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MANAGEMENT OF ENERGY CONSUMPTION

by
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In response to the three (3) questions posed by the Society:

A. What are the latest practical ways to increase energy utilization effectiveness in the food industry?

B. What will be the critical areas in food industry energy utilization five (5) years from now? How can we deal with them?

C. As petroleum based energy supplies dwindle, will we be using more man power and less machine power in the food industry over the next ten (10) years?

QUESTION A: WHAT ARE THE LATEST PRACTICAL WAYS TO INCREASE ENERGY UTILIZATION EFFECTIVENESS IN THE FOOD INDUSTRY?

I suppose this question can be approached in many ways, but in my view there is one approach which has proven to be effective. This approach consists of a thorough Energy Management Program, implemented by appointment of a full time Energy Management Team or at least one person with prime responsibility. The first thing this team/person should tackle is an Energy Audit of each of the stores involved, so that the company has a complete and comprehensive picture of power demand and consumption for each store. This audit is a painstaking and time consuming process, that requires the services of the utility companies in conjunction with the management team.

After this has been accomplished, there are many policy and merchandising items that the team will have to consider to formulate their energy program. Many of the items can be incorporated into the program and implemented without use of special equipment but I'll talk more about these in just a minute. After all of these steps have been accomplished, the team may then decide upon a final step in accomplishing a total energy program.

This final step may be accomplished by the use of an electronic controller which acts essentially as a power monitor, actually shutting off and turning on equipment by priority. Since refrigeration is the main draw on electricity, the job of the controller is chiefly to regulate refrigeration activity whenever possible, based on outside temperature and the relative humidity of the case environment. Very simply, what this system does, is to cycle operation of all in-store equipment that requires electricity based on need and in accord with certain priorities.

Basically a good controller sheds loads to control KW demand and duty cycles equipment wherever possible, always considering the condition of the product and over-riding certain portions of the program to protect the product. This "Duty Cycle" program accomplishes the savings of the KW hour consumption.

Now, the following is a list of items to be considered by the Energy Management Team: (Areas that can show improvement without high cost equipment.)

1. Institute good housekeeping (i.e. shut off unnecessary lights, establish a good cleaning program for equipment, cases, condensers, etc.) button up the building--weather stripping on doors.
2. Control unnecessary door openings - Install McGuire doors or equivalent on all exterior receiving doors.
3. Control the bad habit of leaving cooler and freezer doors open when not necessary. If you can't control it--install light weight flexible doors.
4. Control case loading - Observe manufacturer's load levels. This is a very serious condition and is found in nearly every supermarket.
5. If compactors are used - Control compactor door closing. Many compactors have safety switches on doors in order to operate them safely. These switches can be found bypassed in many stores and the doors left open causing energy waste in summer by unnecessary admission of warm humid air and in the winter by extreme cold air.
6. Lighting - Be concerned with general condition of lighting fixtures, good cleaning and lamp replacement programs are required. Eliminate incandescent lighting wherever possible; since this is the most expensive type of lighting. Reduce total amount of lighting wherever possible; consider refixturing where necessary to accomplish proper lighting with less fixtures. This is not an insignificant area--in 1975 we used this technique only in 18 stores and saved 1,976,231 KWH. By eliminating nearly all incandescent hi-hats, and all

incandescents in back rooms and coolers, we reduced our electric bill by 7.3 percent or \$59,000.

7. Heat domestic hot water from discharge heat of refrigeration condensing units (reclaimed heat).
8. Heat Reclamation - In many cases heat reclamation has accomplished 100 percent heat savings in winter. Use of heat reclamation in the summer for dehumidification (re-heat) reduces tonnage required for air conditioning systems as well as reducing tonnage requirements for refrigeration equipment by keeping BTU case requirements at design conditions. If you stage your A/C system to 3 - 15 ton or 4 - 15 ton units or whatever, you really maximize savings.
9. Use underground return air for air conditioning and heating systems wherever possible. This method accomplishes several things; eliminates cold aisles, establishes more even air flow in sales area, reduces tonnage requirement in air conditioning systems, eliminates stratification, lowers heat requirements in the winter. Our first use of underground returns was in a new store in 1976--during the first year we used 33 hours of make-up heat on 1st stage and 3 hours on two stages plus A/C - 2 / 15 hp and 1 / 30 hp - 30 hp never went on.
10. Control amount of heat in storage area - Convert unit heaters to reclaim coil if capacity is available.
11. Control anti-condensate heaters according to RH in sales area (special equipment is required to accomplish this.)
12. Control temperature limits summer and winter - Install special nonadjustable fixed temperature thermostats to accomplish this.

13. Insulation - Roof, ceilings, walls, 15 ft. in on floors - 4" styrofoam below pad. Check case insulation and replace improperly insulated cases or reinsulate if feasible.

14. Control use of fresh air - Most store air conditioning and heating systems have fresh air intake provisions. Automatically controlled fresh air intakes can be advantageous. In most applications, these fresh air dampers either have manual or improper control, causing extreme waste of energy in summer when dampers are left open when extreme high humidity conditions exist in outside ambient, and during winter dampers are left open when zero degree weather conditions exist.

15. And finally, when you've done everything else you can employ the use of an electronic controller as mentioned before. This type of controller is a good option in older stores to complete the Energy Management Program. Many of the items listed cannot be accomplished properly without this equipment. There are any number of black box systems available and we are currently experimenting with them. My personal view is that any choice of equipment should be based on maximizing savings, insure protection, consider store requirements and payback period. But whether or not you use an electronic controller or not the key word is still CONTROL.

QUESTION B: WHAT WILL BE CRITICAL AREAS IN THE FOOD INDUSTRY IN ENERGY UTILIZATION FIVE YEARS FROM NOW AND HOW CAN WE DEAL WITH THEM?

I don't think the critical areas will be any different in five (5) years than they are right now. I do think the critical period, rather than critical areas, is right now. I feel that the big change that we might see in the next five (5) years, is a possible restriction

placed upon us in the amount of KW hours that we will be allowed to consume per month without penalty. Therefore, I think it is imperative that we all accomplish a total energy management program as soon as possible.

If we do this immediately, it will place us in a very good position to cope with any restrictions that may be placed upon us. I feel that those of us who do not accomplish a good program will be faced with the possibility of curtailing equipment usage and/or store open hours in order to comply with some of these future restrictions. Result - someone could have a very serious competitive disadvantage.

SUMMARY OF QUESTIONS A & B

1. Develop Energy Management Team.
2. Complete a store by store audit of energy consumption.
3. Develop a good Energy Management Program.
4. Implement these as soon as possible.
5. Retrofit existing stores to meet energy saving requirements:
 - *Get rid of incandescent lighting
 - *Close doors
 - *Insulate
 - *Cleaning Program
6. Future Stores - Accomplish as much energy savings as possible through proper store design, engineering and selection of equipment. This will decrease the scope of the total Energy Management Program required in future stores. (We have early evidence that controllers are not necessary when proper design is employed).

QUESTION C: AS PETROLEUM BASED SUPPLIES
DWINDLE, WILL WE BE USING MORE MAN POWER
AND LESS MACHINE POWER IN THE FOOD INDUS-
TRY IN THE NEXT TEN YEARS?

My feelings on this question are that if we implement a good Energy Management Program and accomplish the reduction in KW hours consumption that is possible, that we will be able to continue our operations using machine power as much as in the past and be able to exist within any restrictions in the KW hour consumption that may be imposed upon us.

FINAL SUMMARY

I think that if we manage our energy consumption intelligently and prudently - NOW!! - perhaps we can avoid the impact of rapidly increasing utility costs that are bound to come in the near future.