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Reader Response

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reader response

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OBSERVATIONS ON THE O'TOOLE–WALTON CONSERVATION CONCEPT

As a new subscriber to the *NRJ*, I perused my first issue—January 1982—with interest. Since the journal is aimed at non-economists, perhaps the readership will find some observations on O'Toole and Walton's semantics in the treatment of conservation, and some conceptual expansions, useful.

In their discussion of coal *supply changes*, the authors consider first the effects of socially imposed a) internalization of externalities and b) increased engineering, i.e., physical, efficiency in the energy recovery process. Either requirement would increase the private costs of production. Since the quantities offered for sale, the supply curves, depend on costs, the geometric results would be as displayed by the authors, with the shift occurring from S_2 to S_1, resulting in Type I conservation.

However, rather than *saying* that "the coal supply function shifts upward," it is less misleading to draw the arrow as indicated, and to say that the supply curve has shifted *to the left*, or, indeed, *down*. The supply curve has shifted *down* in the important, non-geometric sense that at each price less coal would be forthcoming under the new circumstances than before. Analogously, a decline in demand would imply a shift to the left, i.e., less would be bought at each price than before, resulting in Type II conservation.

When technological change improves energy end-use efficiency, the authors are correct in saying that gross energy conservation (Type III) can result. We might add explicitly that it *need not* do so. In the upper

FIGURE 1

Type I Conservation

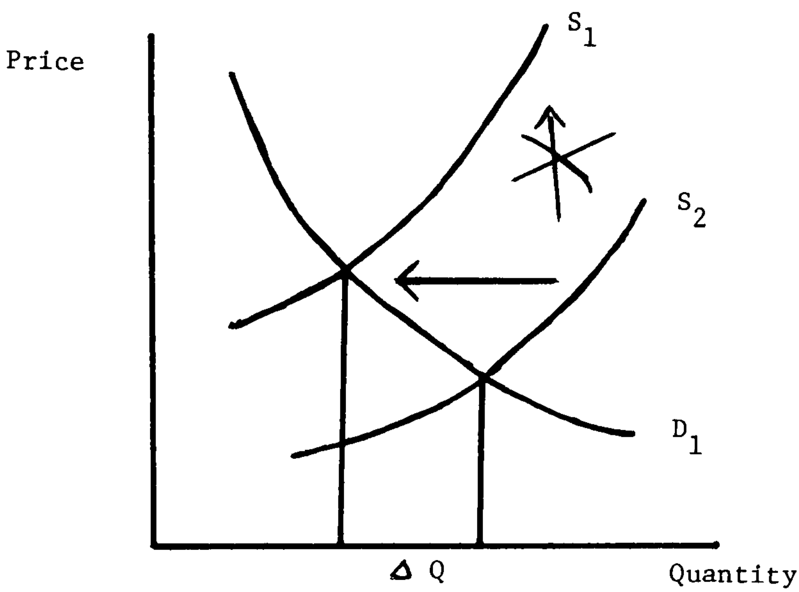
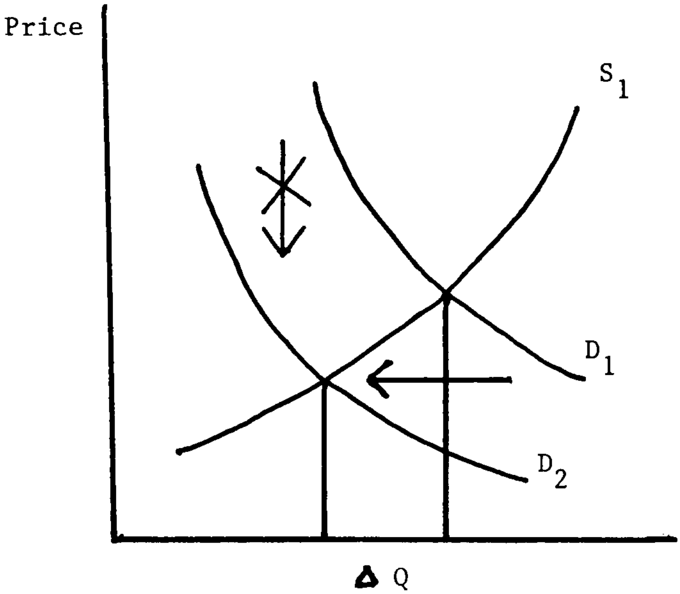


diagram (a) of figure III, a shift from E_1 to E_2 says that an appropriate technological change permits an increased amount of useful energy to be recovered from any given amount of gross material (energy) processed. The implication is that the supply curve of *net* energy is thereby increased in the lower diagram (b), moving the function *to the right*. Since we would then expect the price of net energy to be forced down, we would look for an increased consumption of net energy. What, then, are the conservation implications for gross energy?

Whether conservation in gross energy is realized depends on the responsiveness of the supply curve of net energy to the technological change (the "technology elasticity of supply") and on the responsiveness of net energy buyers to price changes (the "price elasticity of demand"). If the supply increases, to the right, from S_1 to S_2, assuming that the demand curve is D_1, the quantity demanded of net energy rises (Q_1Q_2), but the gross energy level falls. We thus have gross conservation of G_0G_1 in the upper diagram. But if the net energy demand is described by D_2, the buyers are so attracted by the now lower price of net energy that the use

FIGURE 2

Type II Conservation



of both net and gross energy rises. The changes are Q_1Q_3 (b) and G_0G_2 (a). The implied gross conservation is negative.

