

Puttin' on the Ritz – but what are the emissions?

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Abstract

Background, aim and scope A pilot project was performed in 2008 to assemble a GHG account for Choice Hotels Scandinavia (Rønning and Brekke 2008). This paper presents how the account was made and the results from the undertaking. Considering the immaturity of both GHG accounting and environmental assessments in the service sector, the paper also aspires to contribute to methods development with regard to GHG accounting.

Methods There are two initiatives in particular directed toward harmonisation of models and methods for calculating GHG emissions, namely Global Reporting Initiative (WRI and WBCSD 2008) and the work of British Standards on the PAS 2050 (BSI, 2008). The method employed for the specific case presented here is compared and contrasted with the recommendations from these two initiatives.

Results CHG accounts are still in an early phase of development as an environmental management instrument and the case study presented here is seen both as an input to the general discussion on the relevance and usefulness of the approach, and also as a contribution to the understanding of the specific environmental challenges facing hotel businesses.

Discussion The hotel management will need to document both the annual GHG-emissions from the hotel and the “carbon footprint” for a hotel service whether it is a “one night’s stay” or “a two-days conference stay including over night and food”. The first as part of the environmental management system (EMS), the other both as a part of EMS and for external communication. The challenge is to develop a methodology which is able to handle these two purposes simultaneously.

Conclusions and further work When refining the GHG account methodology one should struggle to enforce the company’s ability to utilize the information provided by the GHG account in a GHG mitigation context. Thus, a hybrid LCA approach to the hotels GHG account should be tested. In addition indicators describing the functionality of a hotel function where the differences in size, capacity utilization and functionality of the hotels should be considered.

A GHG account for Choice Hotels Scandinavia will be made annually and the GHG account for 2008 is already in process.

Keywords Carbon footprint, GHG account, hotel

1. Background, aim and scope

How large are the greenhouse gas (GHG) emissions from running a hotel? And what about the emissions from all the hotels in a hotel chain in Scandinavia? A pilot project was performed in 2008 to answer such questions and assemble a GHG account for Choice Hotels Scandinavia (Rønning and Brekke 2008). This paper presents how the account was made and the results from the undertaking.

The aim is to contribute to the development of GHG accounting in general, and GHG accounting for services in particular. In the paper we refer to the development of GHG accounting standardization initiatives and *compare them to the approach described herein*.

Choice Hotels Scandinavia, with its 149 hotels being one of the largest hotel chains in Scandinavia, has established an extensive strategy on sustainable business development. As a part of the strategy GHG accounting will be a basis for

coal setting and will be included in the environmental management system presently implemented in the hotel chain. The purpose for performing the GHG account was to develop a prototype, test it on all hotels simultaneously, and gain experience from data collection and communication of results. The main focus has been on establishing the GHG account internally for the business at so and not for external communication of the service function they provide. The project started in May 2008 and finished by the end of the year. Thus, the study was performed before the PAS 2050 was available. A GHG account for Choice Hotels Scandinavia will be made annually and the GHG account for 2008 is already in process.

2. Methodology

Several efforts addressing issues of methodology for GHG accounting from products and services have been presented during the last decade. Greenhouse Gas (GHG) Protocol Initiative (WRI and WBCSD 2003) produced by the World Resource Institute (WRI) and the World Business Council for Sustainable Development (WBCSD) is in a way the starting point of GHG accounting by and for industrial enterprises. This method focuses on emissions from a given company (scope 1) and from the generation of purchased electricity consumed by the company (scope 2). Scope 3, other indirect emissions which occur from sources not owned or controlled by the company are optional as illustrated in figure 1.

