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基于LCA方法的水泥企业清洁生产审核

Cleaner production audit for a cement enterprise based on LCA

关键词: [生命周期评价](#) [清洁生产审核](#) [水泥](#)

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摘要: 水泥行业是典型的高能耗、高污染的工业,其快速发展带来了严重的资源、能源、环境等问题.因此,本文选择生命周期评价方法(LCA)作为清洁生产审核工具,对大连某水泥企业进行了清洁生产审核.本文在调研水泥工艺及现状的基础上,运用生命周期评价方法对水泥生产过程中原料开采、运输、生料制备、煤粉制备、熟料煅烧及水泥粉磨阶段进行清单分析与建模.采用了生命周期评价软件Gabi 4进行清单计算与分析,评价模型为CML2001Dec 07 特征化模型.在整个水泥生产过程中考虑了全球变暖,人体毒性,环境酸化等环境影响类型,得出整个生命周期中石灰石和煤炭的资源能源耗竭潜值和资源消耗量最大,而环境排放影响中熟料煅烧阶段对各个类型的环境影响远远高于其他几个阶段,同时熟料煅烧过程中排放的二氧化碳等温室气体的影响最严重.最终根据评价分析结果确定清洁生产审核重点并提出了清洁生产方案,并且在清洁生产方案中选择其中最重要的余热发电方案,进行余热发电清洁生产方案前后环境影响比较和清洁生产方案量化分析.

Abstract: Cement production has received increasing attention due to its high consumption of energy and resource. Life cycle assessment (LCA) is an effective tool for cleaner production audits. We constructed LCA model to quantify emissions and resource consumption in each phase of the cement production process for a cement plant in Dalian. We evaluated the environmental impact caused by materials mining, transportation, raw material preparation, clinker calcination and finish grinding and mixing, which are general processes that are involved in cement materials production and transportation. Cradle-to-grave analysis was performed using the GaBi4 software with CML 2001 Dec 07 by which global warming, human toxicity and acidification potential influence was analyzed and compared. Result shows that during the whole lifetime of cement production, clinker calcination could cause the most important impact to the environment in terms of carbon dioxide discharging and smog generation, etc. Furthermore, clinker calcination is also ranked the first place in energy consumption. According to the result of LCA analysis, the focus of cleaner production audit and the cleaner production plan were put forward. In addition, we selected the plan with the most significant waste heat generation, and compared the environmental assessment before and after the implementation of this plan, to quantitatively analyze the cleaner production plan.

Key words: [life cycle assessment](#) [cleaner production audit](#) [cement](#)

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