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Energy economics is a needed science

Mechanical engineering has classically been defined as “the applied science of energy conversion.” Thus, it is somewhat of a contradiction for practitioners in the HVAC field (a subsience of mechanical engineering) to undertake the goal of “energy conservation.” The practice of minimizing energy consumption in building systems, whether in design or operation, might therefore be more accurately described in other terms.

After some reflection and research, we suggest that *energy economics* is an appropriate label to attach to such efforts.

Webster defines *economics* as “a social science concerned chiefly with description and analysis of the production, distribution, and consumption of goods and services.” In the past, most efforts involving energy consumption by the building systems design profession were, understandably, motivated by monetary economics. And though it is certain that monetary economics will continue to be a primary design parameter, it is becoming increasingly evident that another parameter will have an even more meaningful effect on both system design and energy source selection—the parameter of pure energy economics. Examples of this include ASHRAE Standard 90, the Federal Emergency Building Temperature Restrictions of 1979, the Federal Building Energy Performance Standards, and many other proposed and adopted national, state, and local statutes.

Thus, while we cannot omit monetary economics from our considerations, we must supplement it with a new science of energy economics. At the outset, let us make two basic observations:

- In the definition of *economics*, no limitations are placed on “description and analysis” in monetary terms.

- Energy, as obtained in the world today in its initial or raw material forms, can be considered “goods” in the light of Webster’s definition.

After accepting this, we see that the basic hypothesis underlying further development of the independent science of energy economics is:

The forces that motivate and strengthen the monetary economics of a society are diametrically opposed to the conservation of energy resources.

In any socioeconomic system the increased use of energy serves to strengthen the so-called economy of the society. Inversely, conserving the energy resources has the effect of retarding economic growth and weakening the economy.

Since none of the commercially available energy sources today are replenishable, however, continued accelerated use of these commodities is tantamount to living on credit; i.e., today’s use, and the advantages thereof, will not affect society until tomorrow. This observation leads to the thought that enters the mind of every intelligent and decision-making businessman and homemaker—defining the risk. The risk of using tomorrow’s resources today must be taken in a calculated manner; or as the conservative gambler might say, we have to hedge our bet. We must always be able to retain the flexibility to regroup and change the game plan when the need arises.

It is with this concept that the economics of

energy must be disassociated from classical monetary economics. In the development of the proposed science, the basic laws of economics can be utilized, keeping in mind the fundamental difference that money is generated by consumption of resources whereas energy use depletes our finite resources. Thus, the basic economic law of supply and demand is the irrefutable footing of the science of energy economics.

Upon this footing can be constructed the science: The supply is our limited resources, and the demand is what a sound monetary economic system must have to survive and grow. This balance between monetary economics and energy economics must be defined and then achieved on national levels (if not worldwide) if mankind and nations are to survive.

The science of energy economics must recognize that technical breakthroughs occur at (hopefully) opportune times in the history of civilization and provide for these eventualities. We should never be in the position of

betting all we have on such an eventuality, however. For example, in the 1940s and early 1950s, we rested comfortably in the thought that nuclear energy represented a new found infinite source. Now we are beginning to realize that the loop is not closed; we still lack a method of disposing of the wastes.

In summary, a new subsience of energy economics is needed as an evaluation tool for professionals in energy conversion as well as for society in general. This science can use as its footing the basic law of supply and demand and build upon it in much the same manner that monetary economics has developed. In its application, energy economics should interface with monetary economics as well as affording an independent input parameter to the design of all energy conversion cycles, systems, and machinery. The science should be established on a worldwide basis, but until current national boundaries are transcended by interaction among governments and peoples, it must be applied by each nation individually for its survival and defense.