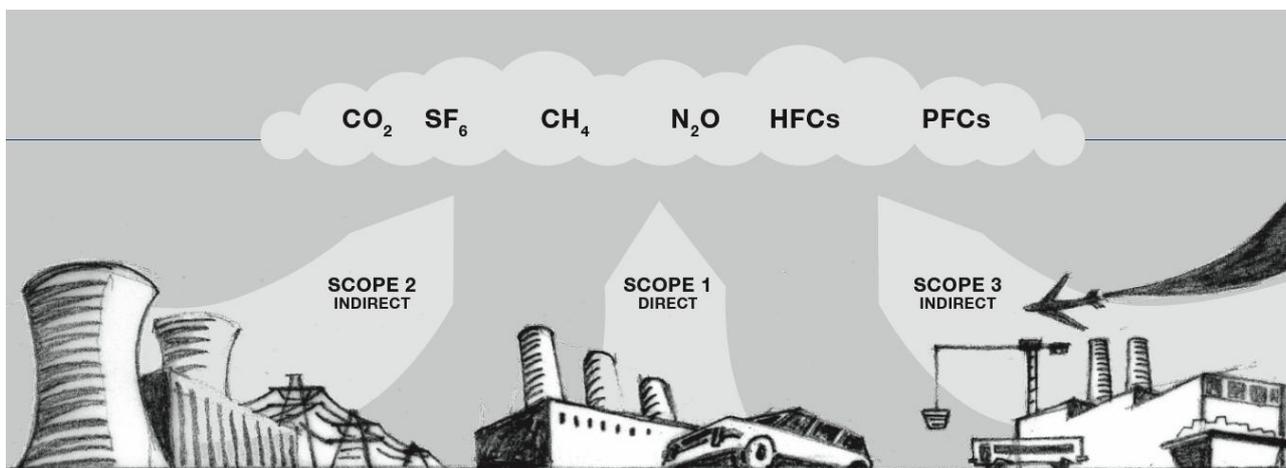


Figure 1 Operational boundaries. Source: New Zealand Business Council for Sustainable Development.

One important reason for the evolution of GHG accounting approaches has been the recognition that emissions from enterprises are not limited to the manufacturing of products, but from support functions as sales management, marketing, and purchasing of goods and services as well. Several sector specific guidelines are developed by the same actors and one specific for GHG management for the service sector is developed (del Pino et. al 2006). GHG accountings based upon this guideline are typically calculated for a given year and not for a given product or service function.

Inspired by and based upon the work of GHG Protocol Initiative, an ISO-standard at the organisation level has been set up for quantification and reporting of GHG emissions in process (NS-ISO 14064-1:2006) and is followed up by GHG – Carbon footprinting of products (ISO NWIP 14067-1 and -2). The standards don't differ methodologically from the GHG Protocol. Another important initiative is the most recently published methodology for calculation of greenhouse gas emissions of goods and services, PAS 2050 (BSI 2008a) in addition to a guideline for performing a carbon footprint analysis (BSI 2008b). This approach tries to extend the GHG from the annual GHG account for the given production company to GHG account for the product itself or service function. In addition the GHG Protocol Initiative is currently developing methods and guidelines for Product life cycle accounting and reporting and Corporate-level value chain (scope 3) accounting and reporting (WRI and WBCSD 2008).

One common feature in these efforts is that principles of life cycle assessment (LCA) methodology are being employed, recognising the need to consider the entire life cycle of business, products or service and also for the PAS 2050s concern, to relate the GHG account to the specific function(s) delivered by the product or service under scrutiny.

A challenge in making an account of a company's emissions is that one needs to consider emissions in two dimensions, as shown in Figure 2.

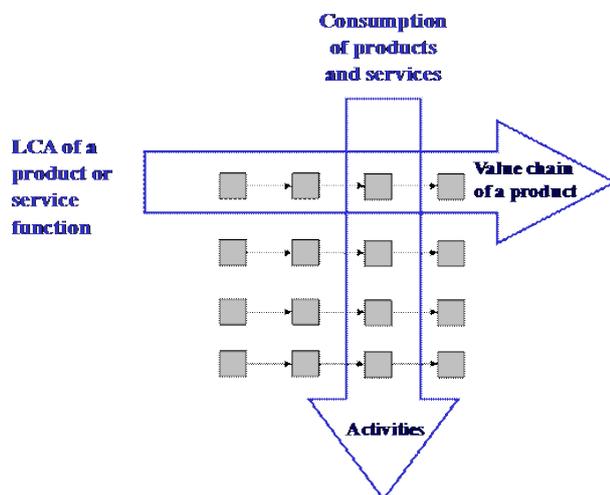


Figure 2 An enterprise's contribution of emissions in two dimensions.

