### ENERGY STAR Griddle

###### Description

This measure applies to electric and natural gas fired high efficiency griddle installed in a commercial kitchen.

This measure was developed to be applicable to the following program types: TOS. If applied to other program types, the measure savings should be verified.

###### Definition of Efficient Equipment

To qualify for this measure the installed equipment must be an ENERGY STAR natural gas or electric griddle with a tested heavy load cooking energy efficiency of 70 percent (electric) 38 percent (gas) or greater and an idle energy rate of 2,650 Btu/hr per square foot of cooking surface or less, utilizing ASTM F1275. The griddle must have an Idle Energy Consumption Rate < 2,600 Btu/hr per square foot of cooking surface.

###### Definition of Baseline Equipment

The baseline equipment is an existing natural gas or electric griddle that’s not ENERGY STAR certified and is at end of use.

###### Deemed Lifetime of Efficient Equipment

The expected measure life is assumed to be 12 years[[1]](#footnote-1)

###### Deemed Measure Cost

The incremental capital cost for this measure is $0 for and electric griddle and $60 for a gas griddle.[[2]](#footnote-2)

###### Loadshape

Loadshape C01 - Commercial Electric Cooking

###### Coincidence Factor

Summer Peak Coincidence Factor for measure is provided below for different building type[[3]](#footnote-3):

|  |  |
| --- | --- |
| Location | CF  CF |
| Fast Food Limited Menu | 0.32 |
| Fast Food Expanded Menu | 0.41 |
| Pizza | 0.46 |
| Full Service Limited Menu | 0.51 |
| Full Service Expanded Menu | 0.36 |
| Cafeteria | 0.36 |

**Algorithm**

###### Calculation of Savings [[4]](#footnote-4)

###### Electric Energy Savings

ΔkWh = (ΔIdle Energy + ΔPreheat Energy + ΔCooking Energy) \* Days /1000

Where:

ΔDailyIdleEnergy =[(IdleBase \* Width \* Depth \* (HOURSday – (LB/(PCBase \* Width \* Depth)) – (PreheatNumberBase\* PreheatTimeBase/60)]- [(IdleENERGYSTAR \* Width \* Depth \* (HOURSday – (LB/(PCENERGYSTAR \* Width \* Depth)) – (PreheatNumberENERGYSTAR\* PreheatTimeENERGYSTAR/60]

ΔDailyPreheatEnergy = (PreHeatNumberBase \* PreheatTimeBase / 60 \* PreheatRateBase \* Width \* Depth) – (PreheatNumberENERGYSTAR\* PreheatTimeENERGYSTAR/60 \* PreheatRateENERGYSTAR \* Width \* Depth)

ΔDailyCookingEnergy = (LB \* EFOOD/ EffBase) - (LB \* EFOOD/ EffENERGYSTAR)

Where:

HOURSday = Average Daily Operation

= custom or if unknown, use 12 hours

Days = Annual days of operation

= custom or if unknown, use 365.25 days a year

LB = Food cooked per day

= custom or if unknown, use 100 pounds

Width = Griddle Width

= custom or if unknown, use 3 feet

Depth = Griddle Depth

= custom or if unknown, use 2 feet

EffENERGYSTAR = Cooking Efficiency ENERGY STAR

= custom or if unknown, use 70%

EffBase = Cooking Efficiency Baseline

= custom or if unknown, use 65%

PCENERGYSTAR = Production Capacity ENERGY STAR

= custom or if unknown, use 40/6 = 6.67 pounds/hr/sq ft

PCBase = Production Capacity base

= custom or if unknown, use 35/6 = 5.83 pounds/hr/sq ft

PreheatNumberENERGYSTAR = Number of preheats per day

= custom or if unknown, use 1

PreheatNumberBase = Number of preheats per day

= custom or if unknown, use 1

PreheatTimeENERGYSTAR = preheat length

= custom or if unknown, use 15 minutes

PreheatTimeBase = preheat length

= custom or if unknown, use 15 minutes

PreheatRateENERGYSTAR = preheat energy rate high efficiency

= custom or if unknown, use 8000/6 = 1333 W/sq ft

PreheatRateBase = preheat energy rate baseline

= custom or if unknown, use 16000/6 = 2667 W/sq ft

IdleENERGYSTAR = Idle energy rate

= custom or if unknown, use 320 W/sq ft

IdleBase = Idle energy rate

= custom or if unknown, use 400 W/sq ft

EFOOD = ASTM energy to food

= 139 w/pound

For example, an ENERGY STAR griddle with a tested heavy load cooking energy efficiency of 70 percent or greater and an idle energy rate of 320 W per square foot of cooking surface or less would save.

