case studies

The waterless wok stove complete with automatic cut-off spout and timer tap was trialed extensively in an Asian kitchen within an RSL club.

The 200 seat Yum Cha style restaurant operates 364 days of the year with average covers of 275 per day. It has two, 2-burner wok stoves, both water cooled with rear swivel spouts. For the purpose of the trial, one wok stove was replaced with a waterless unit complete with cut-off spout and tap timer.

Savings

Cooling water	3,500 L/day
Cleaning water	2,500 L/day
Total water	6,000 L/day
Total cost saving	$5,110/year*
Replacement cost (installed)	$5,000
Payback	one year

*Based on 2004/05 Sydney Water charges; assumes Sewer Usage Discharge Factor of 70 per cent and Trade Waste Discharge Factor of 100 per cent on water saved.

Additional trials

The automatic cut-off spout was subject to an additional trial on a 2-burner, water-cooled wok stove in a Sydney restaurant. The 30 seat, Thai style restaurant operates 360 days a year with the majority of trade being take away meals. The restaurant typically serves 265 meals per day.

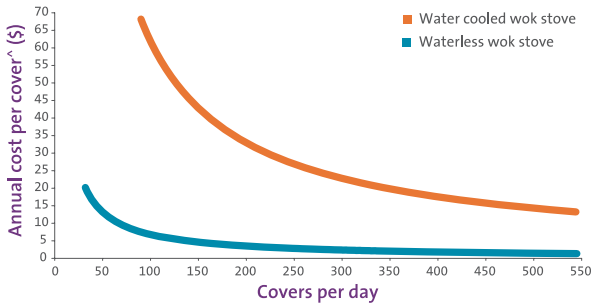
The restaurant has one, 2-burner wok stove and one, 3-burner wok stove. Both wok stoves are water cooled with rear swivel spouts. An automatic cut-off spout was fitted to the 2-burner wok stove and both cooling and spout water consumption was monitored.

Savings

Cleaning water from spout	550 L/day
Cost saving	$500/year§
Replacement cost (installed)	$350
Payback	less than one year

§Based on 2004/05 Sydney Water charges; assumes Sewer Usage and Trade Waste Discharge Factors of 95 and 80 per cent respectively.
(Typical percentages for 'stand alone' Asian style restaurants.)

Water related costs per year versus daily restaurant covers



^Based on 2004/05 Sydney Water charges. Assumes Sewer Usage and Trade Waste Discharge Factors of 95 and 80 per cent respectively.
*Cover is equivalent to a restaurant customer.

This graph demonstrates the potential cost reduction per cover* by eliminating wok stove cooling water and waste.

Advantages of a waterless wok stove

- Operating cost savings – reduced water use means lower water supply, sewer usage and trade waste discharge charges.
- Less maintenance – conventional units continually require maintenance to repair water leaks. A waterless wok stove eliminates these maintenance requirements and reduces down-time.
- Improved reliability – with less reliance on water, a waterless wok stove can function even if the water supply is interrupted. Cooling water is also a common cause of wok stove down-time due to leaks and corrosion.
- Longer equipment life – extensive damage to a water cooled wok stove cooktop occurs if the chef forgets to turn on the cooling water. Waterless wok stoves have a naturally air cooled system eliminating operator error.
- Reduced load on sewage treatment plants – by reducing the water flow, kitchen grease traps can operate more efficiently. This means less grease reaches our sewage treatment plants.
- Reduced demand on Sydney's limited water supply – eliminating wok stove cooling water and reducing other waste means less water is required per meal prepared. This greatly reduces the demand on Sydney's water supply.

Consider this...

There are approximately 2,000 wok stoves in Sydney Water's area of operations. If 5,000 litres of water can be saved from each unit per day by converting to a waterless wok stove, the restaurant industry profitability could increase by $9 million per year❖ and Sydney would save approximately 3,600,000,000 litres (3,600 ML) per year❦.

❖ after cost of installation
❦ assumes wok stove operation of 360 days per year.

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save water, money and the environment

A wok stove, a much used multi-functional piece of equipment, is typically the heart of any Asian restaurant's kitchen. While studies have shown that the majority of wok stoves are not water efficient, recent trials of waterless wok stoves have found water waste can be reduced by as much as 90 per cent with financial paybacks within one year.

