Phosphates and the Environmental Free Lunch

W. Kip Viscusi

THE FREE LUNCH is not without its advantages. Consider, for example, a chance to ameliorate an environmental problem without closing a factory or costing the taxpayer any money. Surely this would be one of those "best things in life" that is free. Free indeed. Until, that is, we get around to examining the price.

My target is a modest one: the increasingly popular practice of banning phosphates from laundry detergents. Phosphates can be environmentally harmful, and banning them seems costless because phosphate-free detergents are available. Attracted by this free-lunch rationale, Wisconsin recently reimposed a ban after spirited debate, joining five other states that also have bans in force. North Carolina, Maryland, and Virginia are currently weighing bans. Many other states have at least flirted with the idea at one time or another.

But is a detergent ban really costless? A look at its implications in two states with very different conditions, North Carolina and Wisconsin, provides a broad perspective on what the free lunch really costs.

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Selling the Free Lunch

The environmental rationale for a detergent-phosphate ban is straightforward enough. Phosphates are pollutants because, ironically enough, they are biodegradable. In fact, living things thrive on them. Excessive phosphate levels in lakes and streams promote rapid growth of algae, and so speed up the natural aging process (called eutrophication) of these waterways. The clarity of the water declines, oxygen levels drop, and in extreme cases fish die. The watershed, in short, can become a swamp—rich in primitive plant and animal life, but not at all like the pristine waters that humans prefer to swim and fish.

What could be more appealing than a legislative ban of phosphates in detergents? The payoff: clearer water at no cost whatsoever to the taxpayer. Indeed, some even suggest that the ban offers a financial *advantage* to consumers, because some generic nonphosphate detergents cost less than the brand-name phosphate detergents consumers now buy. The free lunch, in other words, is freer than free. No wonder some state legislators are eager to dine.

But for those interested in environmental protection, not political pabulum, some irritating seasoning comes along with the meal. First, even if the lunch is free, it is not a substantial repast. Detergent phosphates are only small contributors to the overall phosphate levels. Second, the lunch is not free. A fact apparently overlooked by some state legislatures is that consumers adjust their behavior in response to the phosphate ban. And when all is said and done, washing without phosphates is quantifiably more expensive than washing with them.

The Light Lunch

Detergent phosphates, to start with, are only a minor contributor to waterway eutrophication. Homes that have septic tanks (about half in North Carolina and one-quarter in Wisconsin) contribute little phosphate pollution of any sort, because a properly operating septic tank is an excellent phosphate remover. About half of phosphates that *do* reach waterways come from "non-point sources"—fertilizer runoffs

from farmers' fields, for example. The other half, delivered from "point sources" such as sewer systems, originate mostly from human wastes, and no regulator has yet dared to suggest any restriction on pollution of that type. When all is said and done, no more than 12 to 15 percent of total phosphorus in waterways is attributable to detergents.

And this fact, standing alone, ensures that the environmental benefits of detergent phosphate bans are slight. In two states—Wisconsin and Minnesota—the impact of bans was assessed in follow-up studies, and in both instances no significant effect on water quality was found. Phosphate levels *did* decline, but not enough to make any real difference. A one-seventh reduction in phosphorus levels is rarely enough to reduce eutrophication sufficiently to affect the value of water resources for fishing or recreation. And in Wisconsin the costs of removing phosphorus at wastewater treatment plants dropped very little after the ban, while the amount of phosphorus in water leaving the treatment plants declined perceptibly at less than one-third of the plants.

After the Free Lunch

So much for the environmental benefits of a phosphate-detergent ban. What does the free-lunch ban really cost?

The first cost is as might be expected. Detergent manufacturers do not add phosphates for the exclusive and malicious purpose of eutrophying lakes and streams. Phosphate detergents also provide cleaner clothes. Researchers in academia as well as in the detergent and washing-machine industries have confirmed that sodium carbonate, the usual substitute for phosphates, is less effective at doing what a detergent is supposed to do: releasing and suspending soil and reducing water hardness. Within five to ten washings, the differences between colored shirts washed with phosphate or with nonphosphate granular detergents are readily apparent to any casual observer: the buildup of sodium carbonate residue gives the Brand X shirts a faded appearance that goes far beyond the ring-around-the-collar that TV-homemakers have learned to abhor. As a result, consumers discard their clothes prematurely.

To be sure, liquid nonphosphate detergents do better than granular ones, though still not as well as the phosphate brands. But liquids are much more costly too. The annual cost of switching from the best-selling granular phosphate detergent to the best-selling nonphosphate liquid has been put at $38 per household.

What is the dollar cost to consumers who switch to granular nonphosphate detergents and then endure laundry that is not quite so clean? For those who just glumly contemplate the results, we can only guess. If they value their wash quality only half as much as consumers who decide to take corrective action, the loss from the phosphate ban is, as we shall see, perhaps $30 a year.

