

## Equipment Capital Budget Justification

### **Purpose:**

We are looking to expand our foodservice production capacity and need an additional, energy-efficient oven to allow this increase in production.

### **Brand and Model of the ovens:**

For the full-size gas convection oven, the Alto-Shaam Model ASC-4G was selected and for the full-size electric convection oven, the Duke Model 613-E1V was selected.

### **Initial cost of purchase:**

Comparing the initial costs of the gas ovens, the base efficiency oven which costs \$3042, has the lowest initial cost. Also in the gas ovens, the highest initial cost is \$6069 which is the cost of the Energy Star oven. The Alto-Shaam model has the median initial cost, \$4770, of the gas convection ovens. The initial costs of the electric ovens were in a similar ranking with the base efficiency oven carrying the lowest initial cost of \$2160. The highest initial cost of the electric ovens was the Energy Star oven, which is \$5121; the median initial cost was that of the Duke model which is \$3049. Although the initial cost is an important consideration for the purchase decision, long term costs as well as performance and usage specifications must be considered.

### **Gas vs. Electric:**

The gas ovens, as compared to the electric ovens, have higher initial costs, \$4770 for the Alto-Shaam model, \$3042 for the base efficiency gas oven, and \$6069 for the Energy Star gas oven, versus \$3049 for the Duke model, \$2160 for the base efficiency electric oven, and \$5121 for the Energy Star electric oven. The gas ovens have a significantly lower heavy-load energy efficiency percentage than the electric ovens, 42.0% for the Alto-Shaam model, 30.0% for the base efficiency gas oven and 45.0% for the Energy Star gas oven versus 71.4% energy efficiency for heavy-loads in the Duke model, 65.0% for the base efficiency electric oven, and 73.0% for the Energy Star electric oven. While the gas and electric ovens differ in the heavy-load energy efficiency, all six ovens are quite comparable in their production capacities. The production capacities of the gas ovens are 82.7 lbs/hr for the Alto-Shaam model, 70.0 lbs/hr for the base efficiency gas oven, and 83.0 lbs/hr for the Energy Star gas oven. Similarly, the production capacities of the electric ovens are 84.1 lbs/hr for the Duke model, 70.0 lbs/hr for the base efficiency electric oven and 82.0 lbs/hr for the Energy Star electric oven. Although the gas ovens have higher initial costs and a decreased energy efficiency with heavy-loads, they do have lower lifetime energy costs than the electric ovens. The lifetime energy costs of the gas ovens are \$12684 for the Alto-Shaam model, \$12624 for the base efficiency gas oven, and \$8340 for the Energy Star electric oven, as compared to the lifetime energy costs of the electric ovens, \$18228 for the Duke model, \$19020 for the base efficiency electric oven, and \$14676 for the Energy Star electric oven. Among the six ovens, the gas ovens do have higher lifetime maintenance costs as compared to the electric ovens. The lifetime maintenance costs of the gas ovens are \$1440 for the Alto-Shaam model, \$1800 for the base efficiency gas oven, and \$1164 for the Energy Star gas oven as compared to the electric ovens, \$1260 for the Duke model, \$1440 for the base efficiency electric oven, and \$1056 for the Energy Star electric oven. Comparing the total lifetime costs of all six ovens, the gas ovens are lower than the electric ovens in this category and by a significant margin. The total lifetime costs of the gas ovens are \$18894 for the Alto-

Shaam model, \$17466 for the base efficiency gas oven, and \$15573 for the Energy Star gas oven as compared to the total lifetime costs of the electric ovens which are \$22537 for the Duke model, \$22620 for the base efficiency electric oven, and \$20853 for the Energy Star electric oven. Based solely on the total lifetime costs, the gas ovens seem to be more economical than the electric ovens, yet they are also less energetically efficient for handling heavy-loads. The final purchasing decision will be based on the greatest needs of the foodservice organization.

