Energy analysts are currently using a variety of concepts to assess energy problems and rank alternatives. These concepts include techniques which might be loosely labeled as net energy analysis, gross energy analysis, entropy analysis, and even economic analysis. While there are various gradations within each of these categories, it is clear that a fundamental conceptual difference exists between analysts using economic measures, such as market prices, to value inputs and outputs, and analysts using physical measures, such as energy content. While it is clear from the comments of Odum and Slesser that their energy analyses differ, my concern is not with their differences but with their similarities.

My point continues to be that energy analysts employing economic principles will generally reach different conclusions from energy analysts using noneconomic principles and that these differences will remain even if all markets are free or perfect. Claims that one method cuts through confusion or forecasts impending change faster or has more normative content could probably not be proved by proponents of any method, since every discipline is rife with examples of poor research to be exploited by the opposition.

Under these conditions, I believe it makes more sense to examine the basic assumptions and logic of a discipline in an effort to determine where it will take us if we let it guide our decisions. It is on this basis that I argue that energy analysis guided by noneconomic principles constitutes an energy theory of value. While there is general agreement that the Odum "school" embraces an energy theory of value, Slesser maintains that his "school" does not. Yet if one "values" inputs and outputs in energy terms, ranks or compares alternatives in energy terms, and then acts on this information, I believe that an old adage applies, "When in Italy, all roads lead to Rome."

But what is wrong with units of energy and right with dollars? Isn't it true that one can select any good or product in the economy as the numeraire? Couldn't the government issue homogeneous, 1-Btu lumps of coal with George Washington's picture on them instead of printing dollar bills? Wouldn't all inputs and outputs then be valued in Btu's and wouldn't profit or welfare maximization be the same as energy maximization—an energy theory of value? How can the answers to these questions be yes except for the last one?

The question is really one of what or how one determines value. If the energy content of a good is 3 Btu's, would it always trade for three lumps of coal or even tend toward a value of three lumps of coal? Would there be coal inflation and what is the appropriate discount rate in terms of Btu's? Would supply and demand forces determine values or would energy content? Would confusion end, impending change be forecasted faster, and normative content be increased?

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Origin of Roman "Royal Purple"

I found George D. Ruggieri's article "Drugs from the sea" (29 Oct. 1976, p. 491) most interesting, especially since I have been working with one drug he mentions (tetrodotoxin) for the past 2 years. However, I believe he errs when he states that ". . . Roman ladies . . . bedecked themselves in beautiful gowns dyed purple with a seaweed extract. . . ." The famous "royal purple" of classical times was actually isolated from mollusks (*Purpura* and *Murex*). Had the Roman ladies known explicitly of its origins and manufacture, they would probably have been repelled even more than by the seaweed. It has been suggested (*1*) that the unenviable reputation that the streets of Tyre possessed for being foul-smelling may have come from the decomposing bodies of the mollusks used in the preparation of royal purple.

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Reference

1. C. Singer, E. J. Holmyard, A. R. Hall, Eds., *A History of Technology* (Oxford Univ. Press, New York, 1954), vol. 1, pp. 247–248.

There is certainly no doubt that the "royal purple" of classical times was of molluscan origin. The original reference, "as wool dyed in seaweed pleases one almost as much as purple" ("ut lana tincta fuco citra purpuras placet"), is from Pliny the Elder's *Natural History*. I'm convinced from the above quote that Pliny, too, was aware of "royal purple" (from Mollusca). But as I indicated elsewhere in my article, some of Pliny's remarks were often fanciful and this perhaps may be another example.

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