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《产业生态学报》

1999 年冬，第 3 卷第 2-3 期，19-31 页

题目：化工供应链的服务化

作者：Edward D. Reiskin, Allen L. White, Jill Kauffman Johnson, Thomas J. Votta

关键字：化学品管理服务(CMS)，非物质化，环境成本会计，供应链的绿色化，外购，由产品到服务

摘要：服务化，即企业从以生产产品向提供服务为中心的转变，是推动企业改变其传统物料流管理方式的主要因素。企业由产品生产商到服务供应商的重新定位意味着消费者所需的增加值将来源于产品的功能而非产品实物本身。要充分实现这种转型所能带来的非物质化好处，就必须从根本上重建生产者与消费者的关系。与传统经济追求的产品销售最大化不同，服务化需要生产商和消费者互相合作，分享减少物料消耗所带来的经济回报。本文通过一个在汽车和电子行业中不断扩大的化学品管理服务(CMS)的例子阐明了这种合作关系。CMS 模式的核心是建立一种在提高化学品效率和减少化学品消耗基础上的利益共享与补偿机制，而对服务往往采取固定的价格。这种服务化模式的推广对于促进非物质化以及减少产品生产商的环境负荷具有很大的潜力。

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Servicizing the Chemical Supply Chain

Edward D. Reiskin, Allen L. White, Jill Kauffman Johnson and Thomas J. Votta

KEYWORDS:
chemical management services (CMS), dematerialization, environmental cost accounting, greening the supply chain, outsourcing, product-to-service

SUMMARY:
Servicizing--the transformation from product- to service-based enterprise--is a major force in changing how firms manage material input, throughput, and output. Redefinition of the firm as a service provider instead of a product manufacturer means that function, not form, is the source of added value delivered to the customer. To realize the dematerialization benefits of such a transformation requires a fundamental realignment of the supplier-customer relationship. Instead of the traditional incentives to maximize the volume of physical product sold, servicizing requires a partnership wherein the financial rewards of reduced material consumption are shared between supplier and customer. We illustrate this partnership concept with the example of chemical management services (CMS), an approach that is gaining momentum in the automobile and electronics sector. Compensation and gain-sharing based on chemical efficiency and chemical use reduction, often tied to fixed price mechanisms, lie at the core of the CMS model. Diffusion of the servicizing model holds much promise for driving dematerialization while reducing the environmental burden of product manufacturers.

《产业生态学报》

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题目：一种基于因特网的协作式的产品环境设计方法

作者： Nick Borland, David R. Wallace

关键字：饮料瓶，公用对象请求代理体系结构(CORBA)，面向环境的设计(DfE)，基于因特网的建模，一体化产品设计，生命周期评价(LCA)

摘要：本文为产品设计者提供了一个实施环境影响实时评价的计算机工具。采用并行建模方法，环境专家可以建立生命周期模型，定义界面并通过因特网发布产品环境影响的分析结果。传统的设计人员不是环境方面的专家，他们在进行产品模型设计时，有赖于专家们提供可靠的产品环境影响评价结果。基于因特网的协作式的产品环境设计工具不仅便于专家作出评价，更实现了设计人员和环境专家之间的实时通讯和信息交流。本文讨论了建立和维持生命周期环境评价和产品设计模型间的信息交互的方法，并通过一个饮料瓶的设计实例说明该方法如何兼顾环境和产品特性目标，比较不同的设计方案，从而得到满意的设计。

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Environmentally Conscious Product Design: A Collaborative Internet-based Modeling Approach

Nick Borland and David R. Wallace

KEYWORDS:
beverage containers, common object request broker architecture (CORBA), design for environment (DfE), Internet-based modeling, integrated product design, life-cycle assessment (LCA)

SUMMARY:
This paper proposes a computer-based method for providing product designers with real-time environmental impact assessment. In this concurrent modeling approach, environmental experts build life-cycle models, define their interfaces, and publish them as distributed objects on the Internet. Traditional designers integrating these objects into their design models have access to the impact assessment methods provided by the environmental expert. In this paradigm, the focus shifts from providing techniques that let non-expert designers perform life-cycle impact assessments to tools that facilitate timely communication and in-formation transfer between designers and appropriate environmental experts. Establishing real-time communication between the product design models and the environmental life-cycle models is the primary focus of this paper. Methods for establishing and maintaining the interaction between life-cycle and product design models are described. A beverage container design example illustrates how this collaborative approach can use environmental and traditional design goals to determine effective trade-offs between design alternatives.