#### **Performance-Efficiency & Production Capacity:**

Among the gas ovens, the heavy-load energy efficiencies are all fairly comparable. The Energy Star oven has the highest heavy-load energy efficiency of 45.0% while the Alto-Shaam model has a heavy-load energy efficiency of 42.0%. Ranking last in this performance specification is the base efficiency oven which has a heavy-load energy efficiency of 30.0%. The three electric ovens all rank proportionally higher than the gas ovens in this category. The Energy Star oven is again most efficient with energy usage in heavy loads, 73.0% efficient, while the second-most energy efficient for heavy loads is the Duke model at 71.4% efficiency. The least energy efficient electric oven for heavy loads is the base efficiency oven which is 65.0% efficient. Another important performance specification is the production capacities of the ovens. All six of the ovens were fairly comparable in this category, however in both the gas and electric ovens, the base efficiency ovens had the lowest production capacity, both 70 lbs/hour. Among the gas ovens, the highest production capacity was 83.0 lbs/hr and this was by the Energy Star oven. The median production capacity in the gas ovens was 82.7 lbs/hr, produced by the Alto-Shaam model. As for the electric ovens, the highest production capacity was 84.1 lbs/hr, which was produced by the Duke model. The median production capacity in the electric ovens was 82.0 lbs/hr which was generated by the Energy Star oven.

#### **Lifetime Cost-Energy, Maintenance, Total:**

Comparing the lifetime energy costs of the six ovens, the three gas ovens appear to have a lower cost than the electric ovens. The lowest lifetime energy cost among the gas ovens is \$8340 which is held by the Energy Star oven. Conversely, the highest lifetime energy cost of the gas ovens is \$12684 which is the cost of the Alto-Shaam model. The median lifetime energy cost is \$12624 and this is the cost of the base efficiency gas oven. The lifetime energy costs of the electric ovens are significantly higher although the lowest lifetime energy cost among these ovens is \$14676, which is the Energy Star oven. The median lifetime energy cost among the electric ovens is the Duke model, \$18228, while the highest lifetime energy cost is \$19020, which is the base efficiency oven. Lifetime maintenance cost is another important costing specification to consider in the purchase decision. All six ovens were fairly comparable in this category, with only the base efficiency gas oven as the more expensive outlier at \$1800 for lifetime maintenance costs. The second highest lifetime maintenance cost among the gas ovens was \$1440 which is the Alto-Shaam model. The lowest lifetime maintenance cost among the gas ovens is that of the Energy Star gas oven and it is \$1164. Among the electric ovens, the highest lifetime maintenance cost is \$1440, which is again the base efficiency oven. The median lifetime maintenance cost is \$1260 which is that of the Duke model and the lowest lifetime maintenance cost is \$1056 which is that of the Energy Star electric oven. The total lifetime cost is a significant and important costing specification that allows a quick snapshot of the estimated costs of each of these ovens over the course of their working lifetime. Comparing the gas ovens with the electric ovens, the electric ovens do have the higher total lifetime costs which appears to be due to the higher lifetime energy costs since lifetime

maintenance costs were fairly similar among all six ovens. The lowest total lifetime cost among the gas ovens was \$15573 which is that of the Energy Star oven. The median total lifetime cost among the gas ovens was \$17466 which is that of the base efficiency oven, and the highest total lifetime energy cost is the Alto-Shaam which costs \$18894. The electric ovens do have a higher total lifetime cost, yet all three ovens have similar numbers in this category. The lowest total lifetime cost is the Energy Star electric oven, costing \$20853. The median total lifetime cost is that of the Duke model, costing \$22537, and the highest total lifetime cost among the electric ovens is the base efficiency oven, costing \$22620.

**Purchase Decision and Justification:**

The Energy Star gas oven is the oven selected for purchase. Although this oven does have a higher initial cost, \$6069, than the initial cost of the other two gas ovens, \$3042 and \$4770 and any of the electric ovens, \$2160, \$3049, and \$5121, it also gives the highest production capacity among the gas ovens, 83.0 lbs/hour, and the second highest production capacity of all six of the ovens. The Energy Star gas oven is also the most energetically efficient for handling heavy-loads, 45.0% efficiency, among all of the gas ovens. Of the gas ovens, the Energy Star oven has the lowest lifetime energy cost, \$8340, the lowest lifetime maintenance cost, \$1164 and the lowest total lifetime cost of \$15573. This oven would be amply able to handle 100 servings of 4-8 oz of convection-baked foods given its production capacity of 83.0 lbs/hour. The weight of 4-8 oz of convection-baked food is approximately 0.25-0.5 lbs, multiplied by 100 servings is 25-50 lbs. Given the Energy Star oven's production capacity of 83.0 lbs/hour, cooking 25-50 lbs of convection-baked food should be easily achieved in less than one hour. Since peak foodservice production periods often extend for 2-3 hours, purchasing and utilizing this Energy Star gas oven may allow for an increased output for our foodservice, doubling, even potentially tripling our output which would more than justify the purchase of the oven. For all of the above listed reasons, the Energy Star gas oven is an economical as well as ideal production choice for our foodservice.

