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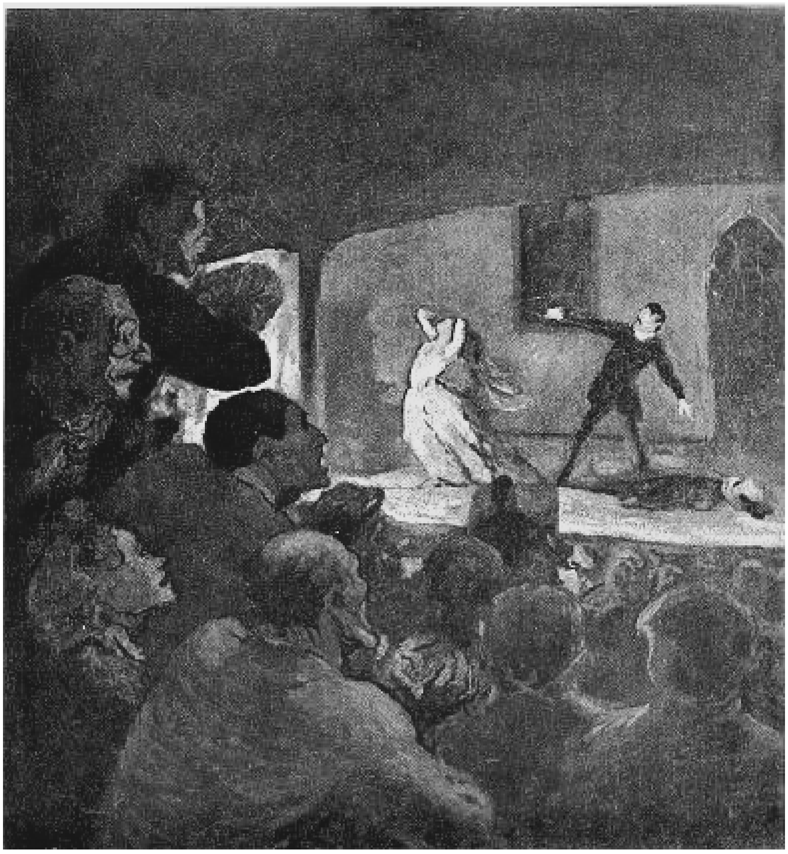

LCA of Stage Performances

Life Cycle Assessment of an Opera and a Theatre Stage Performance

Master Thesis in the Masters Programme Sustainable Energy Systems

JOHAN TENGSTRÖM

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Department of Energy and Environment
Division of Environmental Systems Analysis
CHALMERS UNIVERSITY OF TECHNOLOGY
Göteborg, Sweden 2010
ESA report no. : 2010:8
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MASTER THESIS 2010:8

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Cover; the cover represents a stage performance, anonymous author (Aristegui 2010).

Chalmers reproservice
Göteborg, Sweden 2010

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ABSTRACT

Traditionally are LCA studies carried out for products, but in this project is the LCA methodology used to analyze services. The goal of this study is to investigate the environmental impact from a stage performance in the Göteborg Opera and a stage performance in the Regionteater Väst. The project is divided into several minor LCA studies. The first is an accounting LCA study; one part is for the Regionteater Väst and one part is for the Göteborg Opera. The specific question the LCA study answers is what contributes most to the environmental impact in the Regionteater Väst and the Göteborg Opera. The results, presented by categories, for Regionteater Väst show that building services, transports and materials have the largest emissions. They are 2 kg CO_2 eqv/one sold ticket, 3 kg CO_2 eqv/one sold ticket and 1.5 kg CO_2 eqv/one sold ticket respectively. In the same way, the results for the Göteborg Opera show that building services contribute with, 3kg CO_2 eqv/one sold ticket, the transport with 1.7 kg CO_2 eqv /one sold ticket and the materials with 6 kg CO_2 eqv/one sold ticket.

A comparative LCA study is done from a consumer scenario; consume a stage performance in the Regionteater Väst or in the Göteborg Opera. The results shows that it is better to consume a stage performance in the Regionteater Väst compared to the Göteborg Opera from an environmental point of view. The total emission from the Regionteater Väst is 9.4 kg CO_2 eqv/one sold ticket and for the Göteborg Opera it is 15.3 kg CO_2 eqv/one sold ticket.

A comparative LCA study is done of what is worst for the environment; consume a stage performance in the Regionteater Väst/the Göteborg Opera or a T-shirt. From the results is it possible to understand what and why is worst for the environment. The emission for the T-shirt is 3.4 kg CO_2 eqv/T-shirt inclusive the shopping tour.

A variation analysis is carried out. The number of visitors to the stage performances and what type of vehicle they use back and forth are important factors. For example, the CO_2 emissions are reduced by 2 kg per one sold ticket for the Regionteater Väst and for the Göteborg Opera when the numbers of visitors increase with 15% instead of decrease with 15%.

There are some recommendations. The employees at Regionteater Väst and the Göteborg Opera should use more public transport and reduce the usage of electricity. The Göteborg Opera should reduce the usage of polycarbonate plastic. It is better to visit a stage performance in the Regionteater Väst instead of one in the Göteborg Opera. Finally, to consume a T-shirt is better than visiting a stage performance.

Key words: LCA methodology, stage performance, opera, theatre, CO_2, T-shirt

LCA av Scenkonst
Livscykelanalys av en operaföreställning och en teaterföreställning
Examensarbete inom Sustainable Energy Systems
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SAMMANFATTNING

Tidigare har LCA studier gjorts för produkter, men i detta projekt görs studien av tjänster. Målet med studien är att med LCA metodik undersöka hur stor miljöpåverkan är från en opera på GöteborgsOperan och en teaterpjäs på Regionteater Väst i Uddevalla.

Projektet är uppdelat i flera LCA studier. Den första är en redogörande studie; en del är för Regionteater Väst och en del är för GöteborgsOperan. Den specifika fråga som LCA studien besvarar är vilka processer i Regionteater Väst och i GöteborgsOperan som påverkar miljön mest. Resultaten visar att byggnadsservice, transporter och material ger de högsta utsläppen. För Regionteater Väst är respektive utsläpp 2 kg CO_2 eqv/såld biljett, 3 kg CO_2 eqv/såld biljett och 1.5 kg CO_2 eqv/såld biljett. För GöteborgsOperan är respektive utsläpp 3 kg CO_2 eqv/såld biljett, 1.7 kg CO_2 eqv/såld biljett och 6 kg CO_2 eqv/såld biljett.

En jämförande LCA studie är gjord för att ta reda på vad som är sämst för miljön ur ett konsumentperspektiv; att konsumera en föreställning på Regionteater Väst eller en föreställning på GöteborgsOperan. Resultaten visar att det är bättre att konsumera en föreställning på Regionteater Väst än på GöteborgsOperan. Utsläppen från Regionteater Väst är 9.4 kg CO_2 eqv/såld biljett och för GöteborgsOperan 15.3 kg CO_2 eqv/såld biljett.

De redogörande LCA studierna för GöteborgsOperan och Regionteater Väst har jämförts med en LCA studie av en T-shirt. Skälet är att se vad som är sämst för miljön; att konsumera en opera/teaterföreställning eller en T-shirt. Resultaten för T-shirten är 3.4 kg CO2 eqv/T-shirt inklusive shoppingturen.

