

ENVIRONMENTAL PROTECTION: IS IT BAD FOR THE ECONOMY?
A Non-Technical Summary of the Literature

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Summary

Environmental regulation in the United States stands accused of causing a broad array of undesirable economic consequences. It is said that environmental regulation is too expensive, reduces economic growth, hurts international competitiveness, and causes widespread layoffs and plant closures. Sometimes, it is said, it even forces businesses to flee to more accommodating countries. The view that environmental regulation seriously harms the U.S. economy is so firmly established that it has become the centerpiece in the series of attempts over the last few years to roll back the very rules that have produced such dramatic improvements in environmental quality.

This article reviews the evidence that can be brought to bear to verify or refute these accusations. In all cases, these assertions do not stand up to a careful examination of the facts. First, we do indeed spend a considerable amount on environmental protection, but not as much as we do on health care and national defense – activities that may be of similar significance to many people. Second, we spend about the same amount in terms of GDP as do other nations at similar levels of development. Third, we gain enormous benefits from pollution control, so the issue is not really the cost of environmental protection, but the net benefits we receive. Finally, there is no evidence that U.S. environmental regulation causes large-scale plant closures and job losses, that it impairs our international competitiveness, or that it encourages companies to flee to nations with more lax environmental protection requirements.

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Introduction

Environmental regulation in the United States stands accused of causing a broad array of undesirable economic consequences. It is said that environmental regulation is too expensive, reduces economic growth, hurts international competitiveness, and causes widespread layoffs and plant closures. Sometimes, it is said, it even forces businesses to flee to more accommodating countries. The view that environmental regulation seriously harms the U.S. economy is so firmly established that it has become the centerpiece in the series of attempts over the last few years to roll back the very rules that have produced such dramatic improvements in environmental quality.

These are important charges. Even though they are usually put forward by interested partisans, they should not be taken lightly. If they are true, even partially true, some serious rethinking of environmental policy would seem to be in order. But if not, it might be helpful to explain, once and for all, why not. At the same time, we can see if some of these criticisms nonetheless still have something of significance to say about our environmental policies.

This article examines a variety of claims about the costs of environmental regulations by bringing to bear what accepted economic research has to say about these issues. The following analysis is not about conflicting experts; these are areas in which economists are in substantial agreement. What is available from the literature may not always be conclusive, but as we will see, it certainly is an improvement over scary anecdotes and apocalyptic assertions. In addition, this article does not depend on dueling numbers - where economists have produced different numbers, they do not significantly change the conclusions drawn from them. Instead, this analysis explains what the numbers mean to economists, and more important, what they mean - or should mean - to citizens and policymakers, who want both environmental protection and a strong economy.

While the claims about supposed damage to the economy can mostly be attributed to misinformed advocates or simple exaggeration - plus a few headline-making events like the spotted owl controversy - in truth the majority of the fault lies in a lack of accurate communication of economists' findings about the effects of environmental regulation to the general public, a lack to which regulators, the regulated, and the economics profession all have contributed. In the contentious area of environmental policy, what does get communicated is sometimes misinterpreted or taken out of context. For example, worst-case economic impact scenarios for a regulation - say, potential increases in unemployment and plant closures - are reported not as low probability possibilities, but as very real looming threats. If the probability of being stuck by a meteor streaking to earth was presented in the same way, many people might never venture outdoors.

What Do We Spend on Environmental Protection?

All claims that environmental regulatory costs do significant economic damage to the U.S. economy rest on the assumption that those costs are large. After all, relatively minuscule environmental costs couldn't affect anybody or anything in ways that would give rise to the negative consequences attributed to them. But, there are several possible meanings of the term "large regulatory costs" depending on the context.

One definition of the term is compliance costs that are high enough to result in unemployment, plant closures, and impairment of international competitiveness. This definition requires only that regulatory costs are significant compared with the economic sizes of plants and firms. Before we get to that, let's focus exclusively on costs in a macroeconomic sense - as a percentage of the U.S. gross domestic product. In other

words, how much does environmental protection cost American society? Critics frequently declare that regulatory costs are too large in this sense, diverting enormous national economic resources from productive pursuits into complying with environmental rules.

