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Save \$\$ By Building New??
“New construction could save you money on your utility bills”

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Wow! What a statement! Can you actually save money by building a brand new building? It sounds too good to be true!

A fire department recently requested that we compare the energy efficiency of new construction with that of their existing stations. The client had very detailed utility cost records for his three existing buildings. These buildings were built in 1907, 1956, and 1959. We will occasionally refer to those structures as we discuss our subject.

To answer the client’s comparison question, we considered several issues that were extremely critical to the energy consumption rate of structures. They included: *Building Envelope*, *Electrical*, and *Heating-Ventilation-Air Conditioning (HVAC)*.

Building Envelope

Insulation. Before the middle of the last century, building insulation was rarely used as a stand-alone product. The building materials, due to their inherent properties, provided a degree of insulation. Some owners felt that a “12 inch, solid masonry wall” would have all the buffering they needed. In truth, though, the solid masonry provided a relatively low insulation value. And, on the rare occasion that actual insulation was used, it typically had very low resistance (R) values.

Trapped air in blanket, blown or rigid insulation is what normally provides the barrier to outside air temperatures. Today codes place stringent, minimum insulation requirements on roofs, walls, and even perimeter foundation walls. Most designers will exceed these code-enforced requirements, thus increase the energy cost savings.

Air Infiltration. We’ve all seen and heard the advertisements for building-wrap products. These companies have made a lot of money over the last 25 years for a good reason. Outside air can find its way through building walls without a barrier placed in the walls. Even solid masonry walls will develop cracks in the mortar joints that allow air to infiltrate the conditioned space. The proper installation of caulking plus these air infiltration barriers greatly enhance energy efficiency.

Windows/Doors. Except for the unavoidable cracks around the edges of doors, they and most windows now have a greater R-value than solid walls on older buildings. “*Double-pane*”, “*low E*”, “*argon filled*”, and “*tinted*” are all terms associated with the characteristics that apply to the products manufactured today. There is no comparison between the old, overhead, vehicle doors used on fire stations and garages versus the new doors available. Whether it is glass overhead doors with the characteristics mentioned above or insulated, steel panel overhead doors, insulation values have increased by light-years.

Electrical

Lighting. Lighting has changed more in the last few decades than any other energy-consuming device in a facility. The development of the electronic ballast helped revolutionize the energy demands of light fixtures. Now an 80-watt fixture can provide the lighting given by a 180 to 200 watt fixture just a few years ago. The lower watt fixture also reduces the cooling demand placed on

HVAC systems. The cost of fixtures and replacement lamps is also lower than in past years and the lamps have a longer life expectancy thus reducing maintenance costs.

Most new facilities control lighting levels in critical rooms. For instance, many offices and assembly rooms have double ballast fixtures that allow for half the lighting to be turned off when the brightest lighting levels are not required. Motion sensors, timers and photocells also give a high level of control while reducing energy demand.

Natural Light. There are now more effective ways to bring natural light into a building than ever before. By doing so the need for artificial lighting can be greatly reduced, thus limiting electricity demands and maintenance costs.

HVAC Motors. The motors that run today's HVAC equipment are many times more efficient than those of previous years. This is reflected by the lower electricity consumption that these motors demand.

Many of the parts necessary to keep older electrical devices operable are no longer available. If a replacement part is needed, it may result in the replacement of the entire piece of equipment.

HVAC

Heating. Aside from the electrical demands placed on HVAC equipment, gas consumption rates for similar equipment has also significantly dropped. The average HVAC equipment installed in the 1950s had an efficiency rating of approximately 65%. The average equipment today has a rating of 92%, an increase of roughly 33% efficiency.

Cooling. The average cooling equipment from the 1950s has a rating of approximately 8 seer. The same equipment today is rated from 12 to 15 seer, an increase of roughly 25% efficiency.

There are several other factors that help the heating and cooling efficiencies. Today's equipment requires less maintenance than previously. Like electrical equipment, many of the parts necessary to keep older devices operable are no longer available. The control options for today's HVAC equipment are one of the many reasons for the energy savings. Thermostats are programmable. Often, parts of the building can be cooled while other parts are heated. Equipment can be monitored and/or controlled via phone or computer from remote locations.

Even water heaters play a significant role in saving energy. Today's heaters are roughly 92% efficient where heaters in the 1950s were approximately 80% efficient. For small, remote hot water needs, *point-of-use* heaters can be utilized that instantly heat water when needed.

Conclusion

Based on these and other advancements in the building industry it is safe to say that the current *cost per square foot* for utilities is only half of the *cost per square foot* from the 1950s. Lets look at the example of the previously mentioned fire department. Last year's cost of electricity and gas for the three stations was \$33,216. If they built new stations of the same size, their cost for electricity and gas would be approximately \$16,600, a savings of \$16,600 per year on utilities. If they decided to use this \$16,000 savings to service debt, they could easily borrow another \$250,000. This means they could build 2,500 square feet more than previously planned. Or they could provide full-building, back-up generators, fire sprinklers, and many other new building upgrades for all three stations.

The cost of construction has substantially increased since the 1950s. However, while considering the cost of building a new facility it is beneficial to remember that your yearly maintenance costs should be considered. New construction will likely include equipment that requires less maintenance and more accessible parts for replacement. The substantial energy demand reduction, and the lessened operation and maintenance costs should be part of your decision process.