Industry as a metabolic activity

BRUCE SMART

World Resources Institute, 1709 New York Avenue, N.W., Washington, DC 20006

ABSTRACT The concept of “industrial economic metabolism” can provide a bridge to better understanding between environmentalists and industry. In nature each individual or species reacts to natural stimuli, competing with others for resources, extending its domain until it loses comparative advantage and comes to equilibrium with an adjacent competitor. Those species that succeed over time flourish; those that do not, diminish or disappear. Nature’s rule book has no moral or ethical ingredient beyond self-interest. Corporate metabolisms are remarkably similar to those of nature. They too react to stimuli, collect and use resources, and grow or perish based on how effectively they compete. Corporate management recognizes and responds naturally and efficiently to cost and price signals. Through them it selects resources and converts them into useful products. The efficiency with which this is done is measured by profit, the lifeblood of the corporation and its means of growth. Profit thus provides a discipline on corporate behavior, encouraging efficient performers, and, by its absence, weeding out others. Unfettered by influences other than economics, the path to corporate success is unlikely to be a compassionate one. The dilemma of the manager is that to do what is socially “right” often conflicts with what must be done to survive and prosper. Fortunately, corporations’ behavior can be altered by society when their purely economic role comes into conflict with other human values. The human-designed economic system depends on natural resource inputs, and in turn its metabolic wastes can overload the ecological system, threatening the long-term survivability of both. Increasing concern for the environment now gives the farsighted manager new latitude. There are competitive benefits in some pollution prevention. But there are not sufficiently strong forces to correct all current ills. In addition, we must harness the metabolism of the industrial world to the realities of the natural one by recognizing the immense value of depletable natural resources and ecosystems. Considering these resources as “cheap” or “free” encourages their overuse. What is needed are adjustments that price these resources at their true long-term value. Corporations will respond naturally, quickly, and efficiently to such signals. If we can send our metabolic industry the economic signals it can understand, we can retrofit our human economic system to live in harmony with the natural ecosystem of which we are a part. If we do not, nature assuredly will not accommodate our failure by changing its ways.

The concept embodied in the term “industrial metabolism” offers a bridge to better understanding between environmentalists and industry or, at the very least, an opportunity to explain to environmentalists—in terms familiar to them—why companies act as they do and how they might be helped to improve their environmental performance. Through such greater understanding can come an improved ability to work cooperatively to reach common goals.

Random House dictionary describes “metabolism” as “the sum of the physical and chemical processes in an organism by which its material substance is produced, maintained, and destroyed”; or more generally as “any basic process of functioning or operating.”

In nature the success of a species or an individual is determined by its ability to find the resources it needs—food, water, air, sunlight, space, and shelter—in its surroundings and to process them in a way that causes the individual or species to function effectively, to grow, to remain healthy, to live a long life, and to pass on its genetic heritage to succeeding generations.

In this process individuals react to natural stimuli, competing with each other and with adjacent species for resources present in the common environment, each individual and species extending its domain to that limit at which it loses comparative advantage and comes to equilibrium with an adjacent competitor. Since the natural world is in constant and often random flux, adaptability to change and luck also become success factors in this competitive matrix of global life. Those that succeed over time increase their presence in the environment; those that do not succeed diminish or disappear, and natural systems dispose of the residues left by all. Nature writes the rule book.

With rare exceptions there is in nature’s rule book no ethical or moral ingredient beyond self-interest. The beaver builds its dam without concern for the trees it chews down, for the plants that die on the land it floods, or for the adverse changes it imposes on the inhabitants of the running stream that now becomes its pond. It cares only that it has created a favorable habitat for itself and its family, so that its progeny may increase and its gene pool take a larger place in succeeding generations of beavers, and beavers take a larger place in the natural world. Self-interest, not compassion, guides the beaver’s instincts.

Let’s turn now to the structure and function of modern industry in a free market. Its basic building block is the corporation, so we must first understand what that economic entity is.

According to Random House dictionary, a corporation is an association of individuals provided by law with unlimited life for itself and limits on the personal liability of its owners for its acts. It is thus not a natural entity (as a beaver or a person is) but an invention of society.

The corporation’s prime function is to serve society by creating wealth. It does so by accumulating and employing economic assets—financial, technological, material, and human—to provide goods and services of value to the society of which it is a part.

In their pure unadulterated form, corporations’ and industries’ metabolisms can seem remarkably similar to those of nature, though their environment is usually thought of as
economic, not ecological. They too react to outside stimuli, collect and use resources, and grow or perish based on how effectively they compete individually with each other and with rival groups.