To evaluate this claim, we first need to know how much we as a nation spend on environmental protection each year. Fortunately, we have a comprehensive assessment of this question - EPA's 1990 report *Environmental Investments: The Cost of a Clean Environment* [1]. This landmark study found that the cost to comply with federal environmental regulations was 2.1 percent of gross domestic product in 1990, and a projected 2.6 percent of GDP in 1997. This works out to about \$210 billion in 1997 dollars.

Is this too much? First, we need to determine how accurate this often cited estimate is. If there is serious doubt about whether the \$210 billion figure is even close to the truth, any debate about whether it is too large would be pointless. The fact that the *Cost of Clean* numbers are widely cited does not mean that they are universally accepted by everyone as precisely correct.

First, here's how EPA came up with its numbers. Following statutory mandates to assess the cost of compliance with the Clean Air Act and the Clean Water Act, it expanded the scope of *Cost of Clean* to include expenditures mandated under RCRA, CERCLA, TSCA, and FIFRA as well. In addition, the agency included state and local expenditures and a host of environmental costs that are not necessarily mandated by EPA regulations, such as a variety of solid waste management and water provision expenditures. EPA also projected future costs for new regulations and for regulations being phased in over time. In other words, the agency went out of its way to be as complete as possible.

Still, some economists feel that the \$210 billion figure is too low. For example, according to some researchers [2], the *Cost of Clean* estimates omit a number of more subtle environmental regulatory costs, such as reductions in agricultural yields that arise due to restrictions on pesticide, the costs of complying with noise restrictions at airports, voluntary efforts for litter removal, diverted management focus and inefficient resource use, and legal and other transaction costs. In addition, others [3] argue that the data EPA used to develop the majority of its estimates, which came from the Commerce Department's periodic surveys of private sector pollution control expenditures [4], understate the full social costs of regulation. The idea is that the pollution control costs reported by industry do not include the indirect effects on production these regulatory mandates entail. If pollution control measures render the entire production process less efficient, their full cost to American society exceeds the amounts that companies report.

But there are other arguments suggesting that the *Cost of Clean* estimate is too high. In preparing the report, for instance, EPA supplemented the Commerce Department's industry pollution control expenditures survey with cost estimates drawn from its own regulatory impact analyses of specific environmental regulations. These studies are based on anticipated future compliance costs as predicted by EPA using the best available information at the time. However, industries and consumers almost invariably find cheaper ways to comply with environmental regulations once they are actually subject to the rules [5].

Another reason for suspecting that the *Cost of Clean* figure might be too high again has to do with the accuracy of the Commerce Department's survey. When queried by the government, firms have an incentive to overstate their pollution control costs as a way of reducing the possibility that they will be saddled with additional regulatory costs in the future. Furthermore, firms face honest difficulties in distinguishing actual mandated pollution control costs from other capital expenditures. For example, some pollution control measures involve entire process changes, so determining what portion of the total cost is specifically for environmental protection is difficult and potentially arbitrary.

Finally, it is possible that the compliance costs reported in the Commerce survey exceed the actual social costs of these expenditures, because some pollution control measures might actually increase, rather than decrease, the efficiency of production processes [6]. In this case, the social costs of these requirements will be less than the reported amounts.

Perhaps the correct figure is double or half the \$210 billion, but no one really knows. The important point is that, despite all of the controversy surrounding this estimate, the arguments are mostly about making marginal adjustments, not radical revisions, to this figure. Economists are not saying the number is so far off that it would change their conclusions about whether the answer represents "large regulatory costs," the question we began with and the assertion made by many critics of regulation. It therefore seems justified to take the *Cost of Clean* estimate as at least a point of departure for deciding whether we spend too much on environmental protection.

Regardless of the Cost of Environmental Protection, Is It Still Money Well Spent?

Given this estimate, a simple, straightforward way to evaluate the claim that our nation's environmental compliance costs are too high is to ask how they compare with similar national priorities. In 1997, the United States spent 10.6 percent of GDP for health care and about 4.3 percent for national defense[7]. If it is worth nearly 15 percent of our domestic income to protect our personal health and the security of our nation, is it worth 2.6 percent of GDP to have clean water to drink and air to breathe and to maintain the health of the ecosystems upon which the economy really depends - not to mention our aesthetic interests in nature and the opportunities it provides for enjoyment and recreation?

