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《产业生态学报》

2001年冬, 第5卷第4期, 15-28页

题目: 用于生命周期评价的透明、交互式软件环境及其在住宅窗用材料选择过程中的应用

作者: Gregory A. Norris, Peter Yost

关键字: 绿色建筑, 生命周期评价(LCA), 灵敏度分析, 可持续建筑, 透明度, 不确定性分析

摘要: 生命周期评价(LCA)可用于选择环境友好的建筑材料和部件。目前对LCA中一个重要阶段——产品使用阶段——的评价主要存在两方面的问题: 首先, 建筑部件的环境影响与其具体应用的建筑对象有关; 其次, LCA评价结果一定程度上取决于产品的使用寿命, 而相关信息不易获取。以房屋窗户为例, 房屋的地理位置、气象、供暖等因素以及窗户的使用年限, 都对其最终的环境性能产生影响。为此, 本文提出了一套生命周期评价的软件模型LCE(Life Cycle Explorer), 以便于决策者确定不同影响因素的相对权重并作出正确的评价。利用LCE, 决策者可与产品用户及有关专家联系, 进行信息交流与处理。针对上述的房屋窗户选择问题, LCE得以实证检验, 并进一步确定了设计的指导原则, 即实现不同LCA评价结果与工业生态模型的信息交互。

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A Transparent, Interactive Software Environment for Communicating Life-Cycle Assessment Results: An Application to Residential Windows

Gregory A. Norris and Peter Yost

KEYWORDS:

green buildings, life-cycle assessment (LCA), sensitivity analysis, sustainable architecture, transparency, uncertainty analysis

SUMMARY:

Life-cycle assessments (LCAs) can be used to support the selection of environmentally preferable building materials. But the dominance of the usage phase in the life cycle of building materials represents a special challenge for two reasons. First, many aspects of a building material's usage phase can be context specific. Second, the LCA outcome may rest on a building material's service life, a parameter for which there is typically insufficient information for proper determination. For example, in the selection of a window, important usage-phase, context-specific factors that could be determinant include location/climate, heating-system characteristics (efficiency and fuel), and product durability. A prototype software tool, the Life Cycle Explorer, has been developed that enables decision makers to assess the relative importance of literally dozens of such influential parameters in determining the outcomes of LCA evaluations for building components. The software employed by the Life Cycle Explorer permits extensive layering while maintaining ease of browsing, with the intent of accessibility to both the layperson and the expert. An initial application of the tool addressed residential window selection; the design principles of the software are relevant to the communication phase of a wide variety of LCA and industrial-ecology-related modeling projects.

《产业生态学报》

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题目: 城市与工业共生: 历史观点与现实政策之考量

作者: Pierre Desrochers

关键字: 集聚型经济, 生态工业园, 工业共生, 卡伦堡, 再循环, 城市经济

摘要: 从丹麦卡伦堡的工业共生实践开始, 兴建生态工业园的热潮在全世界逐渐兴起。近年来, 基于副产物/废物交换利用模式的生态工业园在欧洲及北美屡屡出现。然而有证据表明, 不同产业间物质的循环利用, 作为城市的一个基本功能, 业已存在多年, 卡伦堡等区域内企业共生的实例不过是其中的一个很小的片断, 现存的生态工业园政策有待商榷。

本文认为, 经济因素是推动城市或企业间自发产生物质交换利用的一个基本因素。以卡伦堡案例为代表的现行生态工业园规划往往过于局限与一隅, 其成效尚存疑问; 且与自由市场经济相比, 这种公共计划产物的经济效率也相对不高。因此, 对卡伦堡案例进行深入反思, 并由此出发制定更加灵活可行的产业生态政策框架, 具有重要的现实意义。

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Cities and Industrial Symbiosis: Some Historical Perspectives and Policy Implications

Pierre Desrochers

KEYWORDS:

agglomeration economies, eco-industrial parks, industrial ecosystems, Kalundborg, recycling, urbanization economies

SUMMARY:

The exchange of wastes, by-products, and energy among closely situated firms in the Danish city of Kalundborg has become the impetus to and main template for the movement to plan ecoindustrial parks. In recent years, however, similar by-product exchange patterns have been observed in other regions of Europe and North America. Evidence also indicates that cities have historically played an important role in facilitating the creation of recycling linkages between different industries. If Kalundborg and other newly documented cases of localized interfirm recycling linkages are but contemporary manifestations of much older processes, then what are the policy implications for current attempts to plan eco-industrial parks?

