Selected Definitions of Industrial Ecology

Frosch, Robert A. Industrial ecology: A philosophical introduction. *Proceedings*, National Academy of Sciences 89 (February 1992): 800-803.
"The idea of an industrial ecology is based upon a straightforward analogy with natural ecological systems. In nature an ecological system operates through a web of connections in which organisms live and consume each other and each other's waste. The system has evolved so that the characteristic of communities of living organisms seems to be that nothing that contains available energy or useful material will be lost. There will evolve some organism that will manage to make its living by dealing with any waste product that provides available energy or usable material. Ecologists talk of a food web: an interconnection of uses of both organisms and their wastes. In the industrial context we may think of this as being use of products and waste products. The system structure of a natural ecology and the structure of an industrial system, or an economic system, are extremely similar."

Allenby, Braden. Achieving sustainable development through industrial ecology. *International Environmental Affairs* 4, no.1 (1992).
"somewhat teleologically, 'industrial ecology' may be defined as the means by which a state of sustainable development is approached and maintained. It consists of a systems view of human economic activity and its interrelationship with fundamental biological, chemical, and physical systems with the goal of establishing and maintaining the human species at levels that can be sustained indefinitely, given continued economic, cultural, and technological evolution."

Jelinski, L.W., T.E. Graedel, R.A. Laudise, D.W. McCall, and C. Kumar N. Patel. Industrial ecology: Concepts and approaches. *Proceedings*, National Academy of Sciences, USA 89 (February, 1992).
"Industrial Ecology is a new approach to the industrial design of products and processes and the implementation of sustainable manufacturing strategies. It is a concept in which an industrial system is viewed not in isolation from its surrounding systems but in concert with them. Industrial ecology seeks to optimize the total materials cycle from virgin material to finished material to component, to product, to waste products, and to ultimate disposal. Characteristics are: 1) proactive not reactive, 2) designed in not added on, 3) flexible not rigid, and 4) encompassing not insular."

Patel, C. Kumar N. Industrial ecology. *Proceedings*, National Academy of Sciences, USA 89 (February 1992).
"Industrial ecology can be best defined as the totality or the pattern of relationships between various industrial activities, their products, and the environment. Traditional ecological activities have focused on two time aspects of interactions between the industrial activities and the environment -- the past and the present. Industrial ecology, a systems view of the environment, pertains to the future."

Hileman, Bette. Industrial ecology route to slow global change proposed. *Chemical and Engineering News* (August 24, 1992), p.7.
"Industrial ecology is the study of how we humans can continue rearranging Earth, but in such a way as to protect our own health, the health of natural ecosystems, and the health of future generations of plants and animals and humans. It encompasses manufacturing, agriculture, energy production, and transportation -- nearly all of those things we do to provide food and make life easier and more pleasant than it would be without them."

Tibbs, Hardin B.C. Industrial ecology: An environmental agenda for industry. *Whole Earth Review* 77 (December 1992).
"Industrial ecology involves designing industrial infrastructures as if they were a series of interlocking [hu]manmade ecosystems interfacing with the natural global ecosystem. Industrial ecology takes the pattern of the natural environment as a model for solving environmental problems, creating a new paradigm for the industrial system in the process."

"The aim of industrial ecology is to interpret and adapt an understanding of the natural system and

apply it to the design of the [hu]manmade system, in order to achieve a pattern of industrialization that is not only more efficient, but that is intrinsically adjusted to the tolerance and characteristics of the natural system. The emphasis is on forms of technology that work with natural systems, not against them."

Lowe, Ernest. Industrial ecology -- An organizing framework for environmental management. *Total Quality Environmental Management*, Autumn 1993.
"The heart of industrial ecology is a simple recognition that manufacturing and service system are in fact natural systems, intimately connected to their local and regional ecosystems and the global biosphere. . . . the ultimate goal of industrial ecology is bringing the industrial system as close as possible to being a closed-loop system, with near complete recycling of all materials."

Allenby, Braden and Thomas E. Graedel. *Industrial ecology* (pre-publication edition). New York: Prentice Hall, 1993.
"Industrial ecology is the means by which humanity can deliberately and rationally approach and maintain a desirable carrying capacity, given continued economic, cultural, and technological evolution. The concept requires that an industrial system be viewed not in isolation from its surrounding systems, but in concert with them. It is a systems view in which one seeks to optimize the total materials cycle from virgin material, to finished material, to component, to product, to waste product, and to ultimate disposal. Factors to be optimized include resources, energy, and capital."

Hawken, Paul. *The ecology of commerce*. New York: Harper Business, 1993.
"Industrial ecology provides for the first time a large-scale, integrated management tool that designs industrial infrastructures 'as if they were a series of interlocking, artificial ecosystems interfacing with the natural global ecosystem.' For the first time, industry is going beyond life cycle analysis methodology and applying the concept of an ecosystem to the whole of an industrial operation, linking the 'metabolism' of one company with that of another."

Source: University of Michigan. 1995. Appendix B. *Pollution Prevention Educational Resources Compendium: Industrial Ecology*. National Pollution Prevention Center, pp. 21-22. Reprinted with the permission of the National Pollution Prevention Center.