This is not really an issue for economics to decide, but for people to decide. Many would probably agree that most Americans would find this a very reasonable investment - even if it turned out to be twice the amount EPA estimated (or half). Further, what the United States spends each year on environmental protection is similar to what the other nations in the Organization for Economic Cooperation and Development devote to pollution control. The OECD has developed estimates of environmental expenditures for various nations using a consistent methodology, although somewhat different from EPA's[8]. According to these figures, the United States is smack in the middle of four European nations. In 1990, the OECD calculates that the United States spent 1.5 percent of GDP, a figure in line with the *Cost of Clean* estimate. France (1.2 percent) and the United Kingdom (1.4) were lower, West Germany (1.6) and the Netherlands (1.7) were higher. So the U.S. experience certainly does not seem out of line.

But while comparisons of environmental costs to expenditures on other national priorities, and to what other countries spend on pollution control, are interesting and illuminating, from an economics perspective they are ambiguous. Whether we spend too much on environmental protection depends not only on what we spend on other things, but also on the value of what we receive from these expenditures. If we get environmental improvements of, say, \$10 billion as a result of spending \$210 billion, we may indeed be spending too much. But if the environmental benefits amount to \$500 billion, then these expenditures would appear to be good investments.

If all of the benefits of all environmental regulations were quantified and quoted in monetary terms, determining whether the aggregate benefits exceed costs, and by how much, would be a simple matter of comparison. But there is only a partial *Benefits of Clean* report, and for a good reason. The environmental benefits of many regulations are not quantifiable, while those for other regulations can be quantified but are hard to value in monetary terms. Indeed, regulations for which all benefits are quantified and monetized are the exception rather than the rule. Nevertheless, several factors strongly suggest that environmental regulation in the United States provides positive net benefits.

First, a substantial amount of the *Cost of Clean* - about a third - comes from activities that clearly would be undertaken without being mandated by EPA regulations. For example, the costs of solid waste collection and disposal, as well as all of the costs of water purification, are included in the \$210 billion figure. But since most of these costs would be incurred voluntarily in the absence of regulation, the benefits associated with those activities equal or exceed the costs by definition.

Second, the Office of Management and Budget has summarized the ranges of costs and benefits of a large number of environmental regulations (mostly EPA rules, although a few other agencies also issue environmental regulations) as part of their larger effort to summarize the costs and benefits of all Federal regulations [9]. OMB relied on one comprehensive academic study of the costs and benefits Federal regulation (itself based on some 25 academic articles) and on regulatory assessment documents prepared by the Federal agencies issuing regulations costing \$100 million or more per year. OMB's report shows that the aggregate annual benefits of all of these environmental regulations totaled \$162 billion (1996 dollars), while their total annual costs were \$144 billion. Another study [11] of the total annual benefits and costs environmental regulations estimated the aggregate annual benefits and costs at \$253.8 billion and \$206.7 billion respectively (1994 dollars).

Probably more convincing is that in a comprehensive study of the costs and benefits of the entire Clean Air Act from 1970 to 1990[10], total benefits for this time period ranged from \$5.6 trillion to \$49.4 trillion (1990 dollars), while total costs were \$523 billion (1990 dollars). This implies that we are getting nearly roughly \$10 to \$100 of benefits for every \$1 spent on air pollution abatement. Indeed, for one set of regulations - the Montreal Protocol and other early regulations to protect stratospheric ozone - the benefits provided were orders of magnitude greater than the costs. And even for many EPA regulations that do not value human health benefits in terms of dollars, the implied cost-per-life-saved is frequently well within the generally accepted range from the economics literature[12].

Finally, EPA and the Office of Management and Budget have long conducted some form of analysis of the economic effects of environmental regulation, dating back to the "quality of life review" process set up by President Nixon in 1970. Presidents Ford and Carter had similar processes, and President Reagan formalized it with Executive Order 12291, issued in 1981. And President Clinton has further refined the process in Executive Order 12866. These agencies have adhered to a regulatory development process that has had as one of its goals maximizing net benefits, and making regulations cost-effective and sensitive to economic feasibility. This is true even in cases for statutes EPA administers that do not permit an explicit weighing of costs against benefits. Given this level of scrutiny, it is unlikely, taken as a whole, that EPA regulations impose costs higher than their benefits.