This article explores this issue by looking at the economic incentives that have always led to the formation of cities and interfirm recycling linkages at both the local and interregional levels. A critique of current interpretations and policy prescriptions based on the Kalundborg case is then offered. I argue that current attempts to foster the development of eco-industrial parks and eco-industrial networks are too narrow in their geographical scope, that public planning is unlikely to prove more efficient than private initiatives, and that perhaps the most important lesson to be learned from Kalundborg is the value of a flexible regulatory framework.

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题目: 生命周期影响评价的决策分析框架

作者: Jyri Seppälä, Lauren Basson, Gregory A. Norris

关键字: 决策分析, 生命周期影响评价(LCIA), 多重属性, 多目标决策分析(MCDA), 规范化

摘要: 生命周期环境影响评价 (Life-cycle impact assessments, LCIA), 涉及多重不确定性信息, 非常复杂, 适于用决策分析的方法加以解决。但目前多属性决策分析 (Multiple-attribute Decision Analysis, MADA) 在 LCIA 中的应用尚不多见。尽管应用于决策分析的 LCIA 的具体框架还存在争议, 但是已经发现普通决策分析过程与 LCIA 相应步骤非常相似。本文研究发现, MADA 可有效用于 LCIA 评价, 通过价值谱图可将一个评价问题具体化并作为环境影响评价分类界定的基础, 以保证各类环境影响得以量化计算。多属性评价理论 (Multi-attribute Value Theory, MAVT) 作为 MADA 的一种与 LICA 的计算规则有相通之处, 保证 MAVT 可用于 LICA, 对 LICA 模型进行有效的定量化、规范化、加权和集成, 并为 LCIA 的进一步发展提供了理论基础。此外, 由于其良好的理论基础, MAVT 框架有利于 LCIA 方法上的发展。同时它们之间的这种联系并不排除其他 MADA 方法在 LCIA 中的应用。其它 MADA 方法在 LCIA 中的应用仍有待深入研究, 直至确定一种最适宜的方法。

Decision Analysis Frameworks for Life-Cycle Impact Assessment

Jyri Seppälä, Lauren Basson and Gregory A. Norris

KEYWORDS:

decision analysis, life-cycle impact assessment (LCIA) methods, multiple attribute, multiple-criteria decision analysis (MCDA), normalization

SUMMARY:

Life-cycle impact assessments (LCIAs) are complex because they almost always involve uncertain consequences relative to multiple criteria. Several authors have noticed that this is precisely the sort of problem addressed by methods of decision analysis. Despite several experiences of using multiple-attribute decision analysis (MADA) methods in LCIA, the possibilities of MADA methods in LCIA are rather poorly elaborated in the field of life-cycle assessment. In this article we provide an overview of the commonly used MADA methods and discuss LCIA in relation to them. The article also presents how different frames and tools developed by the MADA community can be applied in conducting LCIA. Although the exact framing of LCIA using decision analysis still merits debate, we show that the similarities between generic decision analysis steps and their LCIA counterparts are clear. Structuring of an assessment problem according to a value tree offers a basis for the definition of impact categories and classification. Value trees can thus be used to ensure that all relevant impact categories and interventions are taken into account in the appropriate manner. The similarities between multiattribute value theory (MAVT) and the current calculation rule applied in LCIA mean that techniques, knowledge, and experiences derived from MAVT can be applied to LCIA. For example, MAVT offers a general solution for the calculation of overall impact values and it can be applied to help discern sound from unsound approaches to value measurement, normalization, weighting, and aggregation in the LCIA model. In addition, the MAVT framework can assist in the methodological development of LCIA because of its well-established theoretical foundation. The relationship between MAVT and the current LCIA methodology does not preclude application of other MADA methods in the context of LCIA. A need exists to analyze the weaknesses and the strengths of different multiple-criteria decision analysis methods in order to identify those methods most appropriate for different LCIA applications.

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题目: 实物经济代谢的定量化方法 I: 方法综述

作者: Peter L. Daniels, Stephen Moore

关键字: 产业代谢, 质量平衡, 材料流分析 (MFA), 实物经济, 社会代谢, 物质流分析 (SFA)

摘要: 本文是有关“实物经济”(physical economy)的物流代谢特性的系列研究论文的前半部分。文中从几个不同方向对材料流分析问题作了研究, 包括: 材料流系统界定, 关键的社会和制度作用因素分析, 以及系统成员、成员间连接和材料流范围、种类等问题。作者引入了一些经济学的概念体系, 并对这些概念方法与材料流分析相结合的应用前景作了展望。材料流分析(MFA)究竟是一种对宏观经济行为中的物流加以衡量的狭义的工具, 抑或是一种可对自然界及人类社会间物质联系进行分析的广泛的方法? 有必要对这一问题做出回答。目前, 有关产业生态学及生态效率的考虑在现实的经济决策中所起的作用已经越来越大, 本文可作为相关决策的参考, 此外也希望能够激活有关MFA的研究氛围, 为其广泛应用打下良好的方法论基础。有关MFA方法的进一步探讨, 请参看本系列论文的下半部分。本文主要介绍: (1) 决策者的参考依据, 主要涉及到工业生态学以及经济和生态效益的材料基础等方面; (2) 发起一些必要的讨论和交流, 目的在于指出现有的与环境物流不相容的方面, 同时巩固加强方法的理论基础以及MFA的应用。