In the figure, the company is regarded as responsible for all direct emissions from the use of materials or energy as well as the emissions associated with having them produced or handled after end-of-useful-life. In the figure above this is presented as

- The value chain related to the different products or services consumed by the company (horizontal arrow)
- The activities the company performs to fulfil its function(s)/purpose(s) (vertical arrow)

The approaches from GHG Protocol and PAS 2050 both are based upon a presumption that a GHG account is an instrument to gain knowledge and information in order to identify and quantify reduction potentials, and this is reflected in the recommendations regarding defining system boundaries. These are based on stipulation of the activities that are being controlled by the company whether one is looking upon a company, product or service function. Further, it will influence which data should be used, and not least which data are available related to the given business, product or service under scrutiny.

Calculating carbon footprint and GHG accounting can be approached methodologically from two different perspectives: bottom-up, based on Process Life Cycle Assessment (PLCA) or top-down, based on Input-Output Life cycle Assessment (IOLCA) analysis (Wiedmann and Minx 2007, Pettersen 2008). Generally, input-output LCA has its advantages when applied for macro or meso levels such as industrial sectors or larger product groups, while process LCA has advantages when looking at micro systems; a particular process or individual product. Methodology and guidelines presented by the GHG Protocol and PAS 2050 are based on a bottom-up approach.

3. GHG account for Choice Hotels Scandinavia

The methodology used in the hotel study is origin based upon GHG accounting as described GHG Protocol based guideline to GHG management for service sector (del Pino et al. 2006) and in the final phase of the study the carbon footprinting as given in PAS 2050 (BSI 2008b) was available and had some influence on the discussions of the methodological choices made.

In this study GHG account for one year (2007) is performed for the hotel chain and for each hotel respectively. The GHG account will be used as an internal benchmarking tool. It is, however, particularly troublesome to use annually GHG account in this way, as hotels offer activities and services in addition to the traditional overnight stays. Thus, these additional functions of hotels must be included if hotels are compared or with other ways to offer the same activities and services.

The PAS 2050 Guide on the other hand define a functional unit for the hotel service as “night’s hotel stay” based upon defined a “standard room”.

Since GHG Protocol is calculating GHG emissions for a company’s annual production and activity level, a top-down approach for describing activities are used based upon annual consumptions. The PAS 2050 recommend another approach; to define which activities are necessary for fulfilling the purpose of the function. As in their hotel example it is recommended to develop a process map for a night’s hotel stay and suggests the following components in its life cycle:

- Check-in
- Stay/use of the room
- Check-out
- Clean-up/preparation for next guest

Furthermore, materials, energy and waste associated with each phase are dissected. This is an example of a more comprehensive “bottom-up process” as we know it from the LCA-methodology. In our hotel case this approach turned out to be too detailed, both with respect to data availability and to the hotels’ ability to utilise information at that level as a managerial tool.

Figure 3 below illustrates which products and materials were included and excluded in the specific analysis of GHG emissions from Choice Hotels Scandinavia.