En variationsanalys är gjord. Antalet besökare till föreställningarna samt vilken typ av fordon som används för att resa till och från föreställningarna är viktiga faktorer. CO_2 utsläppen reduceras med 2 kg per såld biljett för både Regionteater Väst och GöteborgsOperan ifall besökarantalet ökar med 15 % istället för att det minskar med 15 %.

Några rekommendationer från studierna är uppräknade nedan. De anställda vid Regionteater Väst och GöteborgsOperan bör använda kollektivtrafik i större utsträckning samt minska användningen av elektricitet. Dessutom bör GöteborgsOperan minska användningen av polykarbonatplast. Det är bättre att gå på en föreställning på Regionteater Väst istället för en föreställning på GöteborgsOperan. Att konsumera en T-shirt är bättre än att gå på en teater- eller operaföreställning.

Nyckelord: LCA metodik, föreställning, opera, teater, CO_2, T-shirt

Contents

PREFACE

The two year Master Program Sustainable Energy Systems at Chalmers involves some mandatory tasks e.g. a master thesis of 30 hec (higher education credits).

This Master Thesis is a minor investigation in a bigger project, which is “Teater eller Tröja – Vad är bäst för miljön?” (Going to the theatre or buying a T-shirt – which environmental impact is worse?). Our Master Thesis investigates the environmental impact for visiting the Göteborg Opera or visiting Regionteater Väst in Uddevalla. The contractor is VGR (Region Västra Götaland) and the whole project will be performed by SP (Svergies tekniska forskningsinstitut), which have delegated the investigation to us.

We want to thank the staff at the Göteborg Opera, and the staff at the theatre in Uddevalla for all help. We also want to give a special thank to our instructor Birgit Brunklaus and our examinator Anne-Marie Tillman at Chalmers University of Technology for their commitment, patience and experience.

Göteborg 2010-05-18

Johan Tengström

Francisco Izurieta

NOTATIONS

In Life Cycle Assessments a certain terminology is used, more or less frequently. Some of these denotations of a certain specific meaning are stated below in order to be understood.

LCA	Life Cycle Assessment
VGR	Region Västra Götaland (West province of Sweden)
ISO	International Organization for Standardization
ELCD	European Life Cycle Database
CPM	Competence Centre for Environmental Assessment of Product and Material Systems (Chalmers University of Technology)
GPS	Global Position System
NO_x	Nitrogen oxides
SO_x	Sulfur oxides
CO_2	Carbon dioxide
CH_4	Methane
CFC	Chloro Fluoro Carbons
PAH	Polycyclic Aromatic Hydrocarbons
PM10	Particulate Matter less than 10 microns in diameter
SO_2	Sulfur dioxide
HCI	Hydrogen chloride
HF	Hydrogen fluoride
NH_3	Ammonia
PO_4^{3-}	Phosphate
H_3PO_4	Phosphoric acid
NH_4^+	Ammonium
NO_3^-	Nitrate
HNO_3	Nitric acid
COD	Chemical Oxygen Demand
HTP	Human Toxicity Potentials
GWP	Global Warming Potentials
MJ	Mega Joule
Nm^3	Normal cubic mete

LIST

Common words which are used in the report are listed in English with a Swedish translation:

Acidification	Försurning
Carpentry	Snickeri
Costume	Kostym
Décor	Dekor
District heating	Fjärrvärme
Eutrophication	Övergödning
Forge	Smedja
Global warming	Växthuseffekt
Hazardous waste	Farligt avfall
Metal workshop	Smedja
Painting	Måleri
Painting workshop	Måleriverkstad
Props	Rekvisita
Rustic site	Bygdegård
Scenery	Dekor
Stage performance	Scenframträdande
Theatre	Teater
Wig and makeup	Peruk och smink

1 INTRODUCTION

The environment of our Earth has proven to be easily affected by human society. Studies show that almost every single one of our activities has an influence on it. Human activities involve a big range of situations; from manufacturing of solid products, to situations where services are offered or provided.

A life cycle assessment is a tool where material and energy flows are measured and environmental impacts are calculated. Traditionally, LCA studies were focused on solid products, but human society also involves services and their use of resources. Therefore, the analysis of services, e.g. the analysis of cultural aspects will be more important than analysis simple products in the future, i.e. if we want to be moving towards a more sustainable society with less material consumption.

This study focuses on the consumption of cultural service in two different performances, an opera stage performance in Gothenburg and a theatre stage performance in Uddevalla. The environmental impact of these activities is analyzed from the cradle to the grave. In other words, these activities are divided into smaller processes that contribute to a total environmental load from a certain product or service. Each one of these processes is analyzed at an ecological point of view. The results from this LCA are then compared to those of another LCA study in a different field, e.g. an LCA study of an ordinary product like a T-shirt, in order to understand how they affect the environment, less or more severely.

2 IMMATERIAL CONSUMPTION

Region Västra Götaland (VGR) initiated a project in 2009 about immaterial consumption. After a while, the project was renamed to Theatre or T-shirt – What is best for the environment. Chapter 2.1 present the aim and method of the overall project and chapter 2.2 present the aim and method for the specific project – stage performances.

2.1 Aim and method of the overall project

Region Västra Götaland (VGR) initiated a pilot study in 2009 about how the cultural board could work with environmentally related questions. The study resulted in five areas that are important for the cultural sector.

a. Culture´s own environmental impact.
b. Culture´s possibilities to inform about a sustainable life style.
c. Culture´s possibilities to change society´s material consumption tendency, into a more cultural consumption.
d. Culture´s responsibilities to solve environmental and cultural conflicts e.g. using energy in cultural buildings versus producing cultural value for society.
e. Culture´s potential to be a place for environmental debates.

Statement "c" assumes that the consumption of culture is better at an environmental point of view rather than the consumption of ordinary manufactured products. This should be investigated. In order to find out if this statement is true or not, the cultural board has initiated the project "Teater eller Tröja – Vad är bäst för miljön?"

Focus for this LCA project is statement "a" and statement "c". In chapter 2.2 is these two statements broke down into specific questions for the Regionteater Väst and the Göteborg Opera. The other statements are answered in the main project, e.g. a literature study or other LCA studies.

SP Sveriges Tekniska Forskningsinstitut is head of the project, which has been divided into some partial studies in different areas, which are performed in the Chalmers University of Technology or in the University of Gothenburg. For example, LCA studies will be done about the Art of Film, the Art of Literature and the Art of Spare Time (Nielsen 2009).

2.2 Aim and method of the specific project – stage performances

This LCA study is a partial project in a more expansive investigation in Swedish which was introduced in chapter 2.1. The main reason for carrying out this LCA study is to investigate the environmental impact from a stage performance at the Göteborg Opera and the environmental impact from a stage performance at the Regionteater Väst. The specific questions the study answers are:

- How large is the environmental impact from a stage performance in the Regionteater Väst?
- How large is the environmental impact from a stage performance in the Göteborg Opera?
- How can the environmental impact from the stage performances be reduced?
- What happen if the consumption of stage performances increases in society?
- Is it environmentally better to consume a stage performance compared to a T-shirt?

Parallel to this project are other LCA studies conducted about the Art of Film, the Art of Literature and the Art of Spare Time which have answers to similar questions stated above and will complement the present study.

3 THEORETICAL BACKGROUND

Life cycle assessment (LCA) is a tool, which main goal is to measure and calculate the environmental impacts of a product or a service during its life cycle, see Figure 1. This means that every emission related to a product/service is considered from cradle to grave (Baumann and Tillman 2004).