In a free market, the central nervous system—the management—of a private corporation is finely tuned to recognize and respond to the cost and price signals of that market. As an economic entity, its metabolism responds naturally and efficiently to those signals. It weighs the values, needs, and desires of potential customers; develops products and services to fill these needs; and accumulates capital, labor, technology, raw materials, and facilities to satisfy them. Each potential input is evaluated in economic terms by its quality and price and, when selected, is converted through the internal metabolic processes of the corporation—management, research and development, engineering, production, and marketing—into useful output, the value of which is again measured by the price it can command from the corporation’s customers.

Since it is part of an integrated global system, a corporation’s activities affect directly or indirectly all other players in the global economy. As in nature, everything affects everything else.

The success of the corporation within its economic environment is defined by the amount by which the revenues derived from its outputs exceed the total charges levied on it for the inputs—the resources consumed. This difference is called profit. Profit is a corporation’s lifeblood, nourishing its organs while providing the incentive needed to acquire and hold investors’ equity capital, the risk capital essential to get corporate life started and keep it going.

Stated another way, profit is the price of equity capital. To be truly successful, a corporation must return more to its equity investors than they could earn elsewhere. When it does so, it attracts more equity and thus can grow and multiply, increasing its share of the world’s economic activity. If it does not, though it may still be “profitable” in an accounting sense (that is, it earns something on its equity), it is falling behind the pack: its internal metabolic processes are not up to snuff, and it shrivels, withers, and eventually dies for lack of equity investors willing to accept the below-market return it offers.

Profit thus provides a necessary and socially beneficial discipline on corporate behavior, serving as a means of encouraging efficient performers and, by its absence, weeding out those that use society’s resources and fill society’s needs less effectively.

In its natural—even Darwinian—response to economic stimuli, the corporation is thus little different in principle from a living organism responding to its natural environment. Nor, in its pure inanimate form, does its success require a social conscience beyond enlightened self-interest any more than is typical in nature.

If unfettered by influences other than pure economics, the path to greatest corporate success is unlikely to be a compassionate one. The dilemma of the thoughtful manager who is, after all, not inanimate is that to do what he or she thinks is socially “right” often conflicts with what must be done to stay competitive—that is, to survive and prosper.

Fortunately, since corporations are not natural phenomena but social instruments created by humans, their behavior can be adjusted by society when, in their purely economic role of wealth creation, they come into conflict with other human values. Society has made many such adjustments over the years. Examples include child labor laws; antitrust laws; Securities and Exchange Commission regulations; labor laws, including minimum wage and the Occupational Safety and Health Act; generally accepted accounting practices; Food and Drug Administration regulations and approvals; truth in labeling; and, of course, laws to protect the environment. All of these are backed up—enforced—by sanctions against those players who do not conform.

Properly designed, these restraints aid the socially responsible manager, for they create an industrial playing field in which social concern must be blended with economic efficiency, thus permitting noneconomic but beneficial actions without loss of competitive position. However, regulations that tell a corporation how to do something tend to be inefficient and stifling to innovation.

Corporate behavior can be better influenced by adjustments to the economic signals the society sends by means such as tax policy, both punitive and concessionary; subsidies; and preferential or discriminatory treatment in government contracts.

Each of these intrusions into the otherwise unfettered economic metabolism of industry carries with it an economic cost. Because each diverts corporate behavior from its optimum economic path, it makes the company less efficient economically, often in unintended or hidden or unmeasured ways. This mandated inefficiency becomes the price collected for the social benefit received.

Since this price is paid not by corporations but by society in higher prices, lower investment returns, fewer jobs, and reduced tax revenues, it is important to society that it be kept as low as possible and surely held to less than the value of the benefit received. Only in this way can society become better off than it otherwise would be.

These are not easy calculations to make or trade-off to design, and they are not helped by absolutist attitudes of parties to the analysis.

Environmentalists do their argument and their cause no good when they repeat the public surveys that say the environment (or human life) is so valuable that it must be protected at any cost. Nor is business well served by taking the position that any measure that interferes with its basic wealth-creation function and the maximization of its profit is an insidious move by left-wing environmentalists to forward their hidden agendas.

Each such attitude stems from the conviction that there is only one valid side to the question, that the ecology and the economy are separate and distinct, and that when they collide one must choose between them.

Fortunately it is becoming clear to more and more thoughtful people that the environment and the economy are not separate systems coming increasingly into conflict, but rather that each is intertwined with the other in the complex natural and social setting in which mankind exists.

The human-designed economic system depends on natural resource inputs, and its metabolic wastes can overload and deplete the natural restorative powers of the ecological system. Uncontrolled industrial activities thus threaten the long-term survivability of that system and, in so doing, are fully capable of damaging or even destroying the economy’s own natural foundations and in due course the economy itself.