The waterless wok stove

Conventional wok stoves

Conventional wok stoves use water for two main purposes:

1. Cooling – as wok stove burners generate high levels of heat for fast meal preparation, water jets are installed to enable cooling water to flow across the cook top to absorb this heat. This water which typically flows at three to four litres per minute and accounts for 2,500 to 3,500 litres per day then runs to waste.
2. Cleaning – the wok must be rinsed between each dish that is prepared. In addition, a small amount of water is used for cleaning the cook top. Typically, this cleaning and rinsing water accounts for 2,000 to 3,000 litres per day.

Above: A conventional wok stove

Eliminating the need for cooling water from a single wok stove can save up to $2,300 per year* in water, sewer usage and trade waste costs.

*Based on 2004/05 Sydney Water charges; assumes Sewer Usage and Trade Waste Discharge Factors of 95 and 80 per cent respectively. (Typical percentages for 'stand alone' Asian style restaurants.)

Design issues

Most Asian restaurants have at least one wok stove and many have two or more. Most stoves are similar in design and have common problems such as:

- Overheating – if cooling water is not flowing over the cook top, the wok stove can buckle, the chef can be burnt and the risk of a cooking oil fire increases.
- Control taps – the cooling jets and swivel spout/tap are often left on, even when the chef is not cooking and water is not needed.

Conventional wok stove designs are not water efficient and are costly to operate.

Above: A waterless wok stove

Water and cost savings

Detailed studies have shown that the average daily water use of a conventional wok stove is 5,500 litres per day. In Chinese restaurants, which account for up to 50 per cent of all Asian restaurants, it can be as much as 8,000 litres per day.

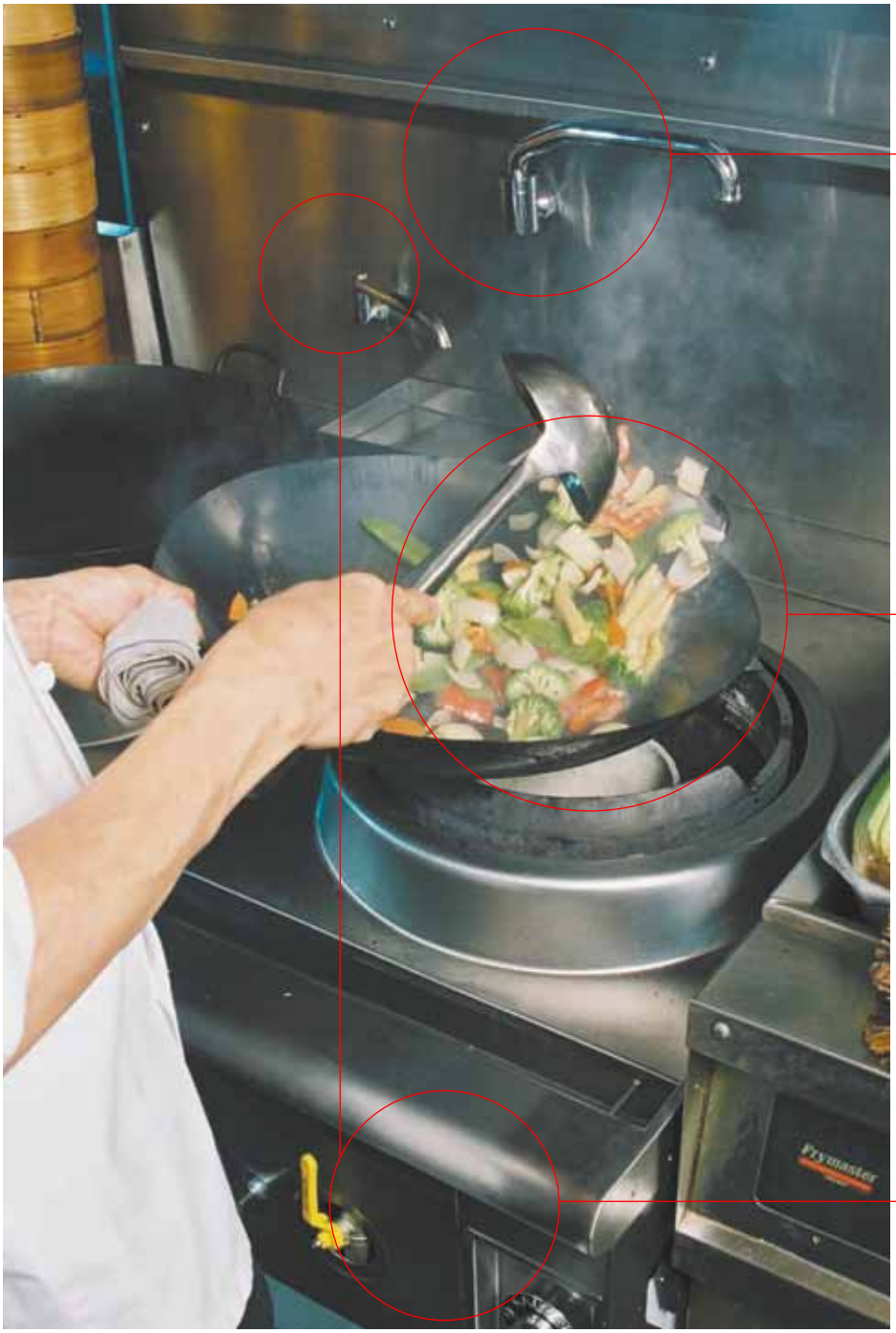
Research has shown that of this water use only 500 litres per day* (less than 10 per cent) is required for cleaning and food preparation.