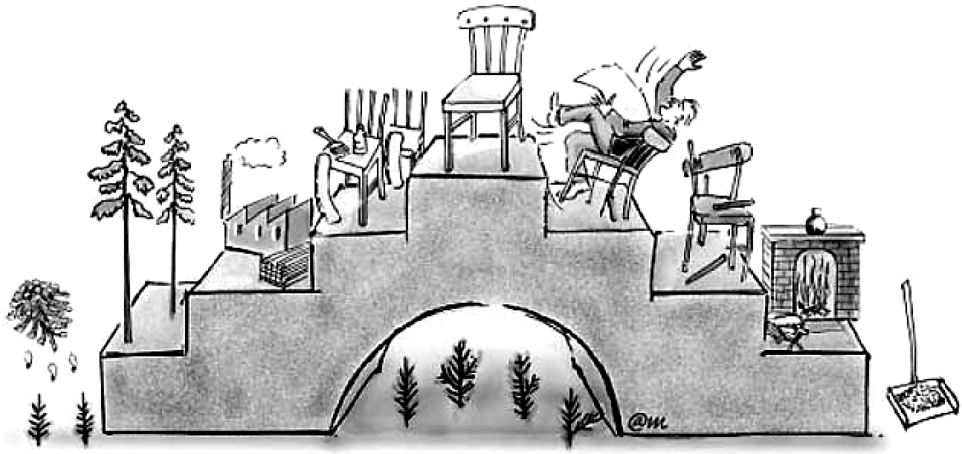

Figure 1 Life cycle of a chair (Skogforsk, 2010).

The International Organization for Standardization presents a methodology to use the LCA tool in the ISO 14040 to ISO 14023. If the ISO standard is followed, the project can be considered to be a Life Cycle Assessment and used for labeling purposes, as well as for product strategic development (Baumann and Tillman 2004).

The methodology to follow when doing an LCA of a service may not be the same as when performing one for a product.

3.1 Types of LCA

The LCA Methodology considers two alternatives for LCA studies:

- **Change oriented LCA**

  This type of LCA aims at understanding which the main contributors are to the environmental impacts if certain changes take place in the system. Therefore this LCA type considers different processes, scenarios, disposals, allocations, etc. Change oriented LCA studies help to understand advantages of a final decision. Hence, it is frequently used as a governmental policy making and business decision taking tool, as well as for comparing products on the market. (Baumann and Tillman 2004).

- **Accounting LCA**

  An accounting LCA is preferably used when a single product needs to be analyzed and described. The main idea of this type of LCA is to better understand the main environmental characteristics of a product, as well as to determine where the main environmental impacts are located (Baumann and Tillman 2004).

3.2 Reference flow or functional unit

The reference flow must be defined in a comparable and dimensional smart unit, see Table 1. Then the results from a study are easier to understand. Furthermore, it is possible to compare results from other studies (Baumann and Tillman 2004). The functional unit in a service LCA may consider the total number of times a service is delivered in a period of time and the number of clients that consumed a service at the same time.

Table 1 Examples of functional units.

Type	Unit
Goods transportation	kg*km
Passenger transportation	p*km
Beer brewery	liter of beer
Steel production	kg of steel

3.3 Assumptions

General assumptions have to be taken into consideration in the goal and scope definition. This is what the ISO standard (ISO 14040 1997) state. Every assumption influences the result of an LCA. They limit or expand the results (Baumann and Tillman 2004). On the other hand, small data assumptions have to be considered during the study. These assumptions have to be stated to give proper relevance to the obtained results. Hence, if the LCA should be transparent, it must be possible to reproduce the results with the data and assumptions stated in the report.

3.4 Geographical and time boundaries

The geographical boundaries determine where the resource use and emissions take place and if they should be taken into account. Therefore, defining system boundaries in an LCA study is very important in order to be able to have data worth to analyze.

If a lot of raw materials are imported from abroad, e.g. with a range of wider geographical boundaries, then the environmental load from the final product may not be easy to change. On the other hand, if most of the raw materials are from local production, then it may be easy to take actions in order to improve the final environmental impact of the product (Baumann and Tillman 2004).

A time boundary may be chosen to validate the relevance of data. For example, if a LCA study wants to analyze the impact of a certain product in the last two years, then used data should not be older than two years. If the time boundary is not set, the collected data must be reliable and relevant according to the defined scope (Baumann and Tillman 2004).

3.5 Limitations of a study

Limitations have to be stated in a clear way in order to give the project size delimitation. A limitation statement considers aspects that could not be investigated, usually because of lack of time, data, budget or interest (Baumann and Tillman 2004).

3.6 Allocation problems

The ISO standard for LCA studies has information about allocation problems. There are mainly three important steps which need to be considered before any allocation can occur. First a balance between the allocated and unallocated environmental impacts must be equal. If it is possible to use different allocation procedures, sensitivity analysis should be done. Finally, a list is done for how to solve allocation problems (Baumann and Tillman 2004).

1. Increase system detail or use system expansion methods to get rid of allocation problems.

2. If it is not possible to solve the problems with statement one, some relationships of physical nature should be used. It could be mass, volume or molar fraction etc.

3. Finally, allocation problems could be solved by more vague relationships like economic value.

3.7 Type of data

Data collection while performing an LCA can be done in different ways. The collection process depends on the desired type of data. Statistic data could be found in reports or provided by specialized companies. Energy consumption can be found in bills and prices of different goods can be found directly on the market. However, certain data have to be gathered directly from people involved in the processes. This is the qualitative data which will validate the relevance of the quantitative data.

3.8 General LCA procedure – goal and scope

A goal and scope definition in an LCA study includes several parts e.g. inventory analysis, flow chart, impact assessment, impact categories, characterization, weighting and interpretation.

The calculations start with a construction of a flow chart in the inventory analysis. Then all different emissions and resource uses for the processes are collected. The data are normalized to a unit from which it is easy to calculate further. Thereafter, the data are calculated and allocated in relation to the functional unit.

The different emissions and resource use contribute to different environmental impacts in different ways. This is handled through impact characterization indicators where all emissions are weighted on the basis of amount and contribution to the impact. The impacts are then related to the processes in which they occur and results are given in bar charts or other type of charts.

Finally an analysis of the results has to be presented together with findings and suggestions (Baumann and Tillman 2004).

3.8.1 Inventory analysis

The inventory analysis is the part of the study where the baseline is settled to quantify all the raw materials, the emissions, and the effluents that are released during the production of a product or a service life cycle. A good inventory analysis helps to identify where a resource reduction can be performed and which area that may need an improvement. The inventory analysis helps to facilitate the design of new products and optimize production.

The inventory analysis sets the foundation for future analyses of the system considering the flows affecting the system. The system is considered to be all the operations involved in the processes of creating a product or a service. Fig 2 shows an inventory of a system of raw materials as inputs and outputs with different possible releases into the environment in relation to the functional unit decided in the goal and scope definition (Baumann and Tillman 2004).