The ingenuity of humans, developed and implemented through the economic system, has pushed back the natural limits to human growth and expansion far beyond where it was in preindustrial times. Though not evenly enjoyed, modern industrial technology has raised the level of public health, increased supplies and quality of food and shelter, freed people for education and cultural pursuits, delayed the average time of death, and thus established a far greater and more comfortable human presence in the natural world than ever before. As a species, humans have become dazzlingly successful.

Yet, continued on its present course, this success can only lead to ecological disaster in which man will be among the many victims of the laws that nature writes. A world with
twice as many people and 5 times as much economic activity—predicted for the middle of the next century—cannot survive the impact of today’s industrial processes. As someone wisely said, “Nature bats last.”

Prevention of this catastrophe, and achievement of long-term sustainable development, lies in making good use of four favorable circumstances.

(i) Economic activity can be altered by society to achieve social as well as economic goals.

(ii) The technology is at hand or can be reasonably easily developed to reduce to tolerable levels (but not to zero) the impact of economic activity on the natural environment.

(iii) The global industrial structure is well suited and positioned to implement and diffuse these new technologies, given appropriate stimulus from governments.

(iv) Use of economic stimuli—price and cost signals—is the most efficient way to direct corporate effort, though it must sometimes be backed up by cost-justified noneconomic measures.

Next to—perhaps even including—population growth, most of our developed world’s environmental problems are caused by economically successful technologies that carry with them unintended harmful ecological side effects. The roots of most of these side effects lie in excessive use of resources or restorative systems that are treated as cheap or free, as now measured, but are precious or even irreplaceable in a longer term environmental sense.

Many socially responsible managers recognize this, as of course do most environmentalists. Yet the hands of the manager are often tied by the need to remain economically competitive with others less concerned or aware, the need to respond to the economic metabolism of the industrial world.

However, increasing public knowledge and respect for the environment gives the farsighted manager some new latitude. There is a competitive benefit to be found in some pollution prevention measures—a cost saving in reduced resource inputs, a more attractive work environment, increased investor support for the company, increased consumer appeal of “greener” products, or lessened exposure to future liabilities.

Responding to these shifts in public attitude and to the economic opportunities they provide is a welcome chance for the responsible manager to move a company’s environmental policies beyond compliance with existing regulations. But it is not a sufficiently strong force, by itself, to correct all current ills. In addition, we must harness the metabolism of the industrial and economic world to the realities of the natural one. To do this we must first recognize the immense value of depletable natural resources and ecosystems and how essential they are to human survival. Considering these resources as “cheap” or “free” encourages their overuse, for companies and consumers respond to the price signals of “cheap” and “free” by profligate consumption, just as they become frugal when prices are high.

What is needed, therefore, are economic adjustments that price these resources at their true long-term value, prices sufficient to lower the demands on them to sustainable levels. The economic metabolism of corporations will respond naturally, quickly, and efficiently to such signals. Better technologies now on the shelf will be deployed and new ones developed in a vigorous corporate effort to remain economically competitive. Those companies and industries that react best to these changed conditions will thrive. Those that do not will deserve-ly fail. Adjustments of the economic system that price natural inputs and restorative powers properly will serve both our parochial long-term human interests and those of the natural ecological system of which we are a part.

Despite the possibilities, it is by no means certain that these changes will take place. Instituting them will require great political will by the citizens of many nations. It will require large investments now to reap distant benefits not easily quantified or even certain. Voters will need to approve sacrifices by themselves to preserve opportunities for those who will be living when they are gone. There will be winners and losers in the process, and the complaining voices of prospective losers will be loud and politically appealing.

To make the necessary changes will require the efforts of thoughtful businessmen and knowledgeable environmentalists joined in a common effort to promote changes in our economic signals, with costs and benefits of each action both carefully balanced and widely shared.

Absolutist viewpoints and policies cannot solve the problem, but only ensure either environmental or economic disaster. It is a job for allies, not adversaries, because public and thus political inertia is immense and will remain so if contentious influential factions are pulling in opposite directions.

It is no longer (if it ever was) a time to look for scapegoats or painless silver bullets. There are none. It is a time to move.

There are signs that change is beginning to happen. That change must be encouraged and not damned because it is still inadequate or incomplete. But it is time to escalate the pace of change by adjusting economic signals so that our industries may shift efficiently into a higher gear towards sustainable development.

If we can send our metabolic industry the signals it can understand, we can retrofit our human economic system to live in harmony with the natural ecosystem of which we are a part. In the final analysis, it is in the self-interest of our species, not out of concern for others, that we must do so.

If we do not make these changes, nature will assuredly not accommodate our failure by changing its ways. Instead the ecological laws that apply to all species that overrun their natural boundaries will thwart mankind as well. Nature bats last.