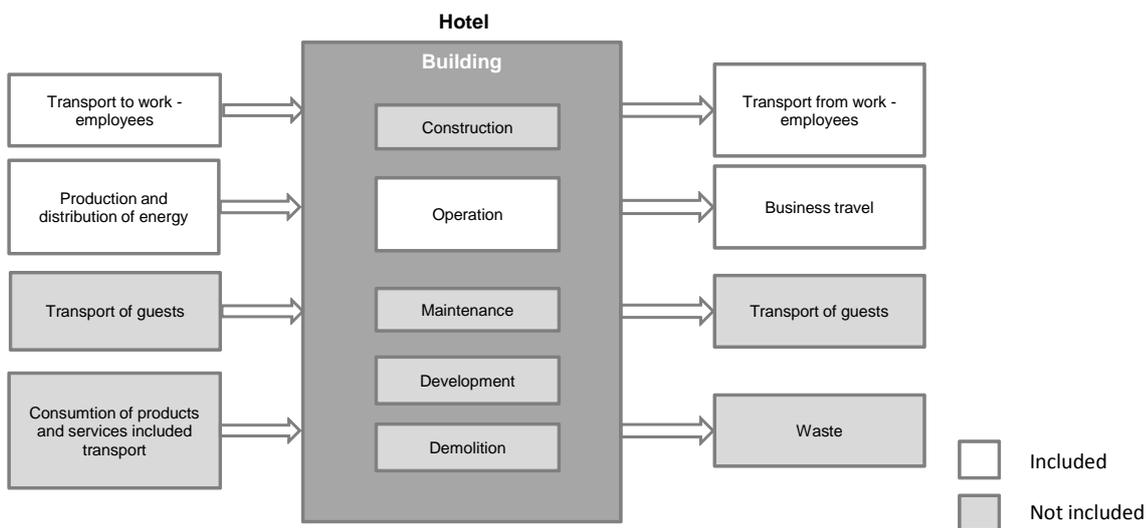


Figure 3 Categories/activities included in the GHG account for hotels.

Figure 3 shows that energy consumption for operating the hotel is included in addition to commuting to and from work and business travel for employees. This represents all of the three scopes as described within the GHG Protocol. But it is not exhaustive for all categories or activities.

Activities related to transportation of goods and people, production, and energy use are considered as equally important areas in GHG accounting. This implies an extension of systems boundaries compared to those generally being adapted in environmental accounting. The GHG Protocol recommends including commuting to and from work, while PAS 2050 state explicitly that it should be excluded. It is an ethical dilemma to include employees’ commuting to and from work. Both in relation to where they live and what means of transport they choose (or are forced to use). On the other hand it is a vital parameter regarding where to locate a business and what can the employer do to arrange better solutions on behalf of the employees to lower the GHG emissions from commuting to and from work. Several studies conclude that transport should be included when looking upon the total energy use in buildings due to its parts of the total energy use, up to 50% depending on location (Norman et al. 2006, Rønning et al. 2006, Selvig 2007, Selvig and Cervenka 2008) .

All information regarding sizes, number of employees, departments etc. and consumption related to energy use and transportation were procured directly from each hotel by questionnaire. The hotel chain is presently in the initial phases of collecting and systemising GHG-related information from its activities. Thus, it was known that it probably wouldn't be able to provide information regarding e.g. consumption of products.

The numbers for energy use are measured according to normal procedure; in addition this type of energy carriers was easy for the hotel management to collect. All the hotels were asked to break the number for energy use into energy use for defined sections in the hotel such as reception, guest rooms, kitchen/restaurant, conference department, pool and Spa. However, only a few hotels provided such information due to lack of facility management systems or electric meters other than for the total energy use in the hotel.

None of the hotels had information neither from employees commuting to and from work, nor from business travels. These data were procured from each hotel by questionnaires. All the 149 hotels answered the questionnaire. Business travel is performed mainly by the management. The hotel management had to give the travel information for an average summer and winter week. The data was then adjusted for a whole year. Same procedure was used for commuting to and from work, but only ten employees were asked to fill in the questionnaire *from each hotel*. Then the data were adjusted for the total number of employees and for the whole year. For those hotels not giving any information regarding either business travel or commuting to and from work no GHG emissions from transport were included.

Emissions and energy consumption for producing and operating capital goods as the hotel building itself and from production of food, detergents, paper, and bed linings are not included. Neither is transport of guests nor waste management.

The building sector's share of final energy consumption worldwide is estimated as high as 30-40 percent (WBCSD, 2009, European Commission (2007). In addition the energy use for operating buildings is calculated as 80-90 percent during the lifespan (Rønning et al. 2001, Rønning et al. 2007, Vold et al. 2006) and a hotel building is probably not an exception. Former studies indicate that use of energy is the most significant contributors to GHG emissions (Beccali et al. 2009). Energy use and transport were regarded as the most important factors to include in the hotel case based on the available data. A more comprehensive follow-up study will be performed to identify which ones are the vital activities or products that should be included in a hotel's GHG account.