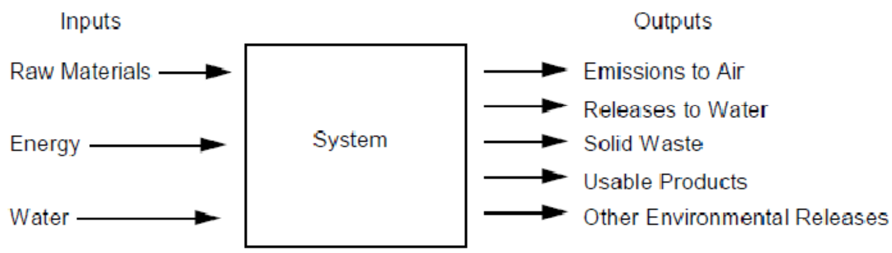

Figure 2 System's Inputs and Outputs (Svoboda, 2008).

Figure 2 show the system in a simple way. Generally is a more detailed flow model created that take into account the system boundaries from the goal and scope in the LCA study. This flow model is often named as a flow chart.

Special about service LCA studies compared to product LCA studies are processes like office and building services are not neglected, they are included. Examples of these processes are district heating, electricity, tap water, waste water and building maintenance.

3.8.2 Impact assessment

This is the part where every result accounted during the inventory is analyzed. This evaluation can involve several aspects, for example ecological, social and cultural aspects (Baumann and Tillman 2004).

3.8.3 Impact categorization and characterization

The accounted emissions and consumptions found in the inventory phase may have several impacts over the environment and human health. These environmental loads are described in different categories which are easier to understand (Appendix 5). The impact categorization also helps to read the results and make them available for larger amount of users in different application fields who are not educated in chemicals (Baumann and Tillman 2004).

There exist several different environmental categories in the impact categorization. However, in an LCA study the used ones are those the conductor thinks are of relevance. For example, land use is a category of not much influence in a service LCA of stage performances, since the theatrical service normally takes place in an area that is already dedicated to similar or specific activities.

The accounted emissions are classified into impact categories according to what these emissions are affecting in the environment (Baumann and Tillman 2004);

- Eutrophication
- Acidification
- Global warming
- Resource use/depletion of raw materials
- Photochemical ozone creation potential
- Eco toxicity
- Human toxicity
- Ozone depletion
- Land use

3.8.4 Weighting

Weighting is a procedure where all the characterized indicators are transformed with a weighting factor to a comparable and standardized value to the other categories. There are several methods to perform the weighting. However, weighting includes society's values about how important specific environmental aspects are e.g. radioactivity or climate change. (Baumann and Tillman 2004).

3.8.5 Interpretation and results statement

In this phase the results are evaluated, so a general picture and an overview can be provided. Based on these findings, improving recommendations are stated and conclusions about the results are formulated. It is important to identify the main environmental impacts, evaluate completeness and consistency by analyzing sensitivity and conclude everything in a clear report (ISO14044, 2006).

4 STAGE PERFORMANCES

This LCA study is analyzing the production of stage performances in the Göteborg Opera and the Regionteater Väst in Uddevalla. The opera is interesting because they use a large amount of material and they are around ten times bigger compared to the Regionteater Väst. The turnover for the Göteborg Opera year 2009 was around 400 million compared to 40 million for the Regionteater Väst Uddevalla year 2009 (GöteborgsOperan AB 2010) (Regionteater Väst AB 2010). It is also interesting to analyze the Regionteater Väst because they have the tour in the western part of Sweden. Travelling has been in focus in previous LCA studies on services (Brunklaus 2010). Chapter 4.1 and 4.2 give some history of the two companies and background information about the opera *Thaïs* and the play *Plocka Potäter i Kostym*.

4.1 The Göteborg Opera

The Göteborg Opera was built in 1994 in the harbor. Jan Izikowitz is the architect and he wanted to have a feeling of ships, sea and harbor. Hence, the building has some influences of ship design. Figure 3 shows the Göteborg Opera. There are two stages in the house, one big with a bit over 1280 seats and a smaller stage with 230 seats. The opera house also contains a restaurant as well as a café and two bars that serve guests visiting the stage performances. Totally around 450 people are working in the building (GöteborgsOperan AB 2010).

Figure 3 The Göteborg Opera (F. Izurieta 2010).

4.1.1 The performance

The opera chose the play *Thaïs* suitable to collect data from. The reasons are:

- They performance has been performed during year 2009 and year 2010.
- The last stage performance was in the spring of year 2010.

There were 11 stage performances and around 50 people who wore working specific with the play *Thaïs*. However, more or less the whole opera was indirect working with Thaïs. For example, the office people and the cleaning personal were not possible to link direct to the play.

"The courtesan *Thaïs* is standing in the center in Alexandria. Her status as a star is falling. At the same time, the monk Athanaël becomes obsessed to convert her to Christianity. The monk succeeds and *Thais* leaves her sinful life and starts a new life in a cloister, see figure 4. As time goes by Athanaël realizes that it is *Thais´* body he is obsessed with (GöteborgsOperan AB 2010)".

Figure 4 The opera Thaïs (GöteborgsOperan AB 2010).

4.2 The Regionteater Väst in Uddevalla

Like the Göteborg Opera, the theatre is located in a house close to the harbor in Uddevalla, but there exist also a stage in Borås. The house in Uddevalla has two stages and is displayed in Figure 5. Main business focus in Uddevalla is to present scene plays on these two stages as well as going on tours in the western part of Sweden to different rustic sites (bygdegårdar). The main business focus for the house in Borås is to produce dance plays. The Regionteater Väst does not have any restaurant or catering service. They have around 40 employees if both Uddevalla and Borås are accounted (Regionteater Väst AB 2010).

Figure 5 The theatre house in Uddevalla (F. Izurieta 2010).

4.2.1 The performance

The play *Plocka potäter i kostym* was chosen by the theatre employees. The criteria for the play were:

- Produced for a tour in the western part of Sweden.
- Not produced for children.
- Possible to collect data for. Therefore, invoices should be possible to find and the staff should remember the play.

There were 24 stage performances in the western part of Sweden. Nine people worked specific with the play *Plocka potäter i kostym* and ten people had worked indirect with it. For example, the office people and the cleaning personal were not possible to link direct to the play.

The play *Plocka potäter i kostym* is about the confusing time during the 60s, when the modern world is knocking on the door to countryside. Problems people face are, alcohol, love, staying or not staying in the countryside or taking a chance and move to the city for another life (Regionteater Väst AB 2010).

5 GOAL AND SCOPE DEFINITION OF TWO STAGE PERFORMANCES

The goal of this study is to investigate the environmental performance of stage performances, more specifically an opera and a theatre stage performance, *Thaïs* respectively *Plocka potäter i kostym*. Specific questions the study answers are:

- Which processes for the play *Plocka potäter i kostym* in the Regionteater Väst and which processes for the opera *Thaïs* in the Göteborg Opera contribute most to the environmental impact? The visitors transportation is put to zero in this accounting LCA. Neither the opera, nor the theatre provides the service of transport the visitors back and forth to the play.
- What is worst for the environment from a consumer scenario; consume a stage performance in the Regionteater Väst or in the Göteborg Opera? Here is the transportation of the visitors is included.
- What is worst for the environment; consume a stage performance in the Regionteater Väst/the Göteborg Opera or a T-shirt? This is important in a wider perspective, because a choice in the society to consume either services or products could be based on scientific research. The reason to choose a T-shirt as the comparative product is the equality in price to a theater or an opera ticket.

Region Västra Götaland´s cultural board is the contractor. They have delegated the project to SP Sveriges Tekniska Forskningsinstitut, which is head of the project.

