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A Public Health View of Environmental Regulation

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Perspectives on environmental regulations and environmental protection

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The laws and regulations that govern the use of environmental resources have complicated effects on our society and our economy. Efforts to regulate environmental impacts are frequently controversial precisely because they have such complicated effects. No single perspective can adequately encompass all of the issues that arise in environmental regulation and environmental protection. Even the terms themselves suggest the fundamentally opposed philosophies that approach the assessment of environmental laws: While proponents of greater environmental activism emphasize the need to "protect" the environment, critics of more stringent controls emphasize that these laws "regulate" and limit the actions of individuals. At the PURE '92 conference, we invited four speakers with very different perspectives to share their views of the important issues in environmental protection and environmental regulation. Three of them are represented here: A. Myrick Freeman, III, an economist at Bowdoin College; John Graham of the Harvard School of Public Health; and Dean Marriott, commissioner of the Maine Department of Environmental Protection.

A public health view of environmental regulation

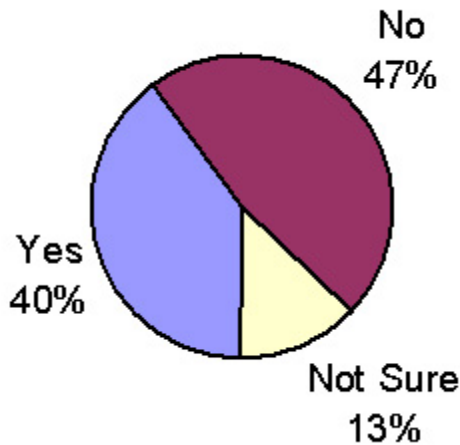
by Dr. John Graham, School of Public Health, Harvard University

I want to put you in a decision-making position. I will ask you to become an environmental regulator, and I will give you a concrete case study involving coke ovens. We will evaluate the benefits and costs of environmental regulations to arrive at some form of decision.

I will start by telling you what the public thinks about this problem, at least as they understand it. Then I will give you some detailed evidence on the benefits and the risks of producing coke, which is used to make steel. Then I will try to provoke you about how to weigh costs and benefits from a public health perspective.

First, for the public view, the American people will tell you that we do not have enough environmental regulations, and they have come to feel more strongly about that each year since these polls have been done. On the other hand, if you tell them that this environmental regulation might lead to higher unemployment in some industries, they are a little bit unsure about whether they are willing to accept the higher rate of unemployment in that industry. (See Figure 1.) So, in some very rough sense, the public wants to improve the environment and is willing to enact more regulations but is nervous about whether we might go a little bit too far.

Figure 1: QUESTION: Would you be willing to accept a higher rate of unemployment so that industry could better preserve and protect the environment, or not?



Source: Cambridge (1990)

Let me move to the coke industry. American industry needs steel. We can either import steel from Japan or Brazil, or we can make steel using the process that I will describe to you. The process starts as coal and iron ore and other raw materials and moves through a variety of manufacturing processes and finishes as rolled steel. There are environmental problems all the way through this process. I will focus on how to resolve the problem of pollution from coke plants.

Let me explain how a coke oven operates. Large ovens heat the coal up to a thousand degrees centigrade in the process of making coke. Doors on top of these ovens allow you to drop the coal in. When the coke is ready, you open the doors at the side and a large mechanism pushes out the coke into the coke cars. These coke cars move to a cooling tower, where coke is cooled before moving to the next step in the process. Unfortunately, there are emissions that flow from leaks and doors. There are 36 coke plants, primarily in the industrial heartland, but also one out in Provo, Utah.

Now, before we decide whether to regulate or how to regulate, I want to remind you what the alternatives are. Maybe we want to get rid of these 36 plants and the associated steel making facilities; that could be an expensive strategy. Second, we could import all the coke, which once again could be expensive and maybe somewhat unreliable. Moreover, there are 12,000 people who work at those 36 plants, and they would like to have a conversation with you before you shut down these plants. Third, we could make coke in negative pressure, non-recovery ovens, which is a different technology that has been known for years. It does not capture the by-products to reheat the ovens. These unrecovered by-products create a waste disposal problem, and the waste disposal problems are serious with the negative pressure, non-recovery ovens. On the horizon, maybe in the next 40 years, the steel-making might be redesigned so that you go from raw materials to steel with no coke-making process whatsoever. This technology is only in the demonstration phase; the economics are uncertain. It would take this industry about 40 years to convert.

