Measuring the Costs and the Benefits of Energy Development

Jonathan A. Lesser

In a previous column,[1] I discussed how requirements for cost-benefit comparisons in connection with energy infrastructure development have led to a fascinating irony. "Clean," renewable energy projects are not being built, because the transmission infrastructure they require has environmental impacts. To add to the absurdity of this situation, many environmentalists remain opposed to rigorous cost-benefit analysis because, in their view, such analysis reduces everything to dollars and cents. They seem to prefer the solace of absolutes (i.e., just say "no" to new energy infrastructure), even if it would lead to the advancement and spread of "clean," renewable technologies.

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However, those of us who live in the real world know that we must make trade-offs. The regulator who is confronted with a mandate to protect "public health and welfare" when evaluating energy development projects needs tools that can be used to weigh benefits and costs in an unbiased and defensible manner. What sorts of tools could there possibly be, given the fact that the "costs" of new energy infrastructure include both measurable and seemingly impossible to measure environmental and social impacts—everything from air and water pollution levels, acres of wetlands, and effects on views to social justice and environmental racism.

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Although markets provide the best possible measure of a product's or service's value, environmental and social considerations, except in limited circumstances, do not come with handy price tags. Wal-Mart does not sell wetlands on Aisle 13, nor does the local grocer offer "buy one, get one free" specials on clean air or social justice. For the regulator seeking to evaluate the effects on public health and welfare, to say nothing of "protecting" it, this creates a confounding but not insoluble problem: how can one measure costs and benefits that do not lend themselves to measurement?[2]

WAYS TO MEASURE INTANGIBLES

Economists have the answer to this problem. We routinely employ a host of tools and ana-

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lytical methods to measure nonmarket goods and services. Some of these approaches exploit market prices to infer the value of environmental and social attributes. For example, suppose we compare the selling prices of two houses. The houses are identical in all respects except that one is located on top of a hill overlooking a beautiful river valley, and the other is located at the bottom of the hill with only views of the neighbors' yards. The difference between the selling prices can be attributed to the value of the view.[3] This approach, which economists call "hedonic pricing," works if we can accurately identify and measure the attributes that make up a good or service, and if we have sufficient data to develop good statistical estimates of the values of those attributes.

Unfortunately, many environmental attributes do not lend themselves to this approach, because there is no underlying good or service that is bought and sold in the market. For example, most individuals who visit the Grand Canyon will probably come away thinking that it is an impressive place. But does that mean someone who has never visited the Grand Canyon does not care about it? Of course not. An individual may be planning a vacation to the Grand Canyon in the future. Or a person may be afraid of heights and terrified of visiting but still like the idea that the Grand Canyon exists.

For these cases, economists have developed several methodologies that can be used to assess value. For example, one way of valuing a trip to see the Grand Canyon is to estimate how much it costs to get there. Presumably, if you are willing to spend $500 traveling to the Grand Canyon, you must have valued seeing it just as much or more. By examining a spectrum of visitors who have traveled different distances, it is possible to develop overall estimates of the value of using national parks, monuments, and so forth.

One glaring weakness of this approach is that, if not executed correctly, it assigns no value to nonvisitors such as our acrophobic individual. That, too, can be addressed. The best way to do so is, in some ways, also the most straightforward of all: just ask. In the spirit of academic obfuscation, economists call this the "contingent valuation method."

In fairness, however, it is not quite as simple as asking a random individual how much he would pay for a view of the Grand Canyon. Try this and you are likely to be rewarded with either a blank stare or bodily injury. Thus, what economists do is design detailed surveys to "tease out" the values individuals place on knowing that the Grand Canyon is "just there," or that the views across it will be improved by reducing air pollution from nearby power plants, or that species will be protected.[4]

MEASURING ENERGY DEVELOPMENT SOCIAL COSTS

With energy development, whether a new generating plant, high-voltage transmission lines, or oil refinery, environmental costs are heavily focused on potential health impacts and, in some cases, factors like "social justice." For example, an oil refinery or power plant is more likely to be sited near a low-income neighborhood than in Beverly Hills. Some equate this with "environmental racism." Regardless, the question remains: how can these costs be measured and addressed? Once again, the economist's toolbox holds the answer.

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Clearly, infrastructure development should not be derailed by irrational environmental fears. For example, there is no scientific evidence that exposure to electromagnetic fields (EMFs) caused by living near high-voltage power lines has any adverse health impacts.[5] Actual health impacts arising from, say, exposure to pollutants, can be measured using what economists call "statistical value of life" estimates. Such estimates are typically derived from studies of wage differences that reflect job risks or from studies that evaluate individuals' willingness to engage in "risky" behavior such as mountain

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climbing, hang gliding, writing columns about energy and the environment, and so forth.

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WHERE ARE THE BENEFITS?

When regulators focus on the costs of energy infrastructure development (including the impacts on social justice), they often fail to consider the economic and environmental benefits. New electric generation will lower electric prices and improve system reliability. This benefits everyone, as will the lower prices that will be realized when new oil refineries and gas pipelines add to available supplies. Those benefits will improve the well-being of everyone and ought to be touted. Yet too often, energy infrastructure development focuses solely on the adverse impacts, whether real or imagined.

Fortunately, benefits *can* be measured using standard economic models. For example, building a new coal-fired power plant will improve electric supplies and reduce market prices for energy and capacity. That reduction in prices can be estimated, and we can then calculate the overall benefits that will accrue either to residents in Beverly Hills or to people living closest to power plants.

And yes, energy infrastructure *can* provide environmental benefits.

And yes, energy infrastructure *can* provide environmental benefits. Transmission lines wheeling power from wind and solar plants means less pollution. New, efficient electric-generating plants powered by natural gas can replace older, less-efficient, and higher-polluting plants; this will reduce prices. Lower energy prices mean consumers and businesses will have more money in their pockets. And when incomes rise, so does the demand for environmental improvement. Doing what makes economic sense also makes environmental sense.

NO MORE BANANAS

To development opponents who advocate "build absolutely nothing anywhere near anybody" (BANANA), I would say such a position is far too narrowly focused and, rather than making sense, jeopardizes our economic and our environmental future. Given an understanding of the range of analytical tools that are available to measure the costs and benefits of new infrastructure, I would ask the holders of such inflexible positions to consider the idea that we can build new energy infrastructure *and* improve environmental quality.

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NOTES

1. (2008, October). Comparing the benefits and the costs of energy development, pp. 31–32.
2. There is yet another level of discomfort for attributes that are considered societal "absolutes." Thus, even if you could determine that murdering your grandmother would pass a cost-benefit test, society still says doing so is wrong.
3. This assumes reasonably contemporaneous price comparisons. The greater the time disparity between the sales, the less likely that we can attribute the sale-price differences to just the view.
4. A book that explains all of the valuation techniques in detail is Freeman, A. (1993). *The measurement of environmental and resource values*. Washington, DC: Resources for the Future.
5. In the case of EMFs, many regulators have adopted what is called a "prudent avoidance" approach, which means that, whereas there is no evidence of adverse health impacts, transmission lines should be sited to minimize exposure "just in case." It is ironic that some individuals who profess fear of EMF demand that transmission lines be buried, even though that can raise their exposure levels.

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