Architecture

Lights Out?

By **ADA LOUISE HUXTABLE**

ARCHITECTURE creates its own world — literally. A building is more than a space enclosure; it is a sealed life-support system. A high-rise building is artificially lighted, ventilated, heated and cooled. Think about that. Think about it in terms of playing with the environment. Think about it in terms of the energy crisis. And polluting side effects. And the multiplication of power needed to do this for every commercial or institutional building in a city.

According to one architect who has been thinking about it quite a bit, Richard G. Stein of New York, "architecture, through its product, the man-made environment, has a greater influence on energy use than any other major component of our Gross National Product except transportation and the military." The office space built in New York City in the last 20 years adds up to 67 million square feet in 195 major structures; an additional 68 million square feet is anticipated in the next 10 years, recession willy-nilly. Energy production is currently projected on a more rapid growth curve than even the population explosion.

These and similarly awesome facts, plus recommendations, were presented by Mr. Stein at the annual symposium of the American Association for the Advancement of Science in Philadelphia. An extract of his thesis, with a dissent from the Illuminating Engineering Society, has been printed in the June issue of the Journal of the American Institute of Architects.

That architects are thinking about the matter is also attested to by the fact that Mr. Stein has just been awarded the 1972 Brunner Scholarship of the A.I.A. for further investigation of the subject. Industry has also begun to think about it. The Owens-Corning Fiberglas Corporation has announced the first Energy Conservation Award competition for architects and engineers. "Too many buildings," says the two-page display in the professional magazines, "waste energy and contribute to environmental pollution."

The fact is that the architects, like everyone else, were just not thinking about the problem at all, except in terms of costs, the taskmaster they all serve. They were hit as hard as everyone else by the news of the energy crisis. But there is an element of glorious, blind delinquency involved, because someone should have seen it coming, and someone should have realized that the way modern buildings were being designed—and still are—was a flagrant invitation to disaster. The architect is concerned with technology, but uses it as if there were no tomorrow.

Any man who designs a sealed, all-glass building — and we write this with mixed feelings because we think the glass building is the great and beautiful vernacular architecture of the 20th century—is obviously not thinking about the fact that the natural resources that create energy are not inexhaustible, and that the dwindling supply and rising demand have become a matter of international concern. There is general acknowledgment now, says Mr. Stein, that "new attitudes about energy use are immediately necessary."

That means, equally, new attitudes about design. Mr. Stein's recommendations include specifics, such as the importance of putting the energy factor into the building equation, in terms of the design process, and beyond the initial dollar cost. He points out that with this as a consideration, materials would be used differently than they are now.

The production of aluminum, for example, requires six times as much electrical energy as the production of steel. Structural design is customarily—and in codes—calculated in terms of failure at the critical point of stress, and of equal loads for every square foot of floor space. Overdesign based on these unvarying standards, instead of the more sensitive and rational placement of steel and pouring of concrete where it is really needed, is estimated as high as 50 per cent of the materials used—all energy consuming in production.

Lighting takes about 24 per cent of all electrical energy sold. In a high-rise office building using steam for heating and cooling, lighting accounts for 54 per cent of the electrical energy used.

Mr. Stein argues with the standards established by the IES that are written into many codes. These standards keep getting pushed up, he says, to unnecessarily high levels, with emphasis on elimination of contrast that makes for constantly increasing over-all artificial illumination. No one has proven that contrast is bad, he says. "The present requirements are absurd," he concludes.

The IES refutes him rather sharply, implying not too subtly that much of the blame is the architect's for misinterpreting or misapplying the standards, and that the rest of the blame goes to wasteful, obsolete systems.

Electric heating, currently being pushed because of low installation costs, is another of Mr. Stein's bugaboos. "The conversion of (fossil fuel) energy to heat to produce steam to operate steam turbine generators to produce electricity, which is then transmitted with line losses to an ultimate destination where the energy is converted back into heat, uses the original heat source at less than half the efficiency with which the fuel can be used if converted to heat at its point of use." Alice-in-Wonderland technology.

To facilitate heating and cooling, all windows are sealed shut. Our technology is so delicate that it cannot deal with the irregularities of an open window, and it costs less not to have to cope with such radical adjustments as weather.

Mr. Stein claims that an office building is occupied 3,100 hours annually. Five hundred hours are in the temperature range in which untreated outdoor air could be used. (To say nothing of the psychology of the lost seasons, or the not-so-minor joys of the spring or summer day.) Opening the windows could be a 19 per cent reduction in energy for air handling, and a kind of reentry into the earth's orbit.

But no one so far has discussed the architect's basic transgression — the way he designs.

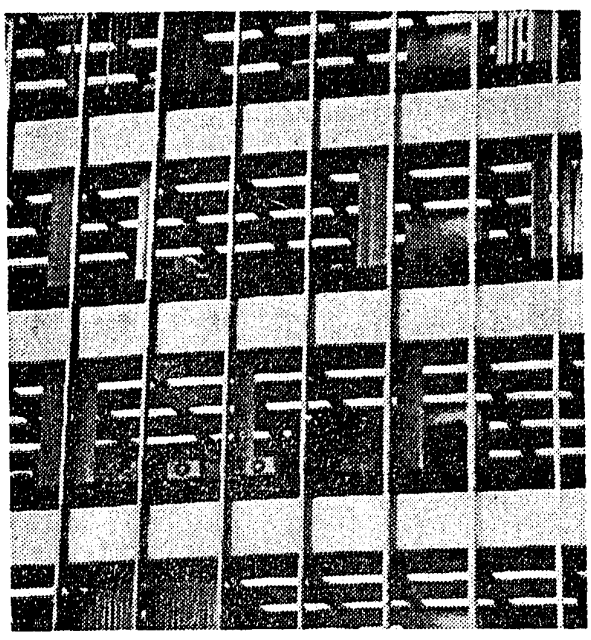
He designs, needless to say, as a creature of his century and its technology and social hierarchy, but his esthetic decisions are largely his own. What a let-them-eat-energy conceit is the beautiful glass box! Heating and cooling the sealed glass container has been formidable and wasteful, ameliorated only by the perfecting of thermal glasses. The architect loves those controlled, sealed windows as much as the cost accountant and the engineer; they keep his façades neatly intact. The contemporary golden proportion is the module — and how those repeated modules keep light installations at over-all high levels in the name of esthetics and efficiency!

Materials are used with a mindlessness about energy and dwindling resources that is either arrogance or ignorance, or a combination of both. Take one paradigmatic example, of one paradigmatic firm, the Shell Oil Building in Houston by Skidmore, Owings and Merrill. SOM gets top marks for architecture and unawareness, but they are no longer reconcilable.

The British professional journal Architectural Design lists the materials of One Shell Plaza deadpan. Enough primavera mahogany from Guatemala and Honduras to deplete the supply for some time. Persian walnut burl from Iran that may not be available again for 20 years. Real leather for the elevators, unseamed, requiring nine-foot cows. (They weren't Texan.) Immense amounts of travertine, the firm's favorite material from a favorite Italian quarry which one hopes is bottomless. Even the roof coping is marble—painted to match the travertine.

Mr. Stein suggests that energy saving will have a profound effect on design. "There will be a renewed enjoyment of the taut, the tense, the spare," he says, "and a falling off of the rhetorical. . . ."

Do we hear the tumbrils rolling?



Sealed high-rise office building, New York