How This Technology Saves Energy

Employing a self-contained steamer in the kitchen can translate to a saving of $500-$800 per year over a standard externally supported steamer*. With the elimination of the drain line and a near, closed-system design, the energy loss associated with condensate removal is minimized. The insulated cavity traps the steam and recycles the condensate, allowing maximum transfer of energy to the food product. Additional steam is generated on an "as-need" basis. The lack of a drain also translates to a drastic reduction in water usage.

*Externally supported steamers are units that require a water feed and condensate drain hookup in addition to the electrical connection.

Energy Efficiency Measures Used in Self-Contained Countertop Steamers

Beyond the capital cost, steamers should be evaluated with regard to long-term performance and operational costs characterized by cooking energy efficiency, production capacity, and water consumption. Look for these energy-saving features in self-contained steamers.

- **Forced convection mechanisms** such as fans and blowers enhance steam distribution within the cavity. Natural convection allows food products in the bottom and top pans to heat first with the middle pan(s) lagging in temperature. Mechanical convection aids steam dispersal, allowing not only even cooking but a shorter cook time.

- **Thermostatic controls** offer more flexibility with cooking temperatures. By regulating the amount of steam generated, the desired cavity temperature can be attained. This feature is used to hold food product at lower temperatures, an energy-saving novelty.

- **Boiler-less design** eliminates lime buildup. This feature reduces the cost associated with degradation of performance, chemicals for de-liming and the replacement of failed elements.

- **Built-in timers** to set the required cook time help to prevent overcooking food product, a feature that helps to save energy.
Benefits and Pitfalls

Manufacturers originally developed the self-contained concept for greater portability, but the design also increases energy efficiency. When steaming easy-to-cook products such as green peas, tests show the energy efficiencies are relatively the same for all steamers, within a ±5% difference. But when testing hard-to-cook food product such as potatoes, the energy saving could be immense. The table below shows the performance comparison between a standard externally-supported steamer and a self-contained steamer cooking full-loads of red potatoes.

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*Based on red potatoes as the food product and 12 hours per day, 30 days per month. Each day's usage consisted of 1 preheat, 7.5 hours of idle, and cooking for 3 hours at light-load capacity, and 1 hour at full-load capacity. Energy cost is based on $0.10 per kWh. These calculations exemplify the maximum performance gain of self-contained steamers over externally-supported steamers. Red potatoes are “tough” to cook due to the slow nature of condensation. Steam that fails to condense in an externally supported steamer goes out the drain, thus reducing energy efficiency. Self-contained steamers trap the steam and recycle the condensate.

Benefits

- Self-contained countertop steamers can match and or exceed the energy efficiency and productivity of externally supported steamers when cooking similar food product.
- When steaming hard-to-cook food product (i.e. potatoes), the energy efficiency of self-contained steamers are often double that of the standard, externally-supported units.
- Without water lines, the self-contained steamer is easy to install and ready to operate within minutes.
- Many self-contained, countertop steamers feature better insulation, minimizing conductive heat loss through the cavity walls.
- Self-contained, countertop steamers requires 2-3 gallons of water daily, a fraction of water usage compared to externally supported steamers.
- Most self-contained steamers do not feature a separate boiler nor submerged heating elements; therefore, do not require periodic de-liming. Labor costs are kept at a minimum and the need for expensive cleaning agents is eliminated.
Pitfalls

- The benefits of the self-contained steamers do come with a price. Compared to an average cost of a standard, externally-supported steamer, the self-contained units cost 15-30% more, ranging from $4500-$5500.
- Using the same water all day could lead to potential flavor transfer. Changing or refreshing the water maybe necessary when cooking distinct types of food (i.e. cabbage, broccoli).

For More Information

Visit Pacific Gas and Electric Company's Food Service Technology Center website.

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