《产业生态学报》

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题目：生态学模型与产品：种群生态学展望

作者： Stephen H. Levine

关键字：生物学类比，生态学与经济学，进化系统，种群生态学，产品政策，技术预测

摘要：产业生态学利用系统生态学有关能流和营养元素流的分析模型来寻求减少产业活动环境影响的途径。另一种生态系统模型——种群生态学模型则重在分析生物种内和种间关系。种群生态学模型可作为系统生态学方法的一种有益补充，用于描述产业生态学领域内的产品间关系的研究。一种环境影响较小的生产过程能否成功实施，将主要取决于其产品能否成功地占领市场。本文还讨论了多种产品相互作用的实例。

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Ecological Models and Products: A Population Ecology Perspective

Stephen H. Levine

KEYWORDS:
biological analogy, ecology and economics, evolutionary systems, population ecology, product policy, technological forecasting

SUMMARY:
Industrial ecology has used the systems ecology model, with its emphasis on the flows of energy and nutrients, as a tool to find ways to minimize the adverse environmental effects of industrial activity. A second ecosystem model, the population ecology model, emphasizes intra- and inter-specific interactions of many types. When applied to industrial systems, it suggests an increased focus on products. It therefore can provide a useful complement to the systems ecology approach. If industrial processes that are less harmful to the environment are to be successfully implemented, they will have to produce products that can successfully penetrate the marketplace. A number of historical examples are used to illustrate the many product interactions discussed.

《产业生态学报》
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题目：定量产业生态学与生态经济学

作者：Herman E. Koenig, John E. Cantlon

关键字：生态系统理论，反馈控制，投入-产出分析，生态数学，生产经济学，技术网络

摘要：本文将技术、生态学和经济学三个相对独立的学科统一在一个理论框架之下。文中给出了对经济系统的物流、能流和信息流及其与自然系统之间的相互作用开展定量分析的数学基础。技术、生态和经济之间复杂的作用关系最终组成了一个由工业和技术组织组成的具有一定生态经济特性的网络，这样定量工程设计的范围从单个技术扩展到企业和行业层面上的技术网络。在这个理论框架中，传统的生态学概念与实践理念在信息的反馈控制下扩展到了产业发展和经济组织领域，自然科学的原理得以有效地应用于社会科学研究。其中有关生态风险定价的研究是对关注地方、区域和国家层面上经济组织的传统经济政策的一个有益补充。

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Quantitative Industrial Ecology & Ecological Economics

Herman E. Koenig and John E. Cantlon

KEYWORDS:
ecological system theory, feedback control, input-output analysis, mathematical ecology, production economics, technological networks

SUMMARY:
This article presents a theoretical foundation for integrating three otherwise disparate areas of human thought and understanding: technology, ecology, and economics. The article presents the mathematical foundations for quantifying the biophysical (mass, energy, and informational) aspects of economic production systems and their interaction with natural systems. These mathematical relationships are required for the on-going ecological and economic design of technological production networks by enterprise management, thereby extending the scope and scale of quantitative engineering design from the domain of individual technologies to networks of technologies at enterprise, corporate, and industrial levels of technological organization. The analytical framework extends the practical utility of ecology, as an applied natural science, from passive environmental monitoring and prediction to active institutional participation in an informational feedback control strategy pursuant to economically abating the ecological risks of industrial growth, development, and modernization at local, regional, and global levels of ecological organization. And it provides the applied natural-science underpinnings and the informational feedback control institutions required to support economics as an applied social science. In this context ecological risk-control pricing is presented as a supplement to conventional economic policies at local, regional, and national levels of economic organization.