ΔDailyIdleEnergy =[400 \* 3 \* 2 \* (12 – (100/(35/6 \* 3 \* 2)) – (1 \*15/60)]- [320 \* 3 \* 2 \* (12 – (100/(40/6 \* 3 \* 2)) – (1\* 15/60]

= 3583 W

ΔDailyPreheatEnergy = (1\* 15 / 60 \* 16000/6 \* 3 \* 2) – (1\* 15/60 \* 8000/6 \* 3 \* 2)

= 2000W

ΔDailyCookingEnergy = (100 \* 139 / 0.65) - (100 \* 139 / 0.70)

= 1527 W

ΔkWh = (2000+1527+3583) \* 365.25 /1000

= 2597 kWh

###### Summer Coincident Peak Demand Savings

kW = ΔkWh/Hours \* CF

For example, an ENERGY STAR griddle in a cafeteria with a tested heavy load cooking energy efficiency of 70 percent or greater and an idle energy rate of 320 W per square foot of cooking surface or less would save

=2597 kWh/4308 \* 0.36

= 0.22 kW

###### Natural Gas Energy Savings

Custom calculation below, otherwise use deemed value of 149 therms.

ΔTherms = (ΔIdle Energy + ΔPreheat Energy + ΔCooking Energy) \* Days /100000

Where:

ΔDailyIdleEnergy =[(IdleBase \* Width \* Depth \* (HOURSday - LB/(PCBase \* Width \* Depth)) – (PreheatNumberBase\* PreheatTimeBase/60)]- [(IdleENERGYSTAR \* Width \* Depth \* (HOURSday – (LB/(PCENERGYSTAR \* Width \* Depth)) – (PreheatNumberENERGYSTAR\* PreheatTimeENERGYSTAR/60]

ΔDailyPreheatEnergy = (PreHeatNumberBase \* PreheatTimeBase / 60 \* PreheatRateBase \* Width \* Depth) – (PreheatNumberENERGYSTAR\* PreheatTimeENERGYSTAR/60 \* PreheatRateENERGYSTAR \* Width \* Depth)

ΔDailyCookingEnergy = (LB \* EFOOD/ EffBase) - (LB \* EFOOD/ EffENERGYSTAR)

Where (new variables only):

EffENERGYSTAR = Cooking Efficiency ENERGY STAR

= custom or if unknown, use 38%

EffBase = Cooking Efficiency Baseline

= custom or if unknown, use 32%

PCENERGYSTAR = Production Capacity ENERGY STAR

= custom or if unknown, use 45/6 = 7.5 pounds/hr/sq ft

PCBase = Production Capacity base

= custom or if unknown, use 25/6 = 4.17 pounds/hr/sq ft

PreheatRateENERGYSTAR = preheat energy rate high efficiency

= custom or if unknown, use 60000/6 = 10000 btu/h/sq ft

PreheatRateBase = preheat energy rate baseline

= custom or if unknown, use 84000/6 = 14000 btu/h/sq ft

IdleENERGYSTAR = Idle energy rate

= custom or if unknown, use 15900/6 = 2650 btu/h/sq ft

IdleBase = Idle energy rate

= custom or if unknown, use 21000/6 = 3500 btu/h/sq ft

EFOOD = ASTM energy to food

= 475 btu/pound

For example, an ENERGY STAR griddle with a tested heavy load cooking energy efficiency of 38 percent or greater and an idle energy rate of 2,650 Btu/h per square foot of cooking surface or less and an Idle Energy Consumption Rate < 2,600 Btu/h per square foot of cooking surface would save.

ΔDailyIdleEnergy =[3500 \* 3 \* 2 \* (12 - 100/(25/6\* 3 \* 2)) – (1\* 15/60))]- [(2650 \* 3 \* 2 \* (12 - (100/(45/6 \* 3 \* 2)) – (1\* 15/60)))]

= 11258 Btu

ΔDailyPreheatEnergy = (1 \* 15 / 60 \* 14,000 \* 3 \* 2) – (1\* 15/60 \* 10000 \* 3 \* 2)

= 6000 btu

ΔDailyCookingEnergy = (100 \* 475/ 0.32) - (100 \* 475/ 0.38)

=23438 btu

ΔTherms = (11258 + 6000 + 23438) \* 365.25 /100000

=149 therms

###### Water Impact Descriptions and Calculation

N/A

###### Deemed O&M Cost Adjustment Calculation

N/A

###### Measure Code: CI-FSE-ESGR-V02-160601

1. Lifetime from ENERGY STAR commercial griddle which cites reference as “FSTC research on available models, 2009” http://www.energystar.gov/index.cfm?fuseaction=find\_a\_product.showProductGroup&pgw\_code=COG [↑](#footnote-ref-1)
2. Measure cost from ENERGY STAR which cites reference as “EPA research on available models using AutoQuotes, 2010” http://www.energystar.gov/index.cfm?fuseaction=find\_a\_product.showProductGroup&pgw\_code=COG [↑](#footnote-ref-2)
3. Values taken from Minnesota Technical Reference Manual, ‘Electric Oven and Range’ measure and is based upon “Project on Restaurant Energy Performance-End-Use Monitoring and Analysis”, Appendixes I and II, Claar, et. al., May 1985 [↑](#footnote-ref-3)
4. Algorithms and assumptions derived from ENERGY STAR Griddle Commercial Kitchen Equipment Savings Calculator.http://www.energystar.gov/index.cfm?fuseaction=find\_a\_product.showProductGroup&pgw\_code=COG [↑](#footnote-ref-4)