sound service plan into effect, are key considerations that will have a marked effect on the green credentials of a site as well as its bottom line.

"Heating water is without doubt the number one use of energy, so it's important that a machine has compact wash tanks, which result in a very low water usage," advises Tim Bender, sales director at Hobart Warewashing UK.

"Of course, hot water is imperative for hygienic wash results and at the end of a wash cycle, waste water at 60°C is discharged along with the energy contained within it. A drain heat recovery system fitted to a machine can harness this energy and return it to the dishwasher. Via a heat exchanger, this reduces the energy required for reaching the final rinse temperature by up to 3,630 kWh per year, protecting the environment and saving operating costs of up to £689 per year," he adds.



> "IT'S IMPORTANT THAT A MACHINE HAS COMPACT WASH TANKS, WHICH RESULT IN A VERY LOW WATER USAGE"

Pre-planning and consideration of workflow is critical when designing a new warewashing area. It is also worth remembering that a dishwasher used for lighter duties may not need to have all the features that a machine being used eight hours a day might have.

"Allied to this, many warewashers are often switched on well before they are used and may sit on standby for long periods in between washes — in the majority of these cases it is more energy efficient to drain the machine down and refill again later in the day," says Bender. "Put simply, a machine that struggles to cope with volume at peak times, or one that regularly needs to be emptied and refilled, can ultimately cost the operator more in the long run than purchasing a more expensive machine at the outset," he adds.

If kitchens are going to safeguard a sustainable future, then they must rely on ever smarter machines. Hobart's undercounter FX, GX and GC machines, for instance, feature a soil sensor, which adjusts the rinse consumption depending on soil levels in the wash tank. The system ensures top quality results while offering customers a potential 30% reduction in operational costs.

"The sheer speed of R&D means that there will soon be machines on the market with ware sensing systems that can detect the exact contents of a machine — be it cutlery, glassware or plates — and adjust the wash accordingly." FEJ

3 KEY THINGS TO TAKE AWAY

- Train staff on the correct operational usage to ensure maximum performance with minimum energy wastage.
- The latest drain heat recovery systems will harness energy and return them to the dishwasher for re-use.
- Consider draining a machine down and refilling in instances where the equipment would otherwise be on standby for long periods of time.

ARE THERE ANY COMMON WAREWASHING MISTAKES THAT OPERATORS CAN AVOID TO IMPROVE THE ENERGY EFFICIENCY OF THEIR KITCHENS?

"One of the most important tips we can offer is to ensure efficient and correct loading of the baskets and racks. From our experience, many operators only part fill the baskets to 60% or 70% capacity, meaning the machine isn't being used to its fullest potential and energy is being wasted heating up water for a full load."