The total climate account for the 149 hotels in the Choice Hotels Scandinavia shows emissions of appr. 20.000 tonnes CO₂ equivalents. Energy use from operating buildings constitutes appr. 13.500 tonnes CO₂ equivalents. Employees' transportation to/from work places comprise appr. 5.500 CO₂ equivalents, and contributions from business travels appr. 800 tonnes CO₂ equivalents.

To compensate for differences in size, capacity utilization and functionality of the hotels, specific indicators for energy use and transportation were developed. The indicator for benchmarking the hotels energy use was chosen as energy use per gross area including capacity utilization for the given hotel and illustrated in figure 4.

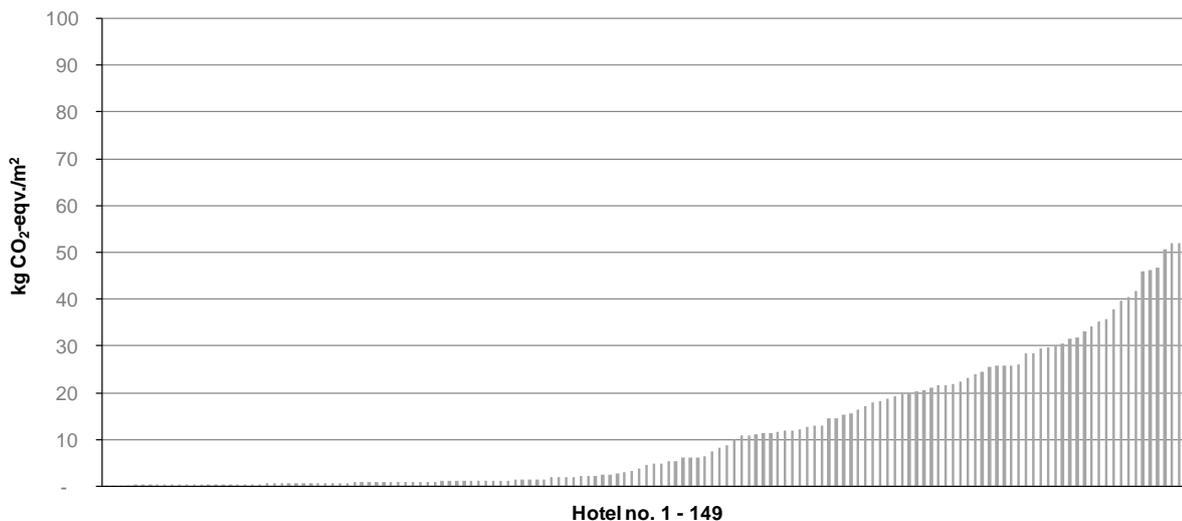


Figure 4 GHG emissions from energy use in 149 hotels per gross area including capacity utilization.

The results show the distribution GHG emissions between the hotels. The differences are mainly due to the mode of energy source. The hotels with less GHG emissions are the one using central heating and for some hotels it reflects the capacity utilization and/or low energy use.

Both the total number and the distribution of GHG emissions between energy use and the two transport categories are charged with uncertainty. All the hotels provided data regarding energy use for operating the hotel, but several hotels did not give information regarding commuting to and from work and/or business travel. Limited availability of data is one reason for having to accept narrow system boundaries in this case, e.g. regarding the actual collection of consumption data and the modelling of emissions from the consumption.

4. Discussion

The undertaking of GHG accounting needs methodological considerations on two dimensions. The first one relates to the question on what emissions should be included, i.e. the activity of boundary setting to decide what emissions that belong to the product or service being scrutinised. The second dimension is related to the actual data collection and which figures should be used for emissions from basic technologies such as electricity generation and various infrastructures.¹ These dimensions are of course entangled as the first dimension will decide which data to be collected and the second dimension will decide whether the actual data to fulfil the system boundaries are at all available. Furthermore, both dimensions are represented at least two levels: on a general level where standard guidelines independent of the product or service to be investigated can be given; and a specific level dependent on the actual product or service to be studied.