Finally, *unless* a case of market failure or inequity can be established, the government's imposing a direct production limit to withhold resources, Type IV conservation, as illustrated in figure IV, is *a priori* suspect. If government imposes an upper production quota, say, at $Q_O = S_G$, we note that this "last" unit of output has a value in the market of P_O.[1] Recall that the willingness and ability of producers to sell—the supply curve—is determined by costs. Thus, at Q_O, the supply price, P_S (the price that would just cover the incremental production costs) is *less* than the bid from the most anxious buyer, the demand price, P_O. This means that at Q_O, society sacrifices less in its best forgone alternative, the cost, than is the value of this resulting output, the price. Only at Q_e does the social sacrifice become equal to the minimal value of the result. The cross-hatched area, therefore, represents the monetary value of the welfare loss

1. A demand curve is an array of the maximum prices that users would be *willing* to pay for various units of the product; the units must be worth *at least* that much to the buyers.

FIGURE 3

Type III Conservation

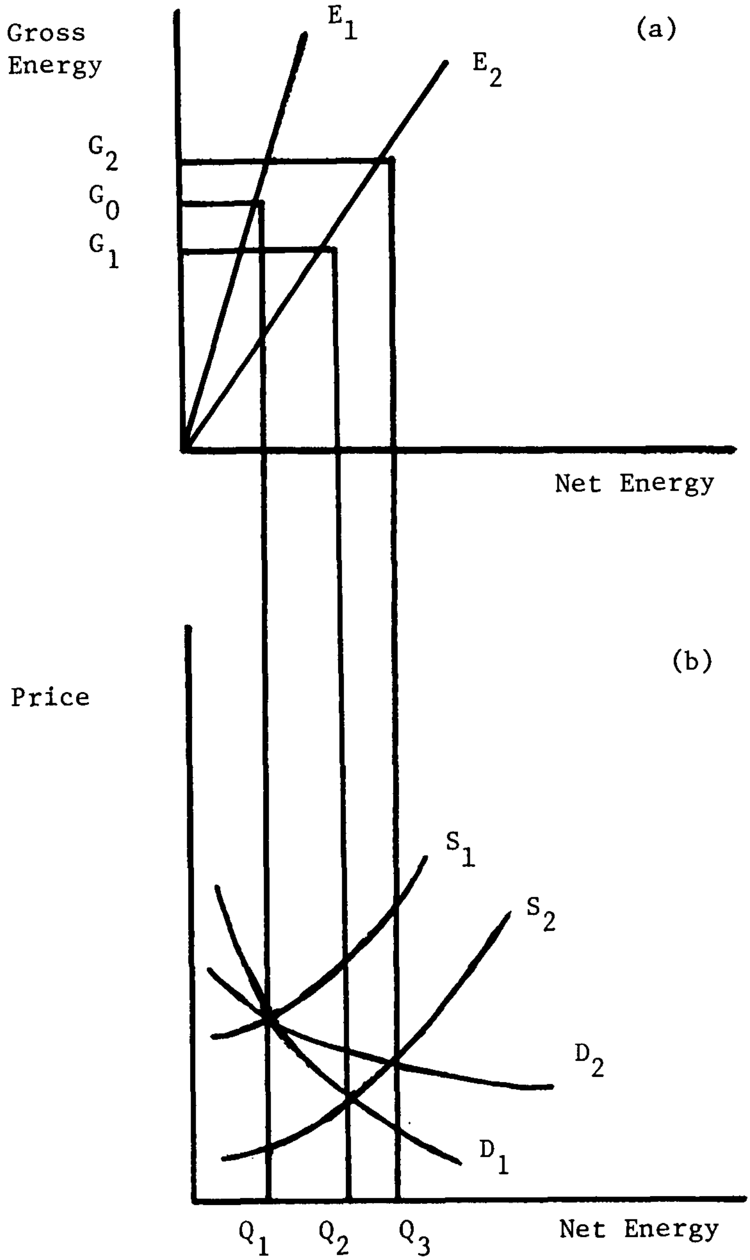
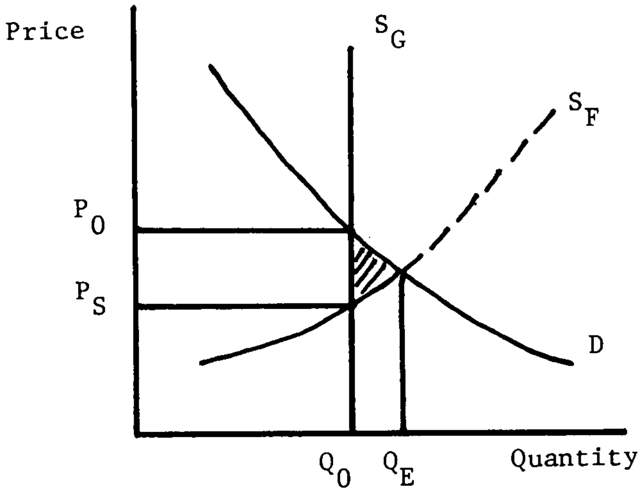


FIGURE 4

Type IV Conservation



from the centrally imposed underproduction, Q_OQ_e, of energy. Any implied conservation is not worth it.

Sincerely,
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