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《产业生态学报》

1999年冬, 第3卷第1期, 9-22页

题目: 市场失灵与企业环境政策: 超越环境法规要求的企业经济学原理

作者: Forest Reinhardt

关键字: 企业环境管理, 环境经济学, 环境战略, 外部性, 免费的午餐, 工业组织

摘要: 本文研究了在何种条件下自愿提供环境公共物品对企业而言将成为一种合理的行为。假设环境外部性是唯一偏离完全竞争的因素, 并且任何企业均不享有对自然资源的低价优先使用权, 那么自愿将环境成本内部化的企业将无法生存。但由于还有其它一些偏离完全竞争的因素存在: 如信息不对称和垄断竞争等, 企业发现, 超越环境法规的要求, 提供更多的环境公共物品可能仍然符合股东的利益。愈来愈多的企业, 特别是一些欧美企业, 声称他们实行超越环境法规要求的环境政策。对企业的股东而言, 只要能够增加企业的预期价值, 或者能合理地控制其经营风险, 企业采取这种政策就是合理的。本文对这类环境政策提出了经济学解释。采取该类环境政策是否增进企业的经济效益, 主要取决于企业的市场定位、组织能力以及行业结构等因素。

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Market Failure and the Environmental Policies of Firms: Economic Rationales for "Beyond Compliance" Behavior

Forest Reinhardt

KEYWORDS:

corporate environmental management, environmental economics, environmental strategy, externalities, free lunch, industrial organization

SUMMARY:

This paper is an inquiry into the circumstances under which the voluntary provision of environmental public goods might be sensible from a firm's point of view. If environmental externalities were the only departure from the economic assumptions of perfect competition, and if no firms had preferential access to superior (low-cost) stocks of natural resources, firms that volunteered to internalize costs could not survive. But because externalities coexist with other departures from the competitive paradigm, such as asymmetric information and oligopoly competition, firms may find it in their shareholders' interests to provide environmental public goods to a greater degree than required by law. A number of firms, especially in Europe and North America, assert that they are pursuing "beyond-compliance" environmental policies. From the perspective of a firm's shareholders, it makes sense to pursue such policies if they increase the firm's expected value or if they appropriately manage business risk. This paper discusses economically rational explanations for such policies. It analyzes the ways in which a firm's chances of financial success in pursuing any one of them are influenced by the firm's market position and organizational capabilities and by the basic structure of the industry in which it competes.

《产业生态学报》

1999年冬, 第3卷第1期, 23-40页

题目: 瑞典铅酸电池系统的铅损耗研究: 有毒金属闭路管理概述

作者: Sten Karlsson

关键字: 清洁再循环, 非物质化, 重金属, 铅酸电池, 铅排放, 材料流

摘要: 铅是一种稀有、有毒且大规模使用的金属。本文探讨了实现其闭路循环的技术机会。文章开发了瑞典铅酸电池系统的模型, 用以分析铅金属的流动与环境损耗情况。该系统模型建立在现有的铅和电池的生产与回收技术基础上, 其中废旧电池的回收率是个变量。研究结果表明在生产与回收过程中铅的损耗很低, 整个系统损失主要取决于其消费损失和回收率。只要废电池能够有效回收, 其铅损耗与自然的铅循环和人类社会工业化历程中的铅消耗相比就微不足道。瑞典目前主要采用天然生产铅生产铅酸电池所需的氧化铅产品, 但模型假设所有的再生铅将循环用于新电池的生产, 并探讨了在氧化铅制造过程中更多使用再生铅的可能性。

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Closing the Technospheric Flows Of Toxic Metals: Modeling Lead Losses from a Lead-Acid Battery System for Sweden

Sten Karlsson

KEYWORDS:

clean recycling, dematerialization, heavy metals, lead-acid batteries, lead emissions, materials flows

SUMMARY:

This article investigates technological opportunities to close technospheric flows in a large-scale use of a toxic and scarce metal, lead. It analyzes the lead flows and losses to the environment in a modeled lead-acid battery system for Sweden. The modeled system is built on today's technology for production and recycling of lead and batteries while the recovery of used batteries is varied. The analysis shows that the losses from the production and recycling processes are so low that consumption losses and the recovery rate dominate the total system losses. In a steady state with very high recovery of used batteries, the system losses are small compared to natural lead flows and to the historical lead losses during the industrialization. The modeling assumes that all the secondary lead goes back into the production of new batteries even though in Swedish battery manufacturing today, primary lead dominates the lead supply for lead oxide production. The possibilities for increased secondary lead use in the production of lead oxide are also discussed.