Of course, one is bound to find the occasional regulation whose costs are decidedly larger than the benefits. After all, there is more to environmental policymaking than purely economic costs and benefits. But these exceptions acknowledged, it is unlikely that, as an entire body, EPA regulations would cost more than their benefits.

So what should one conclude from all of this? Are environmental protection costs large? Yes, they are. Environmental protection is a big enterprise. Large-scale undertakings of every kind involve large sums of money. But they are not nearly as large as what we spend on other, similarly important national priorities. Okay, but are they *too* large, draining vast resources into complying with regulations that otherwise could have been put to productive use elsewhere?

Probably not, because these regulations collectively provide very large offsetting benefits to society.

It would be nice, of course, if pollution control were free. That way we would enjoy lots of environmental benefits at no cost. But the same can be said for anything. We might not like spending almost 11 percent of our national income on medical care or over 4 percent on defense, but we do. Of course, in environmental protection, as in health and defense, there are ways to improve efficiency and save money. And we should do just that. But inefficiency does not mean they are entirely bad investments.

Finally, characterizing these admittedly large environmental protection costs as a drain on the economy, siphoning off resources that could be used productively elsewhere, is off the mark as well. It is closer to the truth to say that these costs are the results of demands for environmental quality improvements by citizens. We should no more characterize the costs of environmental protection as a drain on the economy as we should the costs of providing food and shelter. Allocating resources to produce things nobody wants is a drain. Environmental quality is something the public demands in the classic economic sense.

Does Environmental Protection Cause Unemployment, Plant Closures, and Reduce International Competitiveness?

Another commonly held belief is that environmental regulations cause widespread layoffs and plant closures, and reduce the competitiveness of U.S. industries in the global marketplace. The star witness for this view is the unemployment caused by logging restrictions in the Pacific Northwest to protect habitat for the spotted owl, which indeed put a significant number of unfortunate people in the local timber industry out of work. But looking at the entire nation, it turns out that in reality few layoffs and plant closures occur as a result of environmental regulations. And, for several important reasons, environmental protection is unlikely to impair international competitiveness in any significant way.

One reason why this popular perception is not accurate is that environmental regulatory costs for most industries are actually quite small. In fact, according to Census Bureau data, total 1991 pollution control expenditures as a percentage of value added - a good measure of the economic size of businesses - in manufacturing industries amounted to only 1.72 percent [13]. Costs of this size are simply not large enough in most cases to cause layoffs and shut down plants. Of course, a few industries face somewhat larger environmental protection costs, but these are highly capital-intensive industrial sectors where competitors face similar regulatory costs and whose plants are large, expensive, and unlikely to be closed because of these costs.

Employment data back this claim. According to the Department of Labor [14], mass layoffs during the period 1987-90 that are attributable to environmental and safety regulations (a far larger universe of rules than EPA's regulations alone) were responsible for only a fraction of one percent of the total. In fact, of 2,546 layoff events during that period, only 4 were traced to environmental and safety regulations. Workers were about 500 times more likely to be laid off as a result of seasonal and other work slow-downs and contract completions than because of environmental and safety rules. Model changes alone account for 50 times the layoffs caused by environmental and safety regulations.

In addition, the pollution control sector itself is relatively labor-intensive compared with the rest of the economy, according to studies of the labor intensity of different industrial sectors in the U.S. economy [15]. Thus, increased demand for environmental protection, if anything, tends to increase the demand for labor in the long run. As a result, contrary to the conventional wisdom, and excepting the misfortune of the few who are temporarily dislocated, environmental regulation is probably labor's friend, not its enemy.

Finally, environmental protection costs appear not to affect the competitiveness of U.S. industries in the global marketplace. Strong support for this conclusion is provided in a recent *Journal of Economic*

Literature article [16] surveying numerous academic studies of the possible effects of environmental regulation using various measures of those impacts. The authors conclude that there is no evidence at all that the stringency of environmental protection in the United States significantly affects our competitiveness relative to other nations either positively or negatively.

At 1.72 percent of value added, these costs are not very large in the scheme of things. Moreover, many of the major trading partners of the United States have similar environmental protection regulations and practices, so their industries face comparable pollution-control costs.