The target audiences are the Regionteater Väst´s and the Göteborg Opera´s management, but also politicians and officials in their work towards sustainable consumption in Sweden. The results could also be used as consumer guidance for people to help them live their live with a greater degree of environmental responsibility and concern.

In a study; relevance of data is one of the most important issues in order to obtain results of the desired quality, see Table 2. In order to guarantee a valid data collection, the first step to perform the study in an efficient and reliable strategy is to establish a table for basic data.

Table 3 presents some additional data for the opera and the theatre. Worth to notice is the real ticket price for the opera and the theatre. This is what the ticket would cost if the Swedish state and the western province did not benefit the theatre and the opera with money.

Table 2 Basic data for the LCA.

Functional unit	one sold ticket
Result are presented additional as	one sold ticket*SEK one sold ticket*real price one sold ticket*hour
Type of LCA	**Study one:** Investigate the environmental load from one stage performance in the Göteborg Opera and one stage performance in the Regionteater Väst. Therefore, this is an accounting LCA. **Study two:** Investigate what is worst for the environment, the stage performance in the Göteborg Opera or in the Regionteater Väst. Therefore, this is more of an comparative LCA. **Study three:** Investigate what is worst for the environment, the stage performance in the Göteborg Opera/Regionteater Väst or consume a T-shirt. Therefore, this is more of an comparative LCA.
System boundary	**Natural boundary:** The cradle is the raw material extraction for the production goods and the grave is the incineration of the same goods. **Geographical boundary:** The stage performances are produced in the Regionteater Väst and in the Gothenburg opera. All the costumers are in a range of some km up to the whole Sweden. **Time horizon:** The data used are from recent years. **Cut-off criteria:** The building construction is included as LCA average data.
Allocation	There are allocation problems, like how electricity usage should be divided between different stage performances.
Data quality and requirments	The data is site specific for the forground system. Site specific data or average data from other conducted LCA studies are used for the background system.
The impact categories	Global warming Energy consumption Acidification Eutrophication Resources used Material consumption Water consumption
Assumptions	Use selling statistics for the tickets. Some of the background data. No losses during the production of the cloths and the scene. The shopping tour to buy a T-shirt last 3 hours.
Limitations	This study consider an opera stage performance, a theater stage performance and a comparrison of the results to a T-shirt.

The data assumptions for the whole LCA project are listed in appendix 5.

Table 3 Additional data for the theatre and the opera.

Additional data	
Category	**Value**
Average ticket price opera	384 SEK
Real ticket price opera	1650 SEK
Average ticket price theatre	100 SEK
Real ticket price theatre	2500 SEK
Visitors to stage performance opera	12893 persons/ 11 stage performances
Visitors to stage performance theatre	1647 persons/ 24 stage performances
Play duration time opera	3 hours
Play duration time theatre	2.5 hours

5.1 Methodology

The project is based on an investigation of what kind of environmental impacts two different stage performances have. Therefore, the foundation in the project is to build up a model in Microsoft Excel of a system which represents the operations needed to "manufacture" these stage performances. Hence, the developed model considers the departments that the stage performance businesses have in order to provide a play in an effective way.

The general model in Microsoft Excel for stage performance businesses is based on self knowledge, but also from an LCA for a theatre in Vienna. (Juric and Vogel 2005). The model is constantly modified according to the real processes. This is done while gathering data from the theatre and the opera. As stated in chapter 3.2, having a well thought out reference flow in order to clarify the processes is helpful for the accounting part of the LCA.

The model is first built for all processes involved in the Uddevalla theatre. This model is the base case. It is then modified when studying the opera.

Preliminary analysis is performed with the model for the Uddevalla theatre. It provides experience to recognize the most affected areas and departments of the environmental impacts. In the same way, processes with little or no influence over the environment are recognized.

In contrast to the theatre, when studying the opera, a reduced model is used based on the knowledge acquired from the body of environmental impacts during the investigation performed for the theatre. This simplified model of the opera has almost the same complexity level, except for the transportation of materials bought by the departments.

The theatre flow chart and the opera flow chart are designed under the same conditions. When the organizations are analyzed, the flow charts are modified according to the real operations.

The final analysis of the environmental impacts is done when both models are completed. All the assumptions must be considered, because they influence the results. Therefore, a sensibility analysis is done to verify the validity and importance of the assumptions.

5.1.1 Methods – data collection

The processes are divided in a foreground and a background system. The foreground system has the process stages that occur inside the opera or the theatre. Hence, it is possible for the company to influence these processes. For example, the carpentry can choose to buy another type of wood which is more environmentally friendly. In the background system, the opera or the theatre cannot influence processes in the same way. For example, if the carpentry is used again. They need to buy a certain amount of wood from a manufacturer. But it is not possible for the carpentry to influence the environmental impact from the wood production of the supplier´s.

5.1.1.1 Foreground data

Site specific data is collected from the opera and the theatre by interviewing people, as well as by collecting bills related to the selected plays. These bills have information about their suppliers or even sub suppliers. Qualitative data is collected simultaneously with the quantitative data. This is done by having personal interviews with people responsible for each department in the companies. The qualitative data is matched with the quantitative data to support it with information that the numbers cannot tell (Baumann and Tillman 2004). For example, how different data is measured and when the data could be used. Without this information, numbers are useless.

For collecting data about employees' transportation to and from work, a questionnaire is developed, see Appendix 2. In the theatre is it possible to hand out and get back all questionnaires. Hence, almost every employee answered. However, in the opera the questionnaires are only handed out to people who are directly involved with the selected play. Further, electronic questionnaires are sent to everyone else in the opera. The reasons why electronic questionnaires are used as a complement are the number of employees. It is not possible to hand out questionnaires to 450 employees.

5.1.1.2 Background data

The main method to collect data from suppliers and sub-suppliers are by contacting them by phone. Collaboration from suppliers is essential for collecting required data about purchased products and transportation. If no answers are obtained, an email is sent with a questionnaire. However, there are often no answers at all or the answer is "that information is confidential".

In cases when data are not available, other LCA studies are used. They are found in electronic scientific journals or in printed form in the Chalmers University of technology´s library, or with search engines like Science direct or Google scholar. If it is not possible to find any LCA of a similar product, data are taken from CPM database (CPM LCA Database 2002), and the European Database (ELCD database 2010). Finally, additional data are collected from literature in libraries or from e-books on the internet.

5.1.2 Methods – calculations and analysis

The base model for calculations is designed in Microsoft Excel in order to obtain an automatic modeling spreadsheet. An important step is to define impact categories. They are resources used, global warming, acidification, and eutrophication. The selection of these categories is defined according to the requirements in the goal and scope definition.

When the structures of an effective calculation model are done, data is put in to the spreadsheet, transformed to a normalized state, then to the reference flow and functional unit. Finally, there is a summarizing spreadsheet where all impacts are summarized. Then it is possible to obtain the total environmental loads. To present the results, a spreadsheet is used with graphs in the excel program.

A list for the method´s steps are presented below:

1. The inflows and outflows are calculated for each step in terms of the functional unit.
2. The different environmental impacts on global warming and the other impact categories are calculated and analyzed.
3. Different scenarios are studied, e.g. is it better to consume a T-shirt than a stage performance?
4. A sensitivity analysis is done to understand what parts in the life cycle that has the biggest influence on the environmental impact.

