"Summary of article by Andrew Stirling: Regulating the Electricity Supply Industry by Valuing Environmental Effects: How Much is the Emperor Wearing?" in Frontier Issues in Economic Thought, Volume 3: Human Well-Being and Economic Goals. Island Press: Washington DC, 1997. pp. 147-150

Social Science Library: Frontier Thinking in Sustainable Development and Human Well-being

"Summary of article by Andrew Stirling: Regulating the Electricity Supply Industry by Valuing Environmental Effects: How Much is the Emperor Wearing?"

One of the areas where monetary valuation of environmental externalities has been most extensively applied is in electric power generation. Numerous studies have estimated the value of externalities associated with fossil fuel-burning, nuclear, and renewable technologies. Many proposals have been made, and a few adopted, for use of these estimates in choosing new investments, operating electric power systems, and setting the rates paid by customers. This article examines and critiques both the theoretical arguments for valuation and its practical application in the electricity industry.

COMMON PROBLEMS OF ALL ENVIRONMENTAL ASSESSMENTS

Characterization of distinct categories of environmental effects must precede any analytical evaluation. However, there is nothing approaching a standard classification in the published literature on valuation. One particularly detailed study uses five overlapping, potentially contradictory methods of classifying environmental effects, including the medium (air, water, etc.), agent of harm, originating activity, nature of risk, and manifestation of harm. More systematic approaches have been developed in the field of environmental impact assessment, in order to avoid double-counting. Without a systematic categorization of effects, there is little chance that valuation studies will yield comprehensive or comparable estimates of electric power supply externalities.

Even after environmental effects are appropriately characterized, reducing them to a single quantitative measure presents its own difficulties, as seen in the history of attempts at comparative risk assessments. "The central problem is that environmental effects are inherently and irreducibly multidimensional. A single numerical index fails to convey important contextual information." [1028] For this reason, studies performed for the European Commission in the 1980s recommended moving away from aggregation of environmental effects and quantitative cost-benefit analysis, toward qualitative assessment by decision-makers rather than specialists.

METHODOLOGICAL PROBLEMS WITH VALUATION

There are three common approaches to valuing environmental effects. One method assumes that an equilibrium exists, so the current cost of abating or controlling emissions represents the avoided external environmental cost. However, the appropriateness of current pollution control

requirements is debatable. Furthermore, a circularity in reasoning results if current abatement costs are used to estimate the optimal amount of pollution control.

A second approach assumes that current mitigation costs are an appropriate measure of environmental damage. Yet mitigation efforts address only certain aspects of environmental impacts, and exclude some important problems altogether -- either because they are not readily mitigated, or because they would impose prohibitive costs.

The third group of methods attempts to establish, directly or indirectly, the actual social cost of environmental damage. Among the approaches to damage cost estimation are the travel cost method, which measures the value of an environmental asset by the amount people are willing to pay to travel to it; surrogate or hedonic pricing, whereby differentials in property prices or wages are taken to reflect environmental goods, health benefits, or costs associated with a particular property or job; and contingent valuation, in which surveys are used to determine a sample population's willingness to accept payment for damages, or willingness to pay for benefits. Other calculations of damage costs may be based on market prices for replacement, repair, or restoration of damaged environmental goods. [Discussion of the limitations of contingent valuation, in the original article, is omitted from this summary since it overlaps with the articles by Vatn and Bromley, and by Harvard Law Review editors, summarized in this section]

There is no consensus on the appropriate valuation technique to use for the environmental costs of electricity. Several major studies have combined different techniques for different environmental effects in an ad hoc manner; as a result, "[t]he baroque complexity of the exercise does not lend itself to a state of transparency by which any errors are readily detected." [1031] Presentation of results typically features prominent use of phrases such as "full costs" or "true costs," suggesting a degree of comprehensiveness that is simply not available at present. The discount rate has a profound impact on the valuations for technologies with long-term environmental costs; yet the choice of a discount rate is often little more than arbitrary, and sometimes varies within a particular study,

THEORETICAL DIFFICULTIES IN VALUATION

Beyond the numerous methodological problems with valuation lie deeper theoretical difficulties. The value of an object, or an attribute, is dependent on its context; the market is not always the appropriate context in which to determine environmental values. "[C]an the value of environmental attributes properly be expressed in terms of the price society is willing to pay to avoid destroying them? Or does the environment possess some 'intrinsic' value in itself, reflecting the benefits secured by non-human organisms?" [1034] Unlike other methods of environmental assessment which employ physical indicators, valuation reduces these to a single index, monetary value, that has no meaning whatsoever beyond the confines of human society.

Some authors protest that failure to ascribe monetary values to environmental attributes amounts to assigning them infinite value; others claim that the same failure implies a zero value. These contradictory interpretations could equally well apply to the refusal of parents to place a monetary value on their children. Rather than being infinite or zero, some values are simply

beyond price; a multidimensional whole cannot readily be characterized by a unidimensional index.

POLICY IMPLICATIONS IN PRACTICE

Are the results of valuation of electricity supply externalities useful to policy makers? The external environmental costs incurred by coal-fired electricity generation have received particular attention; the range of estimates found in published studies extend from a high of $20 per kilowatt-hour (kWh) to a low of 0.04¢ ($0.0004) per kWh, a difference of a factor of more than 50,000. Even if a few outliers are arbitrarily excluded, most estimates lie between 0.5¢ and 10¢ per kWh, differing by a factor of "only" 50. "The scale of the disagreement suggests that the accuracy of valuation does not match the precision with which individual authors express their results." [1035-36]

Moreover, there is a significant overlap between the ranges of external costs attributed to different technologies. The range of variation in published results would support virtually any ranking of coal, nuclear power, photovoltaic, and biomass (wood-burning) electricity generation. Such uncertainty seriously undermines the utility of valuation studies for policy formation.

CONCLUSION

Valuation as a method of comparison of environmental effects

> ...is scientistic, in the sense that it relies for its authority on the willingness of policy makers and the general public to accept the validity of ostensibly precise numerical results as an adequate expression of complex, context-dependent and multidimensional qualitative issues. It is technocratic, in the sense that it delegates important political judgments to specialists to an extent greater than other techniques and is even less transparent to informed public scrutiny. Perhaps most importantly, however, it is inaccurate, both in that it is inherently partial in scope, and in that the results generated vary over wide ranges of values...

The alternative to valuing environmental effects lies in acknowledging their fundamentally multidimensional character. Only a set of discrete weighted decision-making criteria can adequately reflect the complexities of nature. Such criteria are far more effectively identified and prioritized by wide political debate, than by small communities of specialists... [B]y providing an anchor for the iteration of political debate, this procedure at least accepts that calculation is subordinate to judgment. [1038]