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Managing greenhouse gas emissions from warehousing and transshipment with environmental performance indicators

David Rüdiger [a,*], Andrea Schön [b], Kerstin Dobers [a]

[a]*Fraunhofer Institute for Material Flow and Logistics, Joseph-von-Fraunhofer-Str. 2, 44227 Dortmund, Germany*
[b]*Schenker AG, HO Essen, Alfredstr. 61, 45130 Essen, Germany*

Abstract

When considering a complete ecological assessment of logistics activities and the development of comprehensive decarbonization strategies, it's important to address not only transportation but the warehousing and transshipment processes as well. In national inventories, the total energy demand of warehousing can equal around one quarter of the transport emissions. The issue of energy-efficient processes at logistics facilities gains importance because of changing regulations and market requirements (e.g. the new European Energy Efficiency Directive which prioritizes the energy demand of buildings). Furthermore, logistics companies tend to realize energetic and/or ecological improvements at logistics facilities and report savings achieved.
As opposed to logistics facilities, the ecological assessment of transportation and the derivation of appropriate environmental performance indicators (EPI) are widely standardized (cf. EN 16258). How to assess, monitor and manage greenhouse gas emissions (GHG) at warehouses or terminals are still major research and standardization issues. That is why the Fraunhofer Institute for Material Flow and Logistics has defined a comprehensive assessment approach for logistics facilities, calculated specific emission factors and developed a flexible yet detailed allocation scheme for different logistics services (e.g. refrigerated warehousing). This article addresses the developed method and provides an argumentative basis for further standardization. This will be realized by the presentation of a classification scheme for logistics facilities based on ecological aspects and the consideration of attributes of logistics items in the discussion about how GHG emissions of logistics facilities are usually influenced. To illustrate strengths and weaknesses of the method, exemplary implementations at facilities of the research partner, DB Schenker, will be published. Focus will be on the emissions of a cross-docking center, a warehouse and a spare parts depot.
The provided assessment method for GHG emissions of logistics facilities and the allocation scheme for EPIs enable logistics companies to monitor and manage the emissions of goods storage and transshipments on a continual basis. Consequently, the

* Corresponding author: David Rüdiger Tel.: +49 231 9743 359
E-mail addresses: David.Ruediger@iml.fraunhofer.de

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method can trigger the development of decarbonization strategies at logistics facilities and foster an organizational or technological improvement process.

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Keywords: Greenhouse gas emissions; logistics centers; logistics facilities; warehousing; transhipment terminals; environmental performance indicators; allocation scheme; GHG protocol; green logistics

1. Introduction

According to the latest figures of the International Panel on Climate Change (IPCC), there is still a steady growth of the annual greenhouse gas (GHG) emissions worldwide. “The total anthropogenic GHG emissions were the highest in human history from 2000 to 2010 and reached 49 Gt CO_2eq/yr in 2010” (IPCC 2014). In terms of mitigating the effects of global warming, political frameworks are required that address specific markets and sectors. Logistics for goods storage and transportation is one of the relevant sectors. In 2009, the World Economic Forum estimated that logistics (transport, warehouses and terminals) accounted for around 5.5% of the global GHG emissions and specified that roughly 4.95% came from freight transport and 0.55% from logistics facilities (WEF 2009). For the UK national GHG inventory, McKinnon calculated even higher shares. “In terms of logistics activities, it is estimated that 3% of total UK emissions are from warehousing. This compares to about 4% from heavy goods vehicles and 2% from vans” (McKinnon 2015). The figures demonstrate the importance of GHG emissions caused by logistics facilities for a complete assessment of the GHG emissions of transport networks and supply chains.

Many countries have agreed on mitigation strategies and have set national reduction targets. Despite a general lack of sector specific reduction targets, many directives and legal requirements already strongly address specific economic sectors (e.g. the logistics sector). Within the European Union (EU), not only the Emission Trading Scheme (ETS) is relevant for the logistics sector (airline industry included since 2012, maritime shipping industry expected to be included by 2018). Other political measures can also be identified. For example, the Décret 2011-1336 in France defines a legal obligation to report GHG emissions for all commercial transports with origin and destination in France. In the UK, the 'Companies Act 2006 (Strategic Report and Directors’ Reports) Regulations 2013' requires quoted companies to report on GHG emissions as part of their annual directors’ report (Defra 2013). Moreover, a few countries are preparing GHG related toll systems for highways and some municipalities intend to, or have already implemented environmental zones for cities in order to penalize or ban polluting road traffic. Within the EU, the political regulations to cut GHG emissions also include buildings such as public, industrial or private ones. In 2012 the European Commission (EC) has published the European Energy Efficiency Directive (EED 2012/27/EU) which prioritizes the energy demand of buildings and its related indirect GHG emissions. The EU directive requires organizations and companies to report the energy input levels on a recurring basis and to define energy saving measures. Only small and medium-sized enterprises (SME) are exempt, along with companies that have already employed or plan on employing either an energy management system (ISO 50001) or the European Eco-Management and Audit Scheme EMAS.

Considering the GHG reduction targets (e.g. EU-27 target 1990-2020: - 20%) and the related political regulations, many companies in the EU have started to prepare for an extended GHG reporting obligation. So far only a few standards and guidelines have been published for the logistics sector, especially for the GHG management of logistics facilities. In this paper, a method for managing GHG emissions from warehousing and transshipment activities with a set of environmental performance indicators (EPI) will be presented that support monitoring and interpret developments in a sophisticated manner. This mainly includes a derivation and definition of assessment boundaries, calculation rules, as well as allocation approaches for different services of logistics facilities. In order to illustrate strengths and weaknesses of the method, exemplary implementations at facilities of the research partner DB Schenker will be published. The method described is a result of the German research project 'Green Logistics' (cf. Green Logistics).