《产业生态学报》

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题目: 重金属平衡 II: 对欧洲农业生态系统中镉、铜、铅和锌的管理

作者: Simon Moolenaar

关键字: 农业, 环境管理系统(EMSs), 重金属, 物流会计(MFA), 土壤质量管理, 物质流分析(SFA)

摘要: 对农业生态系统进行重金属可持续管理的目的是为了保持土壤的农业生产、物质循环以及生物栖息功能。为了有效地认识与管理重金属流, 本文建立了农业生态系统的重金属流模型。系列论文的第一部分已经阐述了农业生态系统中的重金属平衡的一般问题, 本文重点结合几个欧洲的实例对不同空间规模、不同类型的农业生态系统的重金属元素平衡问题进行了研究。在国家与国际尺度上的重金属平衡研究为有关的经济分析和政策制订提供了依据。然而上述层面上的政策往往忽视了农场的具体特点和具体的管理手段。对农场主而言, 农场级别上的重金属平衡分析更为重要。本文认为, 一个农场要获得环境认证, 应将重金属平衡分析引入其农场环境管理系统。只有如此, 农场认证能够更好地服务于农业环境保护政策。

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Heavy Metal Balances, Part II: Management of Cadmium, Copper, Lead, and Zinc in European Agro-Ecosystems

Simon Moolenaar

KEYWORDS:

agriculture, environmental management systems (EMSs), heavy metals, materials flow accounting (MFA), soil quality management, substance flow analysis (SFA)

SUMMARY:

The aim of sustainable heavy-metal management in agro-ecosystems is to ensure that the soil continues to fulfill its functions: in agricultural production, in environmental processes such as the cycling of elements, and as a habitat of numerous organisms. To understand and manage heavy-metal flows effectively, a consistent approach to modeling the flows is needed within the particular agro-system under study. General aspects of heavy-metal balance studies in agro-ecosystems were described in part I of this study. In this article (part II), several European studies of heavy-metal balances at varying spatial scales and in a variety of agro-ecosystems are reviewed. Sectoral studies at the national and international levels provide information for economic analyses and generic regulations; however, policies implemented at these levels often ignore farm characteristics and individual management options. Field-scale and farm-gate balances give farmers specific feedback on effective options for better heavy-metal management. Heavy-metal balances could be incorporated in an environmental management system of certified farms. In this way, farm certification may well serve as a basis from which to develop policy to address environmental issues in agriculture.

《产业生态学报》

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题目: 一种针对汽车的绿色认证方法

作者: John M. DeCicco, Martin Thomas

关键字: 汽车, 生态标志, 环境指标, 燃料效率, 生命周期评价(LCA), 机动车辆

摘要: 合理地提供产品环境影响的信息对市场导向的环境保护至关重要。对产品作绿色认证能够影响消费者的选择, 并通过影响产品或企业的市场形象, 来引导技术和产品的设计开发。虽然已经为汽车及其配套产业制定了很多环境政策, 然而现有的对汽车环境表现的信息披露机制仍然很不完善。比如, 能耗效率是决定汽车环境表现的一项重要指标。为了便于消费者选择更加节能的汽车, 有必要对汽车的整体效率进行研究: 本文利用生命周期评价法对美国市场上的各主要厂商及主要款式的汽车产品进行了绿色评估, 尽管这并不是一项权威的生态认证, 但仍对消费者具有很高的参考价值, 并为发展完善的生态标志系统打下了基础。本文最后分析了该评分系统的背景资料、数据问题、分析方法以及进一步的研究需要, 并总结了其应用前景。

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A Method for Green Rating of Automobiles

John M. DeCicco and Martin Thomas

KEYWORDS:

automobiles, eco-labeling, environmental metrics, fuel efficiency, life-cycle assessment (LCA), motor vehicles

SUMMARY:

Coherent information about the environmental impacts of a product is essential for pursuing market-oriented approaches to environmental protection. Such green rating information can influence consumers' choices and, by affecting product and corporate images in the marketplace, might also influence technology development and product planning. Automobiles and their supporting industries are the subjects of many environmental policies. Informational approaches to automotive environmental performance, however, have been relatively piecemeal. In the course of developing consumer information and market creation programs for vehicles of higher energy efficiency (an important determinant of environmental performance), the authors felt that it was necessary to address this fragmentation rather than treat efficiency in isolation from other factors. A green rating system was developed based on principles of life-cycle assessment and is usable within the confines of available data that permit discrimination among makes and models. The resulting methodology is applied in a consumer-oriented publication that rates vehicles in the U.S. market. The ratings cover all vehicles and do not constitute an eco-label, although the methodology provides groundwork for developing a label. The background, data issues, analysis, and future research needs for this rating system are described along with a summary of its application.

《产业生态学报》

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题目: 移动电话回收和再循环的动态生命周期模型**作者:** Jake McLaren, Lucy Wright, Stuart Parkinson, Tim Jackson**关键字:** 动态模型, 电子废物, 生产者延伸责任, 生命周期能耗, 移动电话, 产品回收

摘要: 1997年, 欧洲电讯与专业电子工业贸易协会(ECTEL)旗下的移动电话回收工作组在英国和瑞典推出了一项试验性移动电话回收计划。本文研究了该回收计划的生命周期能源模型。研究人员从该试验计划收集数据, 并利用相应模型计算了不同种类移动电话及其回收模式在1997年的静态能源平衡图。研究人员还开发了关于英国的时间序列模型, 研究了不同回收方式可能造成的环境影响。本研究所开发的动态交互式生命周期模型方法在政府立法和企业决策领域具有广泛的应用前景。

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A Dynamic Life-Cycle Energy Model of Mobile Phone Take-back and Recycling

Jake McLaren, Lucy Wright, Stuart Parkinson and Tim Jackson

KEYWORDS:

dynamic modeling, electronic waste, extended producer responsibility (EPR), life-cycle energy, mobile phones, product take-back

SUMMARY:

This paper reports the results of a life-cycle energy model of a pilot mobile phone "take-back" scheme carried out by the Cellular Phones Take-back Working Group of the European Trade Organisation for the Telecommunication and Professional Electronics Industry (ECTEL) in the United Kingdom (UK) and Sweden during 1997. Using data collected from the scheme, the model calculates a snapshot "energy balance" associated with mobile phone take-back for a variety of phone types and take-back scenarios in the year 1997. It also develops a time-series model for the UK, describing the environmental implications of different take-back scenarios in the future. Because of its emphasis on interactive, dynamic modeling techniques, the methodology developed for the life-cycle model has the potential for wide application in regulatory and industrial decision making.

《产业生态学报》

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题目: Conoco 的蒸气回收项目

作者: Mark Sharfman, Rex T. Ellington, Mark Meo

关键字: 清洁生产, 闭路循环, 环境控制技术优化, 石油与燃气工业, 污染预防, 零排放

摘要: Conoco 公司是位于美国德克萨斯州 Corpus Christi 附近的天然气工厂, 通过闭路循环技术开展蒸气回收利用, 有效地减少了污染物的排放。为应对美国 1990 年的清洁空气法修正案(CAAA), Conoco 开发了一项技术将生产设施排放的气体收集返回到其洗涤和冷凝单元, 回收并出售有用产品, 同时使废气得到了充分的燃烧, 从而减少了有害空气污染物的排放。该项技术的优势之一是无需用电。通过实施这些措施, 工厂实现了接近于零排放的闭路循环。这项创新为 Conoco 节省了成本, 并保持了生产技术的自主权。整个技术改进仅投入 \$560,000, 其环境标准超出了 CAAA 对该类生产设施的要求。为此 Conoco 节省了排污许可证首次申请所需的 \$2,535,000, 以及今后每年重新审核所需的 \$1,359,000。该项技术每年回收价值 \$210,000 的燃气, 价值 \$58,128 的 3,633 桶冷凝液, 而且年均减排 884 吨氮氧化物、2,366 吨挥发性有机物和 495 吨其它有害空气污染物。该技术相应投资的 \$560,000 不到两年即可全部收回。

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Conoco and the Vapor Recovery Project

Mark Sharfman, Rex T. Ellington and Mark Meo

KEYWORDS:

cleaner production, closing the loop, maximum available control technology (MACT), oil and gas industry, pollution prevention, zero emissions