By installing a more water efficient unit there is the potential to save 5,000 litres per day per wok stove, a total of 1,800 kL per year, and achieve savings of up to $4,500 per year#.

*Varies with customer demand and cooking style.

#Based on 2004/05 Sydney Water charges; assumes Sewer Usage and Trade Waste Discharge Factors of 95 and 80 per cent respectively. (Typical percentages for 'stand alone' Asian style restaurants.) Assumes wok stove operation of 360 days per year.

Key features of a waterless wok stove



Spout waste

While most wok stoves have one or more swivel laundry-type spouts to rinse the wok between dishes, they are often left running as chefs have no time to turn them off. The waterless wok stove is fitted with a spout that cuts off water supply when it is not in use.

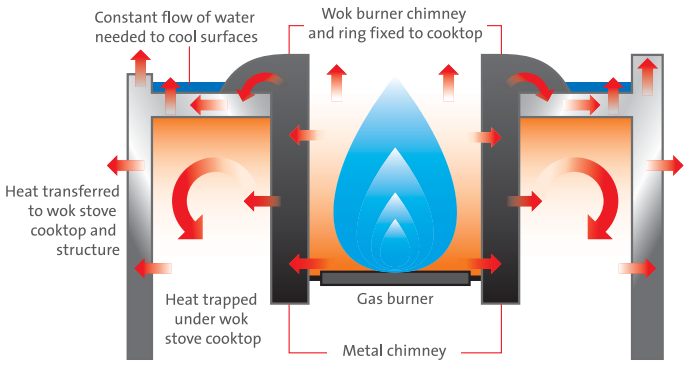
Stove overheating

The conventional wok stove thermally couples much of the gas burner heat in the body of the wok stove and traps heat under the cook top. The waterless wok stove has an air gap that insulates wok stove elements and ensures the release of this heat to the kitchen exhaust – eliminating the need for cooling water.

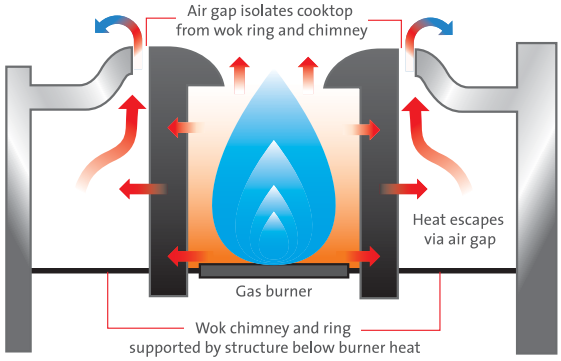
Timer tap

Some wok stoves have a spout or tap (hosecock) at the rear used to fill a small pot or reservoir. This is typically left running when the reservoir is full. The waterless wok stove uses a knee operated 'joy-stick' on a timer tap to limit both the flow rate and the duration of flow to this reservoir, preventing waste.

Water-cooled wok stove



Air-cooled wok stove



every drop counts








The cost of wasting water

This graph shows that by eliminating wok stove cooling water and waste, the flow rate to the wok stove is reduced minimising operating costs. eg Reducing the flow rate from 12 to 4 litres per minute, achieves a saving of $5,400 per year when paying water supply, sewer use and trade waste charges.

Waterless wok stoves cost approximately the same as conventional water cooled designs.