《产业生态学报》
1999 年冬，第 3 卷第 2-3 期，85-93 页

题目：生命周期改进分析的结构化方法

作者： Thomas E. Graedel

关键字：面向环境的设计(DfE)，改进分析，解释分析，ISO14043，生命周期评价(LCA)，优先排序

摘要：生命周期评价的第 3 个阶段是解释分析或者改进分析阶段，特别是可能的改进措施，一直得到很少的关注，但其在整个 LCA 过程中意义十分重大。本文提出了一种生命周期改进分析的结构化方法，可在决策时有效地参考和利用 LCA 前两个阶段所得的包括环境影响、技术可行性、经济效益、产品管理、用户感受等在内的各个方面的信息。此外还提出了一种从生命周期和作用者两方面对各种影响因素进行优先排序的方法。

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A Structured Approach to LCA Improvement Analysis

Thomas E. Graedel

KEYWORDS:
design for environment (DfE), improvement analysis, interpretation analysis, ISO 14043, life-cycle assessment (LCA), prioritization

SUMMARY:
The third stage of life-cycle assessment, interpretation analysis (and improvement analysis, one of its components), has received relatively modest attention from LCA developers, especially as regards approaches for effecting improvements. However, this latter step is crucial if the LCA is to produce environmental benefits. A structured approach to improvement analysis is proposed, in which it is recognized that decisions regarding the recommendations that flow from the first two LCA stages are based not only on the environmental aspects of the recommended actions but also on such factors as technical feasibility, economic benefit, implications for product management, and effects on customer perception. A prioritization technique based on these factors is developed, as are two prioritization diagrams, one segmented by action agent and one segmented by life stage.

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题目：基于投入产出分析的产品生命周期评价

作者： Satish Joshi

关键字：汽车油箱，面向环境的设计(DfE)，投入产出分析，ISO14000，生命周期评价(LCA)，产品评价

摘要：生命周期评价(LCA)是对产品、材料或过程的相关环境影响进行的综合、系统的评判，定量给出了参评对象从原料开采、制造、使用到最终处置的整个生命周期过程中的环境负荷。然而 LCA 目前仍面临着边界确定、灵活性、数据准确性等诸多问题。本文提出了一个快速、高效的 LCA 评价模型。其核心部分是包括美国 498 个行业的环境影响的投入产出表。主要的环境影响涵盖了全球变暖、酸雨、能源使用、不可再生矿物消耗、富营养化、传统污染排放、环境毒性等方面。通过组合已有数据建立新的产业单元，该模型可对单个产品或整个过程作出分析。文中还提供了比较汽车钢质油箱和塑料油箱环境表现的 LCA 分析实例。

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Product Environmental Life Cycle Assessment Using Input-Output Techniques

Satish Joshi

KEYWORDS:
automobile fuel tanks, design for environment (DfE), input-output analysis, ISO 14000, life-cycle assessment (LCA), product evaluation

SUMMARY:
Life-cycle assessment (LCA) facilitates a systems view in environmental evaluation of products, materials, and processes. Life-cycle assessment attempts to quantify environmental burdens over the entire life-cycle of a product from raw material extraction, manufacturing, and use to ultimate disposal. However, current methods for LCA suffer from problems of subjective boundary definition, inflexibility, high cost, data confidentiality, and aggregation. This paper proposes alternative models to conduct quick, cost effective, and yet comprehensive life-cycle assessments. The core of the analytical model consists of the 498 sector economic input-output tables for the U.S. economy augmented with various sector-level environmental impact vectors. The environmental impacts covered include global warming, acidification, energy use, non-renewable ores consumption, eutrophication, conventional pollutant emissions and toxic releases to the environment. Alternative models are proposed for environmental assessment of individual products, processes, and life-cycle stages by selective disaggregation of aggregate input-output data or by creation of hypothetical new commodity sectors. To demonstrate the method, a case study comparing the life-cycle environmental performance of steel and plastic automobile fuel tank systems is presented.

《产业生态学报》
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题目：氯元素的生命周期，第 4 部分：持久性环状有机氯分析

作者：Robert U. Ayres, Leslie W. Ayres

关键字：生物富集，氯化烃，持久性有机污染物(POPs)，持久性生物富集有毒化合物(PTBs)，杀虫剂，物质流分析(SFA)