In our case we predict that the hotel management will need to document both the annual GHG-emissions from the hotel and the “carbon footprint” for a hotel service whether it is a “one night’s stay” or “a two-days conference stay including over night and food”. The first as part of the environmental management system (EMS), the other both as a part of EMS and also for external communication. The challenge is to develop a methodology which is able to handle these two purposes simultaneously.

Transport and energy use in building are regarded as important issues to include in a GHG emission from a service company’s activity. But, still one has to consider other aspects to clarify what are the most important sources for GHG emissions. Transport of guests was excluded in our study. When IKEA – a global home furnishing retailer – made up the GHG-account for their 160 stores they included customer travels. The customer travels accounted for 82 percent of its total GHG-emissions (del Pino et al. 2006). For the hotel chain management transport of guests and employees will

¹ These two dimensions remind of the two first steps in conducting an LCA where the first is stating the goal and scope of a study and the second is performing the data inventory.

be vital when deciding location of new hotels and how to be a responsible employer, facilitating for the employees to make sustainable commuting.

Since a service company normally doesn't have figures in terms of mass but only economic data on the total consumption of goods, the GHG emissions related to production of those will probably be excluded in a P-LCA approach as given in PAS 2050 and in GHG Protocol. In our study that was the case for e.g. food and linings etc.

Input-Output Life Cycle Assessments for typical US industries indicate that on average up to 75% of total emissions were overlooked when only looking upon the industries scope 1 and 2 emissions (Matthews et al. 2008). On the other hand the information provided by an IO-LCA can be too general for a specific hotel with respect to managing e.g. the purchase of "the office chair with lowest GHG emissions" and its consequences on the GHG account.

A review of relevant methods for the calculation of the GHG-emissions of goods and services was carried out as background information for the PAS 2050 development (Minx et al. 2008). This study concluded that the method most suited to meet the needs of the PAS various applications is a fully integrated, ISO-consistent Hybrid-LCA approach, which combines the detail of process LCA with the complete supply chain coverage of I/O LCA.

5. Conclusions and further work

Even though GHG accounts are relatively well developed as an overall documented methodology with respect to companies - whether looking upon manufacturing or service companies, it still remains to define more clearly requirements on several methodological topics in order to make the GHG accounts comparable between companies, e.g. in a hotel chain. This also seems to reflect the similar challenges regarding topics as system boundaries, allocation, electricity data etc. (Finkbeiner 2009). In an LCA context these topics are often recommended solved during a PCR process for the given product or service function. The PAS 2050 recommend using the PCR for carbon footprinting of the given product when available which seems reasonable by our experiences.

The results from the project shows that it is possible to work out a climate account for Choice Hotels Scandinavia. Even if the account does not include all activities and aspects presented above (fig. 2) it still is a useful foundation for further elaboration of the methodology. The results are based upon validated data to indicate the hotel chain's total climate gas emissions and to identify areas where actions should be taken in order to reduce emissions substantially.

It is of vital importance that the GHG account provides information that is manageable. It is a risk that activities measured and data collected is too detailed with respect to the actual administrative environmental management systems used by the hotels and other service companies. Thus, a hybrid LCA applied in the hotel case could represent a methodological approach which will facilitate a comprehensive overview over the GHG emissions from those sources where data are lacking without the need for detailed data the management will not be able to produce in real life. A GHG account for Choice Hotels Scandinavia will be made annually and the GHG account for 2008 is already in process. A more comprehensive analysis will be carried out and the GHG account will probably include several activities as a hybrid LCA will serve as the methodology basis. The hotel managements have gain experience from the first GHG accounting process and one expect e.g. transport data provided from each hotel.

The GHG account will be provide information describing both the hotel's as annual GHG emissions and will be further developed to include indicator describing the functionality of a hotel function where the differences in size, capacity utilization and functionality of the hotels will be considered.

A PCR for the hotel function is recommended performed.

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