Let me briefly describe the health risks of coke oven emissions. The emissions from these coke ovens are nasty. There are thousands of chemicals in a complex proven to cause cancer. Studies of the employees who have worked on these ovens since World War II find that those who work on top of the ovens have a seven-fold increase in risk of respiratory cancer compared to those who do not work on the ovens. If you are a part-time worker on the top of the ovens you have a five-fold increase, and a 3.7 fold increase if you work on the sides. Those who work there for fifteen or more years are the ones who have these particularly strong increases in risk.

I would like to tell you what the risk might be to the community around these facilities, because the worker problem is a limited view. Workers have work schedules, which limit the time that they work on the ovens. They wear respirators and protective clothing. New electronic controls open the doors on the top of the ovens, so the workers do not have to work literally right on top of the ovens. The real environmental concern is the responsibility to the community around these facilities to assess what these emissions mean to their health.

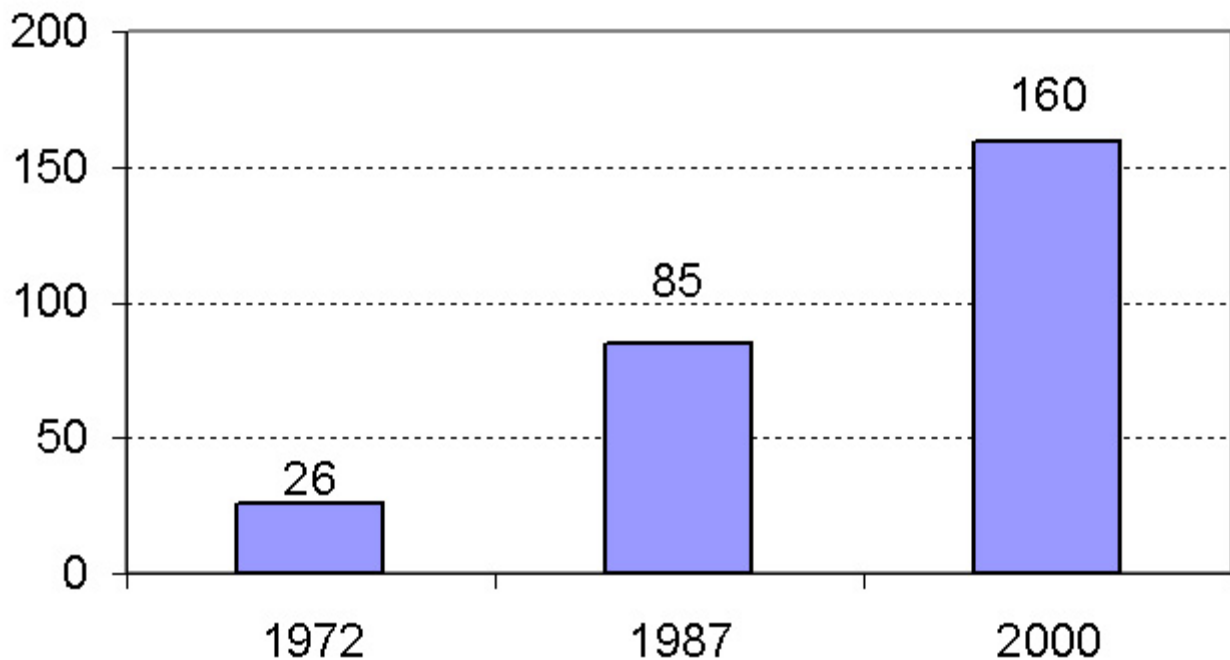
Before I provide specific data for coke ovens, let me remind you that we live in a society where cancer is a likely cause of death for one out of four of us. For a baby born today, at current mortality rates, there is one chance in four that this person will die of cancer. At the five dirtiest coke plants in the country, as measured by EPA estimates, the number of cancers per year at any facility does not exceed one cancer per year. For the entire industry, all 36 plants, there are 2.4 more cancers per year, if you believe all of the decimal points in EPA's risk assessments (which I'll get back to in a moment). So from this perspective, the total public health impact of these 36 facilities is not a major public health problem and, indeed, that is not the driving concern in this decision. The people who live near the fence lines of the facilities are the key concern. For this group, EPA has a different way of expressing these estimates, called the maximum individual risk. This is the risk to maximally exposed individuals. For example, at the plant in Clairton, Pennsylvania that is about 1 chance in 100, which is roughly comparable to your lifetime risk of dying in a car accident. This is not a trivial matter at all. If you look at the distribution of these facilities, some of them are dirtier than others. Six of them are at 1 chance in a 100, 20 of them are at 1 chance at 1000 and 10 of them are at 1 chance in 10,000. So if you want to regulate this industry at a one in a million standard, you will shut down the entire industry. If you look at the whole industry in terms of exposure, we have a relatively small number of people (about 500) at 1 in a 100, 23,000 people at 1 in 1,000 and a large number at much smaller risks. When you look at the total number of cancers, it is less than 10.