## Gas Convection Oven Life-Cycle Cost Calculation

Courtesy of Pacific Gas and Electric Company

Food Service Technology Center

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	<b>Alto-Shaam Model ASC-4G Oven</b>	<b>Base Efficiency Oven</b>	<b>Energy Star Oven</b>
<b>Performance:</b>			
Oven Size:	Full Size	Full Size	Full Size
Preheat Energy: (Btu)	8633	19000	11000
Idle Energy Rate: (Btu/h)	21013	18000	11758
Heavy-Load Energy Efficiency: (%)	42.0	30.0	45.0
Production Capacity: (lbs/h)	82.7	70.0	83.0
<b>Usage:</b>			
Operating Hours per Day: (h/day)	12.0	12.0	12.0
Operating Days per Year: (d/year)	365	365	365
Number of Preheats per Day: (#/day)	1	1	1
Pounds of Food Cooked: (lbs/day)	100.0	100.0	100.0
<b>Utility Cost and Lifespan:</b>			
Gas Cost per Therm: (\$/therm)	\$1.000	\$1.000	\$1.000
Lifespan of Oven: (years)	12.0	12.0	12.0
Discount Rate: (%/year)	0.00	0.00	0.00
<b>Other:</b>			
Maintenance Costs per Year:	\$120	\$150	\$97
Initial Cost of Oven:	\$4770	\$3042	\$6069
<b>Results:</b>			
Annual Energy Consumption: (Therms)	1057	1052	695
Average Energy Consumption Rate: (Btu/h)	24138	24010	15879
Annual Energy Cost:	\$1057	\$1052	\$695
Lifetime Energy Cost:	\$12684	\$12624	\$8340
Lifetime Maintenance Cost:	\$1440	\$1800	\$1164
Initial Cost of Oven:	\$4770	\$3042	\$6069
<b>Total Lifetime Cost:</b>	<b>\$18894</b>	<b>\$17466</b>	<b>\$15573</b>

## Electric Convection Oven Life-Cycle Cost Calculation

Courtesy of Pacific Gas and Electric Company

Food Service Technology Center

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	<b>Duke Model 613-E1V Oven</b>	<b>Base Efficiency Oven</b>	<b>Energy Star Oven</b>
<b>Performance:</b>			
Oven Size:	Full Size	Full Size	Full Size
Preheat Energy: (kWh)	1.70	1.50	1.00
Idle Energy Rate: (kW)	1.90	2.00	1.40
Heavy-Load Energy Efficiency: (%)	71.4	65.0	73.0
Production Capacity: (lbs/h)	84.1	70.0	82.0
<b>Usage:</b>			
Operating Hours per Day: (h/day)	12.0	12.0	12.0
Operating Days per Year: (d/year)	365	365	365
Number of Preheats per Day: (#/day)	1	1	1
Pounds of Food Cooked: (lbs/day)	100.0	100.0	100.0
<b>Utility Cost and Lifespan:</b>			
Electric Cost per kWh: (\$/kWh)	\$0.130	\$0.130	\$0.130
Electric Demand Cost per kW: (\$/kW)	\$0.00	\$0.00	\$0.00
Lifespan of Oven: (years)	12.0	12.0	12.0
Discount Rate: (%/year)	0.00	0.00	0.00
<b>Other:</b>			
Maintenance Costs per Year:	\$105	\$120	\$88
Initial Cost of Oven:	\$3049	\$2160	\$5121
<b>Results:</b>			
Average Energy Consumption: (kWh)	11687	12193	9406
Average Energy Consumption Rate : (kW)	2.7	2.8	2.1
Annual Energy Cost:	\$1519	\$1585	\$1223
<b>Lifetime Costs:</b>			
Lifetime Energy Cost:	\$18228	\$19020	\$14676
Lifetime Maintenance Cost:	\$1260	\$1440	\$1056
Initial Cost of Oven:	\$3049	\$2160	\$5121
<b>Total Lifetime Cost:</b>	<b>\$22537</b>	<b>\$22620</b>	<b>\$20853</b>