5.2 Type of LCA

The present studies are intended to be a base for upcoming tactical decisions in the stage performance business. Therefore, the first LCA study focuses on understanding the level of environmental load generated by stage performances. Therefore is the study account oriented. The second LCA study is more of a comparative nature since it compares the stage performances between the opera and the theatre. The third LCA study is also of a comparative nature since it compares what is worst for the environment; visit a stage performance in the Regionteater Väst/the Göteborg Opera or buy and consume a T-shirt.

5.3 Reference flow and functional unit

The functional unit "one sold ticket" is used for the two accounting LCA studies; one for the stage performance in the theatre and one for the stage performance in the Göteborg Opera. These two studies answer the question about what environmental impacts are high respective low from the stage performance in the theatre and the stage performance in the opera.

For the two LCA studies of a more comparative nature are three additional functional units used:

- "One sold ticket*SEK" give the environmental impact per Swedish crown spend on a ticket.
- "One sold ticket*real price" give the environmental impact per Swedish crown spend if the theatre and opera did not get any benefits from the Swedish state and the western province.
- "One sold ticket*hour" give the environmental impact per spend time.

With the functional unit of "one sold ticket", it is possible to compare the opera with the theatre. With the additional functional units is it possible to measure economical values and time factors in the stage performance business and compare it with economical values and time factors for a T-shirt.

5.4 Geographical boundaries

Products manufactured all around the world are imported to the opera or the theatre. Extraction of crude oil for production of fuels occurs on an international market. Hence, the environmental impacts are considered on an international basis i.e. not only emissions produced in Sweden are accounted. However, the environmental load during use phase and disposal end up in the Swedish waste handling system that can be affected by the decision from the national authorities. Global warming is one of the environmental impacts which affects the whole world and will therefore have a global perspective even if everything would be produced in Sweden.

5.5 Limitations and data quality and validity issues

This study considers one specific play at the Göteborg Opera and one specific play at the Regionteater Väst in Uddevalla. The result could differ if other plays were chosen or if other opera companies and theatre companies were chosen. The study could be slightly modified to be possible to model other stage performance business or other plays.

Site specific data in this study represents the current situation and does not consider the future technical improvements or decisions to handle different materials.

Due to regulations from suppliers of materials to the opera and the theatre, a big share in the background systems are average data from Sweden or data from other LCA studies conducted of similar products. The consequences of this are that the environmental impact from the Regionteater Väst and the Göteborg Opera are not the true environmental impact. In reality with site specific data with well known data quality and validity, the environmental load could be bigger or smaller compared to this study. However, it is better with average data with lower quality and validity than no data at all.

5.6 Allocation problems

There are many allocation problems in the study of the opera and the theatre. Therefore they are divided into main and minor allocation problems. Main allocation problems have a bigger influence of the results of the LCA studies, compared to the influence of minor allocation problems.

5.6.1 Main allocation problem for the theatre and the opera

Diffuse resource usage for the theatre and the opera generates the main allocation problem which will influence the results from the LCA. An example of a diffuse resource usage is electricity or district heating for the theatre and the opera. The measurements of these are for the whole building, but they must be allocated to the studied plays with an allocation method.

As seen in Table 8, there are three allocation methods for the theatre. The chosen one is the "stage performance allocation method". The main reason for this choice is that it is possible to have the same allocation method for both the theatre and the opera. This is crucial to be able to compare them in an equitable and fair way.

In the "stage performance allocation method in" Table 8, the amount of stage performance times (24 for the *Plocka potäter i kostym* or 11 for the *Thaïs*) is divided by the total amount of stage performances. The visitors' allocation method works in the same way; meanwhile, in the play allocation method, the main or biggest plays produced during one year are the denominator and the play *Plocka potäter i kostym* is the nominator.

Table 9 shows the" stage performance allocation method" and "visitors' allocation method" for the opera. It works in the same way as for the theatre.

Table 4 Allocation methods for the theatre.

Allocations for the Regionteater Väst			
Name	**Stage performance allocation**	**Visitor allocation**	**Play allocation**
Nobelpristagaren	15	939	
Allt blir bättre	18	720	
Världsomseglingen	59	4519	
Plocka potäter i kostym	**24**	**1647**	**1**
Lycka till med allt	28	1208	
Tala! Det är så mörkt	25	1125	
Kul i kulisserna	41	977	
Produced big plays/year			**3**
Total	**210**	**11135**	
Allocation metthods	0.114285714	0.147911989	0.333333333

Table 5 Allocation methods for the opera.

Allocations for the Göteborg Opera		
Name	**Stage performance allocation**	**Visitors allocation**
Total	200	250000
Thais	11	12893
Allocation share	**0.055**	**0.051572**

5.6.2 Minor allocation problems for the theatre and the opera

There are some minor allocation problems for both the theatre and the opera. The problems together with solutions are listed in Appendix 6. A trend which could be seen is the allocation problems due to delivering of line based energy or material to the buildings (See problem A to D in Appendix 6). These are often taken for granted, but they are important to consider. There are also problems to allocate office and cleaning products to a specific play, and general transportations which not happen particularly for one play. Finally, there are some allocation problems with waste handling processes.

6 INVENTORY ANALYSIS

The inventory analysis has to follow the lifecycle for a whole play. First is the planning and designing of the play. Then the use phase, and finally the retirement or disposal phase of the play.

Some processes in the flow charts have a different color compared to the most common; light blue and green, see figure 6 and figure 7. This is because they are not symbolizing any manufacturing of a product which is possible to touch in an ordinary way. Instead, they represent line based service processes or products (electricity, tap water, district heating etc) delivered to the opera or theatre house.

The different colors of the processes are shown in the list below:

- Black: building related operations
- Light blue: ordinary product flow
- Orange: personnel transportation
- Green: transportation

One idea of having flow charts is to help to visualize all flows. The detailed flow charts can be found in Appendix 1. They visualize both the foreground system and the background system. The inventory results can be found in Appendix 12 and Appendix 13.

6.1 General flow chart and inventory of the Regionteater Väst

All processes are affecting the “play for public” in the middle of the flow chart. This is directly related to the building where most of the processes take place. Even if the Regionteater Väst travels around to the audience, there is a building that lodges processes, like metal workshop or carpentry, see figure 6. The chapters below present all the processes in the foreground system.