Even more convincing are studies indicating that environmental regulations in different countries around the world (and in different regions of the United States) are far less important than other factors that affect decisions regarding the location of investments in new plant and equipment [17]. Multinational companies do not shop around for countries with particularly lax or nonexistent environmental regulations in order to cut costs by polluting more. Given the relatively small cost of regulation as a percentage of value added, it wouldn't make economic sense to move a plant overseas to avoid environmental protection requirements.

If anything, multinationals are keenly sensitive to charges of exploiting the environment in developing countries, and generally put in place practices that compare favorably with those in their U.S. facilities. Where plants do move overseas, it is for market reasons, usually to gain easier access to raw materials or cheaper labor, or to serve their foreign customers more efficiently. There might be a rogue corporation here or there that actually did move to avoid environmental regulatory cost, but otherwise the image of numerous companies setting up shop in places where they can pollute at will and then undercut everyone else is a fantasy.

Of course, none of this means that specific regulations in particular instances do not result in unemployment, plant closings, or impaired international competitiveness. There are outliers in every data set. But these consequences are the exception.

Does Environmental Protection Decrease U.S. Economic Growth?

Yet another popular view is that environmental regulations reduce the growth of our economy over the long run. The charge here is more or less that expenditures on environmental protection displace other productive investments. Over time, these cumulative decreases in investment geared toward "productive" economic pursuits start to add up to a large enough sum to affect macroeconomic conditions, such as the size of the capital stock, labor productivity and wages, and employment.

A number of economic researchers have investigated these long run impacts of environmental regulatory costs [18]. In doing so, they use modeling techniques very different from the simpler ones normally used to compute the compliance costs of individual regulations. Estimating long-run effects for an entire economy is a much more complex exercise.

Methods for evaluating the short-term costs of individual environmental regulations focus on the specific markets and activities directly affected by the rule. For example, to calculate the costs of a regulation requiring air pollution control for cement kilns, the analysis would examine economic conditions in the market for cement, such as the characteristics of supply, the level and elasticity of demand, and the direct costs of complying with the rule. But this method cannot possibly shed light on whether the typical environmental regulation will have a negative long run impact on nationwide economic growth, which actually depends on many factors throughout the economy and on the combined impacts of many different

environmental and other regulations.

The technique economists have developed for assessing the long run, nationwide consequences of environmental rules is called "computable general equilibrium modeling." CGE models usually contain several dozen industry sectors, including households who supply labor and consume outputs. They have several features that make them attractive for evaluating long run effects of various policies. One is that they allow extensive substitution among industry sectors. For example, if environmental protection costs increase in one sector, the more expensive output that results both increases the demand for substitutes and produces higher costs for sectors that continue to use this sector's output. Also, in CGE models the rate of capital formation changes as household incomes and savings rates change. Because of this feature, it is possible to simulate the long run impacts of policies that reduce incomes and hence capital formation.

Of course, CGE modeling is limited to current technologies for production and pollution control; obviously it cannot forecast cost-reducing methods in products or compliance that may be invented in the future. These models also aggregate industry sectors to make the task manageable, so distinctions that could matter at a finer level of detail cannot be observed and assessed. Nevertheless, as a tool for forecasting a highly uncertain future, and how that future might be altered by various policies, CGE modeling is the best technique we have.

Computable General Equilibrium Modeling Results Must Be Interpreted With Caution

CGE modeling may be the best forecasting technique for this issue, but it can produce results that are easily misinterpreted outside of the economics profession. Indeed, understanding some of the assumptions built into these models is important for how citizens and policymakers should evaluate their findings.

Let's start by looking at some of the key results, then analyze how they were generated. First, the models indicate that environmental regulatory costs taken in the aggregate do indeed reduce economic growth. The amounts vary depending on the model, but to the outside observer, not by very much. One model [19] that examined 35 industrial sectors, plus households and government activities, over the period 1974-85 (the period during which many U.S. regulations were phased in) concludes that GDP growth was reduced by about 0.2 percent annually as a result of the costs of environmental rules. (Keep in mind that this is a reduction in the rate of GDP *growth*, not a reduction in GDP. The economy still grows, but by slightly less per year.)