The $30 figure is concededly speculative, but the cost of corrective action that other more enterprising consumers *do* take is not. A phosphate ban will impel about 20 percent of consumers to raise water temperature and increase their use of bleach, fabric softener, and wash pretreatments. The resultant annual costs are not trivial—about $11 per household in Wisconsin, $8 in North Carolina (weighted by the fraction of households taking corrective action). Moreover, some of the costs of using nonphosphate detergents arise whether or not the consumer takes corrective action. Carbonate buildups from the granular variety cause washing-machine repair problems and related consumer complaints to be much greater in phosphate-ban states and repair costs to be higher. Based on an appliance industry study, I estimate the present value of annual repair costs to be $12 per household in Wisconsin, $5 in North Carolina. Finally, carbonate buildup on clothes increases fabric wear. Drawing on results obtained by consumer science research-

ESTIMATED PHOSPHATE REDUCTION COSTS
(dollars per household per year)

Method	Wisconsin	North Carolina
DETERGENT BAN		
Energy and laundry additives	11	8
Increased machine repair	12	5
Fabric wear	22	10
	45	23
Laundry time*	4	4
Decreased wash quality*	30	30
Total	79	57
CHEMICAL TREATMENT		
Total cost	1.50	24
Unit cost (based on level of phosphate removed)	1.50	3–4

*Cost estimates for these items are more speculative.

ers at the University of California, I estimate these annual costs to be $22 per household in Wisconsin, $10 in North Carolina. The bottom line: the cost of actual out-of-pocket outlays and after-the-free-lunch corrective action averages $45 a year for Wisconsin households and $23 for North Carolina households. (The cost differences between the two states derive from differences in energy costs and water hardness.)

There's more. Using laundry additives requires extra laundry time, and phosphate-free detergents entail extra ironing as well, because they damage the permanent press qualities of fabrics. Putting a price on this is difficult. One minute a week at a price of $5 per hour should, however, provide a conservative estimate of the annual lost-time cost—$4 per household.

Now it must be conceded that these several costs, summarized in the table, are not likely to bankrupt the average American household. But the advocates of a detergent-phosphate ban miss the mark when they assert that the costs do not exist. Perhaps the implicit assumption is that consumers don't "really" care about cleaner wash, fabric wear, time spent ironing, and so on. But they manifestly do. Detergents containing phosphates are the dominant consumer choice in markets where they are available. After Wisconsin's ban came into effect there was a rapid upsurge in complaints to operators of coin laundries. Washing machine manufacturers also witnessed an increase in complaints about wash quality. Some consumers understood the real cause of the problem and crossed state lines to stockpile phosphate detergents. Prisons and commercial laundries took the more direct route of obtaining statutory exemptions from the ban.

The Cheaper Lunch

When the free lunch turns out to be nothing of the sort, we should inquire if there might be a cheaper one—most particularly, a cheaper one that offers better fare. With phosphate pollution, as luck would have it, there is.

The chemical treatment of wastewater can eliminate 90 percent of phosphate levels in sewage—about six times as much, in other words, as a phosphate-detergent ban. And the cost is comparatively modest. In states such as North Carolina, which have not yet invested in central wastewater treatment facilities, the annual cost would be about $24 per household. In Wisconsin, where the needed facilities are already in place, the cost of achieving the same phosphate reduction as a phosphate ban would be about $1.50.

As the table reveals, these figures suggest that wastewater treatment in Wisconsin can remove as much phosphate as a phosphate-detergent ban at about 1/30th of the readily quantifiable costs of the ban. In North Carolina there is a six-fold improvement at about the same price as a phosphate-detergent ban. A very rough extrapolation from the North Carolina and Wisconsin experiences indicates that the national cost of wastewater phosphate treatment might be about $1 billion, while the consumer cost of a phosphate-detergent ban would be about $2.8 billion. In Wisconsin, North Carolina, and nationally, the comparative cost advantages of wastewater treatment is perhaps twice as large again if one also takes into account what I have so far omitted—the costs of increased laundry time and decreased wash quality. And the comparative cost advantage of wastewater treatment increases even more when one looks at what really counts—the dollar cost per unit of pollution removed.

Why then does the expensive free lunch of a phosphate-detergent ban remain so popular? The reasons are not hard to find. The cost of wastewater treatment facilities are visible, and therefore are political as well as economic. By contrast, the costs of a phosphate-detergent ban are not easily attributed to the ban, so the political costs are correspondingly slight. In addition, a ban hits that most popular of political targets, the out-of-state corporate villain. Direct controls on a much more important source of phosphates—the fertilizers used by in-state farmers—would reduce phosphate levels more effectively but at a far higher political cost.

Yet the facts are clear. In the case of phosphate detergents, the "defect" attacked by the ban is in fact a product attribute that is significantly valued by consumers, and for good reason. Banning phosphate detergents is "free" only to the legislator worried about the next election. Treatment plants do not offer any free lunch either, but they do achieve much more pollution control at less or, at worst, comparable cost. And *that*, for once, is indeed pure gravy. ■