摘要：环状有机氯拥有一些明显的特点，如易挥发、溶于液体、有毒、在环境中持久存在、在生物体内可富集等。持久性有机污染物(POPs) 就是这样一类物质，它们传播得很广，甚至在北极也能找到。杀虫剂和除草剂是这类污染物主要来源。此外还有二氧(杂)芑(PCDDs)和呋喃(PCDFs)，它们是一种混入除草剂中的化学反应中间体，另外也产生于垃圾焚烧和氯漂白过程。大多数 POPs 在发达国家已受到严格的控制，但在发展中国家情况可能就不那么乐观。对 POPs 不仅要监控其污染源和源头浓度，还应监控其在环境中的含量及传播途径。为开展一个全面的风险分析，我们需要更全面地收集有关这些化合物的产量、用量、存量、使用时间和地点的详细数据。然而目前政府和国际组织间尚缺乏一定的合作，收集来的这类数据很不一致。

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The Life-Cycle of Chlorine, Part IV: Accounting for Persistent Cyclic Organo-Chlorines

Robert U. Ayres and Leslie W. Ayres

KEYWORDS:
bioaccumulation, chlorinated hydrocarbons, persistent organic pollutants (POPs), persistent toxic bioaccumulative compounds (PTBs), pesticides, substance flow analysis (SFA)

SUMMARY:
Some cyclic organo-chlorines share key characteristics to a significant degree, notably volatility, solubility in lipids, environmental persistence, a tendency to bioaccumulation, and toxicity to animals. A subset of this group has been designated "persistent organic pollutants" (POPs). Because of their volatility, persistence, and tendency to bioaccumulate, POPs are found in remote locations, such as the Arctic, far from the locations where they were initially used or produced. Except PCDDs (dioxins)and PCDFs (furans), all are, or were, originally produced for use as such mainly as pesticides or herbicides. PCDDs and PCDFs have never been produced for their own sake; they are unwanted contaminants of chemical intermediates that were passed on and incorporated in final products, notably herbicides; they are also generated spontaneously in most combustion processes and chlorine bleaching of paper. Most POPs have been sharply restricted or banned outright in most of the industrialized countries, but not in less developed countries. The qualities of persistence and bioaccumulation give special urgency to monitoring not only point source emissions and local concentrations, but also the mobile environmental reservoirs and exposure routes of these chemicals. To conduct adequate risk analyses, far more detailed data is needed on quantities produced and used, quantities and location of storage, mode of use, location of use, and period of use. Such data are not collected consistently by government or international agencies.

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题目：桉树油项目的产业生态学研究

作者：Allan Barton

关键字：林业，二氧化碳固定，旱地农业，桉树油，土地关怀，溶剂

摘要：桉树油的商业价值促进了桉树种植业的发展。桉树可控制地下水和土壤盐度，桉树油可以替代一些导致臭氧层空洞的溶剂，此外种植桉树还能吸收大气中的二氧化碳。西澳大利亚种植了大量的小桉树并生产出了大批桉树油。种植业的发展还有助于土壤恢复，随着三氯乙烷这一可能造成臭氧层消耗的化学品的禁用，桉树油作为一种替代工业溶剂的前景逐渐看好。目前市场上对这类“天然”产品存在一定偏好。通过改进种植技术、改良树种、发展规模经营，产品的价格可望降低一半，那时桉树油应该能大规模占领市场。

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The Oil Mallee Project: A Multifaceted Industrial Ecology Case Study

Allan Barton

KEYWORDS:
agroforestry, carbon sequestration, dryland farming, eucalyptus oil, landcare, solvent

SUMMARY:
The planting on degraded agricultural lands of eucalypts for leaf oil provides a commercial incentive for restoring original vegetation; a sustainable method of controlling groundwater and salinity; a product that is an environmentally benign substitute for a widely used solvent damaging to the ozone layer; and a mechanism for reducing atmospheric carbon dioxide levels. With integrated tree crop systems and improved harvesting and processing technologies, the Western Australian wheat belt could produce large volumes of high-cineole eucalyptus oil from mallee eucalypts. With new industrial markets, a scale of planting could be achieved that would result in substantial land rehabilitation benefits. Industrial solvent markets are large and currently in transition following the recent withdrawal of 1,1,1-trichloroethane as a result of international measures to control ozone depletion. There is a strong preference in these markets for "natural" replacement products. Although large-scale penetration of these markets would need prices about half those prevailing in traditional eucalyptus oil markets, this goal should be achievable with the potential for economies of scale, genetic advances, and improved harvesting and processing technologies.