Approaches for Quantifying the Metabolism of Physical Economies, Part I: Methodological Overview

Peter L. Daniels and Stephen Moore

KEYWORDS:

industrial metabolism, mass balance, material flow analysis (MFA), physical economy, societal metabolism, substance flow analysis (SFA)

SUMMARY:

This article is the first of a two-part series that describes and compares the essential features of nine existing "physical economy" approaches for quantifying the material demands of the human economy upon the natural environment. A range of material flow analysis (MFA) and related techniques is assessed and compared in terms of several major dimensions. These include the system boundary identification for material flow sources, extents, and the key socioinstitutional entities containing relevant driving forces, as well as the nature and detailing of system components and flow interconnections, and the comprehensiveness and types of flows and materials covered. Shared conceptual themes of a new wave of physical economy approaches are described with a brief overview of the potential applications of this broad family of methodologies. The evolving and somewhat controversial nature of the characteristics and role that define MFA is examined. This review suggests the need to specify whether MFA is a general metabolic flow measurement procedure that can be applied from micro- to macrolevels of economic activity, or a more specific methodology aimed primarily at economy-wide analyses that "map" the material relations between society and nature. Some alternative options for classifying MFA are introduced for discussion before a more detailed comparative summary of the key methodological features of each approach in the second part of this two-part article. The review is presented (1) as a reference and resource for the increasing number of policy makers and practitioners involved in industrial ecology and the evaluation of the material basis of economies and the formulation of eco-efficiency strategies, and (2) to provoke discussion and ongoing dialogue to clarify the many existing areas of discordance in environmental accounting related to material flows, and help consolidate the methodological basis and application of MFA.

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题目: ASG 的环境管理经验: 多组织机构信息系统的使用

作者: Teresa M. Shaft, Mark P. Sharfman, Magnus Swahn

关键字: 集成链式管理(ICM), 生命周期管理(LCM), 物流, 航运, 供应链管理, 运输

摘要: ASG AB(以下简称 ASG)是总部位于瑞典斯德哥尔摩的一家从事国际运输及物流服务的企业, 该公司提供了一个利用泛组织信息系统(IOISs)实现企业可持续发展的有益案例, 本文对其生命周期导向的环境管理系统作了分析。通过引入IOISs, ASG 及其供应商的环境性能得到了很大的改观, 从而进一步加强了市场竞争优势。ASG 的经验说明可持续的环保实践应该成为企业经营战略的一部分, 从单纯的遵守环境法规转向积极的环境成本控制能够使企业获益丰厚。本文还比较分析了环境管理信息系统在ASG的应用情况以及其在Shaft等企业应用前景。ASG 的经验对有关企业开发类似的系统十分重要, 但必须注意环境管理系统必须符合相关企业的特性, 不同企业的环境管理系统难免有所不同。

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Using Interorganizational Information Systems to Support Environmental Management Efforts at ASG

Teresa M. Shaft, Mark P. Sharfman and Magnus Swahn

KEYWORDS:

integrated chain management (ICM), life-cycle management (LCM), logistics, shipping, supply chain management, transport

SUMMARY:

We examine use of environmental information systems by ASG AB (hereafter ASG), an international logistics and transport firm headquartered in Stockholm, Sweden, as a case study to illustrate the role of information systems in life-cycle-oriented environmental management. This case provides an example of how a firm can use interorganizational information systems (IOISs) to move toward environmentally sustainable business practices. Through the use of IOISs, ASG has been able to improve its environmental performance and that of its suppliers. Further, this improved environmental performance has been a competitive advantage for ASG and enabled it to attract new business. As such, ASG's experiences illustrate how aggressive practices move environmental management beyond compliance and cost control, at which many firms have been successful, to revenue generation. The case also shows how environmentally sustainable business practices can be integrated into a firm's strategy. In addition to illustrating how ASG has used IOISs to improve environmental performance, we compare their use of environmental ISs with the expected evolution of environmental ISs presented in the Shaft and colleagues (1997) framework. Although some of ASG's experiences verify the expected progression of these types of systems, some developments are not as expected. These differences have implications for the framework.