But CGE models *have to* predict reduced economic growth because of environmental compliance. After all, pollution control costs in these models are treated as extra expenditures necessary to produce the same level of valued output (just as they are in the conventional methodology for evaluating the short-run costs of individual regulations). The outcome is implicit in how the model is constructed. So this finding isn't necessarily a complete picture for what people and policymakers want to know about real world regulation, where a pollution control sector emerges as part of the economy, and helps to produce environmental protection, which is also an "output" with value.

Nevertheless, CGE models do reveal other consequences of environmental compliance costs that are not captured by conventional regulatory cost calculations. These concern the long run accumulation of indirect effects. One of these indirect linkages is critical to understand in order to correctly interpret the results CGE models produce. If environmental regulations impose costs that make outputs more expensive for consumers, then what economists call the "real wage" - the value in goods and services of the money people are paid for labor - declines. But because savings are linked to income, and investment is determined

by savings, the lower real wage results in less capital formation. Over time this causes a further drop in real wages because the productivity of labor declines when it has less capital to work with. This may be an indirect effect, but to the American people, it would be an important one.

However, for simplicity, CGE models generally assume that household savings are the only available source of investment funds. This is what economists call a "closed economy," in which capital from outside the country cannot be tapped. Making the opposite assumption about access to international investment capital - an "open economy," like the world we live in - drastically alters the results of CGE models. In one, for instance, the total economic cost of environmental rules was 40 percent lower [20].

A second indirect consequence of environmental regulation predicted by CGE models is lower employment over time. But this is not unemployment in the way people understand the term - involuntary, regulation-induced layoffs. Because these models assume that people will work more for higher wages and vice versa, the reduced employment predicted by these models is the consequence of voluntary choices of individuals who elect to "consume" more leisure when the real wage falls, not the involuntary unemployment of concern to policymakers and the public.

One additional issue to consider in evaluating the conclusions reached by CGE models concerns the benefits of environmental policies. CGE modeling does not include benefits at all. It can't. The technique is designed to model the goods and services producing economy. It only estimates costs. The benefits of environmental regulations - improved human health and reduced environmental damage - don't fit into this framework.

Studies using CGE models take pains to remind readers that the entire benefits side of environmental regulation is not captured. But the omission of benefits has important implications. First, if this methodology is intended to measure costs and impacts of environmental rules beyond those estimated using conventional regulatory cost estimation methods designed to evaluate individual regulations, there is an obvious asymmetry with the benefits side. If indirect effects and linkages can amplify the costs of environmental protection requirements in the long run, as CGE models demonstrate, aren't there then long run benefit-related indirect consequences that should be taken into account?

In fact, the benefits of environmental regulations do have long run economic implications. For example, healthier workers are more productive and miss fewer work days [21]. Enhanced labor productivity, however, is not reflected in CGE models. Healthier people also consume less medical care. If this raises their effective real income and their savings, according to the logic of CGE models this would raise the rate of private investment. A cleaner environment also enhances the productivity of some investments, and reduces the costs of others. None of these positive effects are incorporated into the long run predictions of these models. Finally, just as CGE models by definition treat all regulatory costs as non-productive, they don't define improved human health and other categories of benefits as valuable outputs. If these improvements were treated like other forms of consumption, then the costs of regulations would be seen also as producing valued outputs instead of just draining resources from other productive activities.

The upshot of all of this is that CGE models report more or less what we expected to hear - that environmental regulations do involve costs. But, as is the case with conventional measures of regulatory costs, if the benefits were incorporated, environmental protection might not reduce economic growth, properly defined, at all.

What Conclusions Can We Draw?

So, conventional economics shows that environmental regulation does not cause the widespread negative economic effects that are so often alleged. Does this mean that its critics are always wrong? Not at all. These myths arise, no doubt, because there are specific rules that cause *some* of the hardships that eventually get attributed to *all* environmental regulations in the public mind. Identifying and modifying these problem areas is a worthy objective. Economics does not conclude that no adjustments are necessary as long as the total costs and benefits of all environmental regulations combined are in reasonable balance. Instead, economists advise examining the marginal costs and benefits of individual regulations in order to continue to increase their net benefits. All environmental professionals have an interest in increasing the efficiency, and thus the effectiveness, of regulation.

There is indeed room for improvement in environmental protection, just as in any large-scale program. But in the end, while acknowledging that environmental regulation may not be perfect, it certainly is not the economic monster some would have us believe.

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