4.4 Steam Cookers

Overview

Steam cookers, also known as food steamers, are commercial kitchen appliances used to prepare foods in a sealed vessel that limits the escape of air or liquids below a preset pressure. There are two types of steam cookers: boiler-based and connectionless (i.e., without a central boiler connection).

Boiler-based steam cookers are connected to a central boiler, which delivers steam to the heating compartment. Steam that does not condense on the food escapes as a mixture of steam and condensate through a drain. In addition, some water is continuously bled off from the steam cooker to help reduce and manage scale buildup. Most manufacturers indicate that water supplied to the steam cooker should be under 50 parts per million (ppm) of total dissolved solids (TDS), or else bleed off should be increased.

Boiler-based steam cookers also use large amounts of water to further condense the steam and to cool (i.e., temper) the condensate water to less than 140°F before it enters the sewer system. Most boiler-based steam cookers offer a standby setting, which maintains the boiler in a ready-to-use state. In many instances, the condensate cooling water will continue to flow even when the steam cooker is in standby mode, particularly if the condensate cooling water is controlled by a valve that must be manually turned on and off. Some boiler-based steam cookers, but not all, do allow for the condensate cooling water to be turned off while the steamer is in standby mode. Steamers that are timer-controlled will automatically switch to standby mode at the end of the set cook time, minimizing the amount of water wasted while the unit is not in use.

Connectionless steam cookers can be either completely unconnected to any water supply or can be connected to a water supply to keep the water reservoir full. Connectionless steam cookers have an individual reservoir where water is heated below the steam trays to create the steam. These types of steam cookers are manually drained and refilled and do not require a dedicated drain for condensate or the addition of cooling or tempering water. A small amount of steam is vented through the top of the steam cooker, but what is not vented or condensed on the food returns as condensate to the reservoir. Connectionless steam cookers that are connected to a water supply have a float valve that maintains the water level in the reservoir, but unlike the boiler-based steam cookers, there is no continuous flow of water. This type of steam cooker is usually as efficient as other connectionless models that are not connected to a water supply.

Steam cookers can achieve lower idle energy rates and reduce the amount of steam needed and water used by reducing the temperature of the compartment during standby mode, not continuously supplying steam to the cooking compartment, and adding insulation. To address these efficiency advances in commercial steam cookers, the U.S. Environmental Protection Agency (EPA) and U.S. Energy Department's (DOE's) ENERGY STAR® has developed voluntary criteria to qualify energy-efficient—and thus, water-efficient—steam cookers. ENERGY STAR qualified models must meet minimum cooking efficiency and maximum idle energy rate requirements.

4.4 Steam Cookers

ENERGY STAR qualified steam cookers typically use at least 90 percent less water when compared to standard steam cooker models. ENERGY STAR qualified steam cookers use an average of 3 gallons of water per hour, while standard models typically use 40 gallons of water per hour.

Operation, Maintenance, and User Education

For optimal steam cooker efficiency, consider the following:

- Use batch production as opposed to staged loading of food pans (i.e., do not continuously open the door to load and unload food pans).
- In a multi-pan steamer, if possible, fill the steam cooker to capacity instead of cooking one pan at a time.
- Keep the doors closed while the steamer is operating.
- Use only as many steamer compartments as needed.
- Use a timer to ensure that the steam cooker returns to standby mode after use.
- Turn the steam cooker off during long periods of non-use. This will reduce water and energy use associated with keeping the steam cooker in stand-by mode.
- Fix and repair any leaks. Remove any deposit buildup from the boiler on boiler-based models.

Retrofit Options

There are currently no known retrofit options available on the market to increase the water efficiency of steam cookers.

Replacement Options

Steam cookers come in several sizes with varying numbers of boiler pans. Be sure to choose a steam cooker that is of the appropriate size for the steam cooking needs of the facility. A larger-than-necessary steam cooker can waste water and energy to heat unused compartment space.

When purchasing a new steam cooker or replacing an existing one, choose models that are ENERGY STAR qualified.[28]

Savings Potential

ENERGY STAR qualified steam cookers can use 90 percent less water and 50 percent less energy as standard steam cookers.[29] Traditional boiler-based steam cookers use as much as 40 gallons of water per hour. Switching to an ENERGY STAR qualified steam cooker can reduce that water use to 3 gallons of water per hour or less.