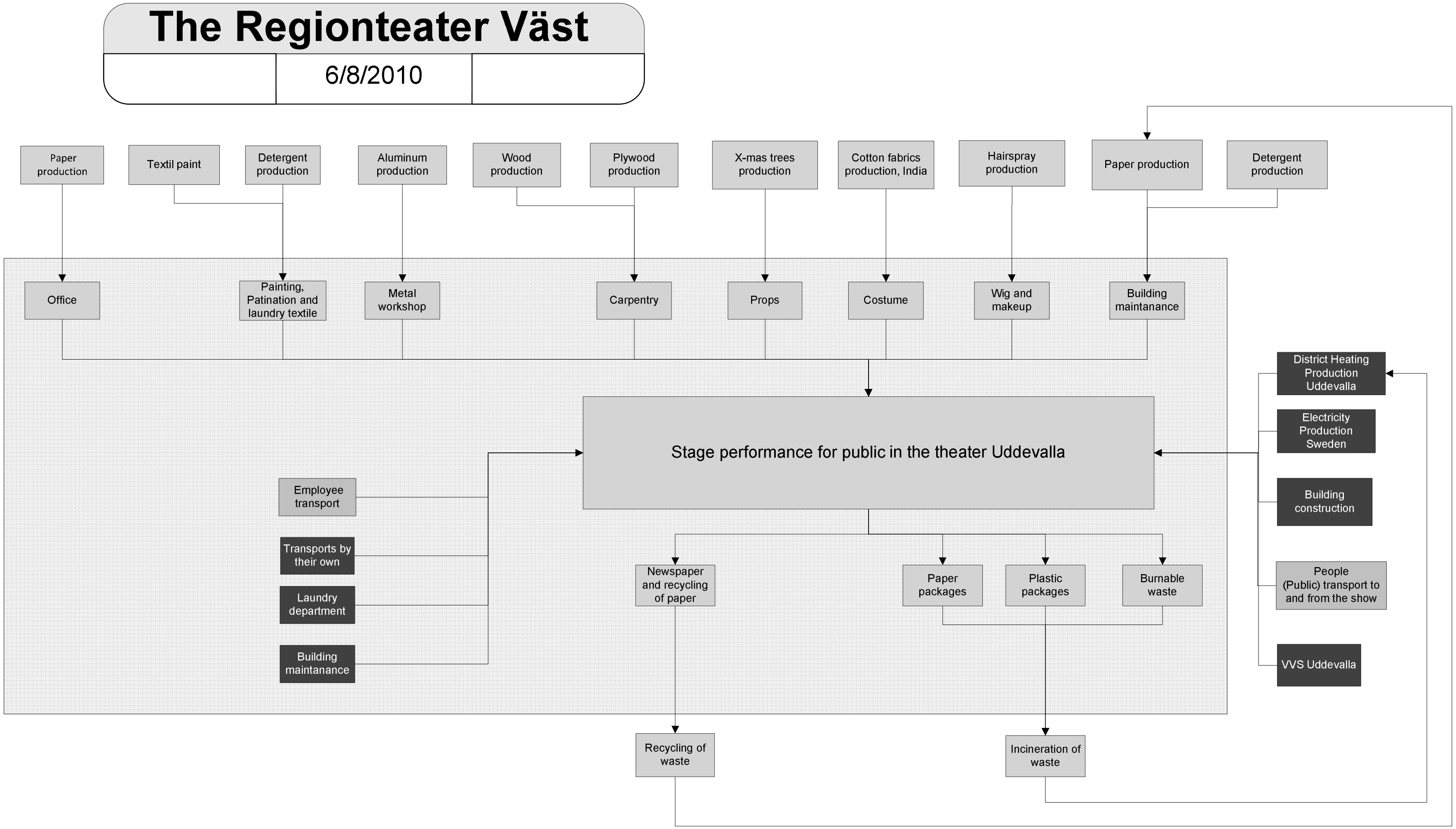

Figure 6 General flow chart for the Regionteater Väst.

6.1.1 Office

All the plays’ management takes place in the office facilities. For example, there is an executive manager, a technical chief, economy boss, producer, public communications manager. There are also other sections like, marketing, reception, project coordinator, producers, accounting, pedagogy which also consume office resources. The main consumed resource is paper, see assumptions in appendix 5.

6.1.2 Painting workshop

There is a person in the painting workshop who deals with painting material and part of the stage painting. This activity consumes water based paint.

6.1.3 Metal workshop

One person in the metal workshop deals with the requirements related to metals. The main metals used are aluminum and steel.

6.1.4 Carpentry

In the carpentry several types of wood are used, mainly birch plywood, pine and spruce.

6.1.5 Prop

The prop has a particular operation system, since they keep a lot of materials in their storage for future stage performances. For example, in the case of the play *Plocka potäter i kostym*, the Regionteater Väst bought 28 Christmas trees from China which they store for the future.

6.1.6 Decoration and costume

In the decoration and costume, some cotton and polyester fibers are used to manufacture their own costumes and obtain the desired image. On the other hand, some costumes are reused and some others are second hand clothes.

6.1.7 Wig and makeup

Almost no makeup is used in the play *Plocka potäter i kostym*. The main consumption is hair spray, which is used in large amounts. Therefore, this is the only considered input to this department.

6.1.8 Employee transportation specific for the play

To be able to gain knowledge of the transportation of the employees’ specific for the play, questionnaires are handed out. The employee transportation is assumed to be classified in four types of transports with average Swedish data; bus, train, car, and bike. The respective kilometers are shown in Appendix 3.

6.1.9 Cleaning and building maintenance

One person is responsible for the cleaning of the whole building. He/she cleans the toilets, halls and offices. He/she also keeps an account of the total of paper towels, soap, and hygienic resources used in general.

6.1.10 Clients' transportation

The play *Plocka potäter i kostym* is played during a tour to municipalities around the western part of Sweden. The visitors travel mainly by car to the plays. Data for the study is gathered by interviews of the managers of the rustic sites (bygdegårdar), see Appendix 4.

6.1.11 Employee transportation

There are a lot of transports of employees who are not specifically working with the analyzed play. For example the office people, cleaning lady and executive manager. This transportation must also be counted because they keep the theatre running. This transportation data is gathered by handing out questioners. Data from these questioners could be seen in Appendix 3.

6.1.12 Building construction

The building is considered to be a construction of concrete. The relation to the emissions is by square meter, see general assumptions in Appendix 5. The building has a life time of 50 years, even though there are several opera houses and theatres around the world which have last much more than 100 years.

6.1.13 District heating

The district heating in Uddevalla comes from two different sources, one heat only boiler and a waste management plant. Both are owned by Uddevalla energy AB (Uddevalla Energi AB 2010).

6.1.14 Electricity

The electricity consumption is registered trough the bill and is equivalent to 75% of the total value. That is because the electricity measurement is for the whole building and there are some more companies situated in the same building. The emissions come from the Swedish electricity production mixture (ELCD database 2010).

6.1.15 Water for services

The tap water comes from Uddevalla municipality water system. The waste water is delivered to Skansverket for cleaning treatment.

6.1.16 Disposal or renewal

The theatre in Uddevalla fractionates the waste in several categories. There are 15 waste fractions from the theatre, but the burnable and paper/plastic related fractions are only considered in the study. The other fractions of waste are transported to Havskurens retrieving plant by the caretaker.

6.2 General flow chart and inventory of the opera

The inventory analysis in the Göteborg Opera is almost the same as for the Regionteater Väst. Figure seven display the flow chart for the Göteborg Opera and the chapters below explain more in detail the processes in the foreground system.