SUMMARY:

We describe Conoco's closed-loop approach to reducing undesirable emissions through vapor recovery at some of its natural gas production facilities near Corpus Christi, Texas. In response to the U.S. Clean Air Act Amendments of 1990 (CAAA), Conoco developed a technological solution that routed emissions from the facilities to fuel scrubbers and condensers to capture usable product and hazardous air pollutants. Usable product was sold. Nonsalable emissions were routed to on-site equipment as fuel. The new technology was designed without power needs because electricity was not available. In completing these modifications, a closed system (approaching zero emissions) for these facilities was achieved. This innovation saved and earned money for the firm and allowed Conoco to retain its autonomy in these operations. The solution was so effective that the air quality permits under the CAAA were not required for these production facilities, for a total out-of-pocket cost of \$560,000 (plus earned revenue). The firm saved \$2,535,000 in initial and \$1,359,000 in annual permit costs and fees. The technology recovered \$210,000/yr worth of vent gas as on-site fuel and 3,633 barrels/yr of saleable condensate valued at \$58,128/yr. At the same time, it reduced its division environmental impact by 884 tons/year of nitrogen oxides, 2,366 tons/yr of volatile organic compounds, and 495/yr of other hazardous air pollutants. Payout of this \$560,000 investment was less than 2 years.

《产业生态学报》

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题目: 牛奶包装的生命周期设计与管理

作者: Gregory A. Keoleian, David V. Spitzley

关键字: 生命周期成本, 生命周期设计, 生命周期能耗, 牛奶包装, 环境表现评价, 固体废物

摘要: 对牛奶包装进行生命周期清单分析和成本分析可更好地指导其环境设计和环境管理。本文选取了容纳 1 加仑牛奶所需的一次性和可重用玻璃瓶、一次性和可重用高密度聚乙烯 (HDPE) 瓶、纸包装盒、线性低密度聚乙烯 (LLDPE) 袋以及可重用聚碳酸酯瓶共七种容器, 分析了其整个生命周期中的固体废物、能耗及成本情况。此外还对环境障碍、各种环境因素间的平衡问题作了研究。灵敏度分析表明生命周期成本和环境负荷主要取决于原料生产能耗、消费后固体废物和容器成本等因素。而短期的回收率、垃圾收费和回收材料市场价格等因素所起的作用较小。本文的生命周期清单分析研究结果与已有的关于容器生命周期的研究是一致的。可重用 HDPE 瓶、聚碳酸酯瓶和 LLDPE 袋在生命周期固体废物排放和能耗等方面, 具有最好的环境表现。然而这类容器要想占领更大的市场, 还需要解决诸如空容器处理与贮存、可重用包装的押金、以及软包装袋的再封口和防穿孔等问题。

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Guidance for Improving Life Cycle Design and Management of Milk Packaging

Gregory A. Keoleian and David V. Spitzley

KEYWORDS:

life-cycle costs, life-cycle design, life-cycle energy, milk packaging, performance evaluation, solid waste

SUMMARY:

Life-cycle inventory and cost-analysis tools applied to milk packaging offer guidelines for achieving better environmental design and management of these systems. Life-cycle solid waste, energy, and costs were analyzed for seven systems including single-use and refillable glass bottles, single-use and refillable high-density polyethylene (HDPE) bottles, paperboard gable-top cartons, linear low-density polyethylene (LLDPE) flexible pouches, and poly carbonate refillable bottles on a basis of 1,00 gal of milk delivered. In addition, performance requirements were also investigated that highlighted potential barriers and trade-offs for environmentally preferable alternatives. Sensitivity analyses indicated that material production energy, postconsumer solid waste, and empty container costs were key parameters for predicting life-cycle burdens and costs. Recent trends in recycling rates, tipping fees, and recycled materials market value had minimal effect on the results. Inventory model results for life-cycle solid waste and energy indicated the same rank order as results from previously published life-cycle inventory of container systems. Refillable HDPE and polycarbonate, and the flexible pouch were identified as the most environmentally preferable with respect to life-cycle energy and solid waste. The greater market penetration of these containers may be limited by performance issues such as empty container storage, handling requirements, and deposit fees for refillables, and resealability and puncture resistance for the pouch.