[28] U.S. Environmental Protection Agency (EPA) and U.S. Energy Department's (DOE's) ENERGY STAR. Commercial Steam Cookers. www.energystar.gov/index.cfm?fuseaction=find_a_product.showProductGroup&pgw_code=COC.
[29] *Ibid.*

Use ENERGY STAR's commercial kitchen equipment savings calculator[30] to estimate facility-specific water, energy, and cost savings for replacing an existing boiler-based steam cooker with an ENERGY STAR qualified model.

The Food Service Technology Center also has a life cycle and energy cost calculator, which can be used to calculate the savings potential from replacing many types of commercial kitchen equipment, including steam cookers.[31]

To estimate facility-specific water savings and payback, the facility can also use the following information.

Current Water Use

To estimate the water use of a steam cooker, identify the following information and use Equation 4-5:

- Water use rate of the existing steam cooker, typically provided in gallons per hour.
- Average daily use time.
- Days of facility operation per year.

Equation 4-5. Water Use of Steam Cooker (gallons per year)

= Steam Cooker Water Use Rate x Daily Use Time x Days of Operation

Where:

- Steam Cooker Water Use Rate (gallons per hour)
- Daily Use Time (hours per day)
- Days of Operation (days per year)

Water Use After Replacement

To estimate the water use after replacing an existing steam cooker with an ENERGY STAR qualified steam cooker, use Equation 4-5, substituting the water use of the ENERGY STAR qualified steam cooker for the water use of the existing steam cooker.

Water Savings

To calculate the water savings that can be achieved from replacing an existing steam cooker, identify the following information and use Equation 4-6:

- Current water use as calculated using Equation 4-5.
- Water use after replacement as calculated using Equation 4-5.

[30] EPA and DOE's ENERGY STAR. Savings Calculator for ENERGY STAR Qualified Commercial Kitchen Equipment. www.energystar.gov/ia/business/bulk_purchasing/bpsavings_calc/commercial_kitchen_equipment_calculator.xls.
[31] Food Service Technology Center. Commercial Foodservice Equipment Lifecycle Cost Calculator. www.fishnick.com/saveenergy/tools/calculators/.

Equation 4-6. Water Savings From Steam Cooker Replacement (gallons per year)

= Current Water Use of Steam Cooker – Water Use of Steam Cooker After Replacement

Where:

- Current Water Use of Steam Cooker (gallons per year)
- Water Use of Steam Cooker After Replacement (gallons per year)

Payback

To calculate the simple payback from the water savings associated with replacing an existing steam cooker, consider the equipment and installation cost of the ENERGY STAR qualified steam cooker, the water savings as calculated in Equation 4-6, and the facility-specific cost of water and wastewater.

By switching to an ENERGY STAR qualified steam cooker, facilities can also save a significant amount of energy. ENERGY STAR qualified steam cookers can use half as much energy as standard steam cookers.[32] This energy savings will further reduce the payback period and increase replacement cost-effectiveness.

Additional Resources

Alliance for Water Efficiency. Food Steamers Introduction. www.allianceforwaterefficiency.org/1Column.aspx?id=642&terms=steam.

East Bay Municipal Utility District. 2008. *WaterSmart Guidebook—A Water-Use Efficiency Plan Review Guide for New Businesses*. Pages FOOD7-8. www.ebmud.com/for-customers/conservation-rebates-and-services/commercial/watersmart-guidebook.

EPA and DOE's ENERGY STAR. Commercial Steam Cookers. www.energystar.gov/index.cfm?fuseaction=find_a_product.showProductGroup&pgw_code=COC#buying.

Food Service Technology Center (FSTC). Commercial Foodservice Equipment Life-cycle Cost Calculators. www.fishnick.com/saveenergy/tools/calculators/.

FSTC. Steamers. www.fishnick.com/savewater/appliances/steamers/.

[32] EPA and DOE's ENERGY STAR. Commercial Steam Cookers, *op. cit.*