What are we going to do about this problem? Well, engineers and economists have done their analyses and here are the options. First, for a very small price, \$5 million by one EPA estimate, one-third of these emissions can be eliminated by the best available technology (BAT). This involves plugging leaks, renovating some doors, and doing inexpensive things that can reduce this problem. To build all new doors along those batteries at all 36 plants will cost \$138 million, which would eliminate eighty-three percent of these emissions. As often is the case in this kind of problem, if you want to control ninety percent of these emissions, the price tag goes up enormously, to about \$2.1 billion in capital costs. To get this industry to a low risk, like 1 in 10,000 or 1 in a million, you are basically talking about shutting down two-thirds of all of this industry, unless you give them decades to bring along new technologies.

I would like to provoke you a little bit at this point. If you are tempted to go as far as that \$2 billion option, I would like to propose some alternative ways of spending \$2 billion. Suppose we tax the coke industry and offer \$80,000 in lump sum compensation to each of those 25,000 people who are at 1 in 100 or 1 in 1000. Those people in Gary, Indiana or in Clairton, Pennsylvania might prefer the \$80,000 over the risk reduction you will achieve for that amount. They could build a new house, plus screen their homes for radon or control indoor air.

This example leads me to think somewhat differently about the question of what regulations are really affordable. I will offer a different perspective about public health and environmental regulation. People often think that "public health" always takes the "clean up the environment" position and that the economics do not really matter in terms of health. My position, however, is that there are health implications of those economic burdens. First, national expenses for environmental control are \$85 billion per year now and we have projections of \$160 billion per year in the future (Figure 2). Although health care costs are escalating rapidly, these rates of increase are in the same ballpark as the health care industry.

Figure 2: Estimated costs of Pollution Control, 1972-2000, USA (billions of 1990 \$)



Source: EPA (1990)

Now, how does regulation impact upon prosperity? If you regulate the coke production industry and decide to spend \$2 billion dollars, how are we going to finance that? Well, our choices are higher prices for these products, lower wages for their workers or more unemployment in this industry. (If you think this overlooks the dividends to the stockholders, note that these companies have not been making money in the last eight years. Ten years ago there were 70 of these plants; today there are 36. You will not finance this problem by reducing dividends to stockholders.) Raise prices, layoff workers, or reduce wages are your options. All of these ultimately affect the level of our household income.

The link that is often missed in these analyses is that as family income declines, you will affect their health status. You will affect it directly because families will not have the income to purchase improvements in their health status. You will affect it indirectly because the tax base that finances our emergency medical care systems and our environmental protection agencies are based on household income. When we reduce our household income, we can support less of these types of activities. In examining the level of sickness or mortality, not only in this society but in virtually any society, you find that those in the lower income spectrum have increased illness and increased mortality rates. This is data on self-reported, chronic conditions. As income increases, you have improved health, although the relationship flattens out at around \$40,000 or \$50,000 a year. Beyond that income level there does not seem to be much of a relationship. (The supporting studies control for the age of the household, and the educational level of the household.) If we take money from people in the lower income spectrum, that could be associated with increased cancer rates in these populations. One of my colleagues, Dr. Ralph Keeney, has made a provocative calculation: Each \$5 million in regulatory costs is associated with 1 statistical fatality. Before we spend \$2 billion on coke ovens, we should think about how many extra health effects will be induced through income effects on public health.

In conclusion, we have a clear case of 36 dirty plants causing pollution that is associated with cancer. We clearly need environmental regulation at these facilities. We have the science, both epidemiology and toxicology, to target the relative environmental priority of these facilities. The question we face is how far to push the regulatory process: How much expenditure are we willing to force? My caution is that if we are overly stringent, we will not only have costs exceeding benefits, but we will have net health harm that is often not recognized. I draw this connection between people's economic well being and their health because, in the public discourse around environmental regulation, many people like to take the high moral ground by arguing that they are protecting "public health" by reducing environmental pollution. People concerned about the cost are supposedly not at the same level of moral respectability when they make these cost arguments. In the public health community, there is a very strong sensitivity about who bears these economic costs and what those costs ultimately mean for people's health and their quality of life. I intentionally make that provocative statement to keep everyone aware of why we must be concerned about economic costs, even if we are not economists or accountants.

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