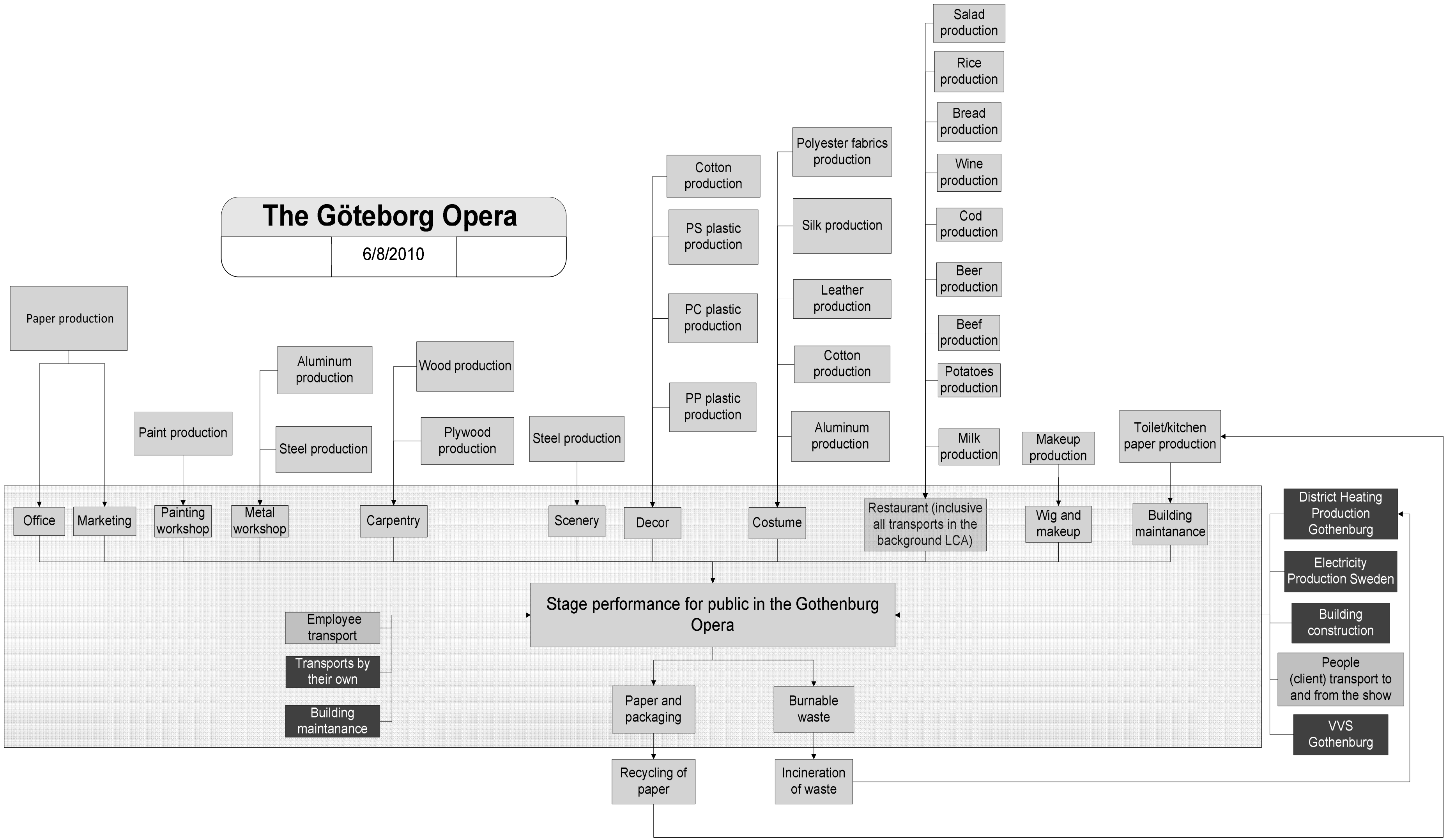

Figure 7 General flow chart for the Göteborg Opera.

6.2.1 Office

Paper is the only material which is considered in the office for this study. The emissions are mainly caused by the marketing printed papers for posters, letters, programs, etc and from ordinary office papers.

6.2.2 Painting workshop

The painting section is focused on painting and finishing the decorations of the set. The used paints are plastic and water paint.

6.2.3 Metal workshop

The structure of the set and some other parts are made of metals. The main materials used in the workshop are aluminum and steel.

6.2.4 Carpentry

The carpentry role is important, since many of the details are based on wood for the set. The emissions come from different types of woods that are acquired from different suppliers.

6.2.5 Props

The props use several special materials, like big mirrors, and some polyethylene glasses. The emissions come mainly from the production of these mirrors and polyethylene.

6.2.6 Décor and costume

The opera uses a lot of resources for decoration and costume. They buy silk fabrics, cotton fabrics and polyester fabrics from Sweden, Germany and United Kingdom. Most costumes are manufactured by the 37 employees in the costume department (Kinberg Isaksson 2010).

6.2.7 Wig and makeup

The main emissions are related to the manufacturing of the makeup. Unfortunately, it is not possible to find any environmental data for production of makeup. Hence, wig and makeup are not covered in the LCA for the opera stage performance.

6.2.8 Employee transportation specific for the play Thaïs

The employee transportation calculation was done in the same way as for the theatre. See Appendix 3.

6.2.9 Cleaning and building maintenance

There are many cleaning personal in the opera. These persons are required to keep the service areas clean and with the required sanitary supplies. Main data which is analyzed is the consumption of paper.

6.2.10 Clients' transportation

The client's transportation differs from the Regionteater Västs´, see Appendix 4.

6.2.11 Employee transportation

The transportation is solved in the same way as for the Regionteater Väst, see Appendix 3.

6.2.12 Building construction

The building is considered to be a construction of concrete, the same as for the Regionteater Väst. The only data which differ are those concerning the size of the buildings.

6.2.13 District heating

The district heating comes from a lot of sources, since there are a lot of production facilities in the district heating network in Gothenburg. The main energy company in Gothenburg is Göteborg Energi AB and they own many of the production plants.

6.2.14 Electricity

The electricity production mix is the same as for the Regionteater Väst, since the electricity market is equal in the Nordic countries. Hence, the emissions from the electricity could be calculated in the same way for the Regionteater Väst and the Göteborg Opera.

6.2.15 Water for services

The tap water to the Göteborg Opera is delivered from the municipality water system. The waste water is cleaned in Ryaverket.

6.2.16 Disposal or renewal

The Göteborg Opera´s waste is fractionized in site, as same as for the waste from the Regionteater Väst in Uddevalla. However, the Göteborg Opera pay an extra fee to the company Renova for the service of getting the unsorted waste sorted and treated in an environmentally good way (Koniouchenkova 2010).

In this study are burnable waste and paper packaging considered. Unsorted waste, unburnable, dangerous and glass fractions are collected to be recycled or transported to landfill by garbage trucks and not included in this study.

6.3 Similarities and differences

The processes in the Regionteater Väst and the Göteborg Opera are similar. Therefore have the flow charts in the project many processes in common, e.g. the metal workshop, the carpentry and the wig/makeup. In these processes mentioned previously, the stage, the props, and the actors´ wigs and makeup are done. However, some processes are identified which are not common between the flow charts, for example:

- The district heating production and the waste management are different depending on in which town the stage performance is.
- The transports for the employees are different between the theatre and the opera.
- The transports of the visitors are different between the theatre and the opera.
- The opera has a restaurant, which not the theatre has.
- The opera has a scenery department
- There is no décor department in the theatre. Instead it has props department.
- The costume department use a lot more fabrics in the opera compared to the theatre.
- The metal workshop in the Göteborg Opera use steel and aluminum.

7 RESULTS

There are three types of LCA studies included in the report. Chapter 7.1 contains an accounting LCA of the Regionteater Väst and the Göteborg Opera. The main questions this chapter answers are:

- What are big and what emissions are small in each play?
- How big or small are the resource usages in each play?

The functional unit in the study is “per sold ticket”.

Chapter 7.2 is a comparing LCA of the Regionteater Väst and the Göteborg Opera. The main question this LCA study answer is if it is better for a consumer to buy an opera ticket or buy a theatre ticket from an environmental point of view. The functional units are “sold ticket*SEK”, “sold ticket*real price” and “sold ticket*hour”.

In chapter 7.3 are the results from chapter 7.1 compared to data from an LCA study of a T-shirt. The functional unit is “per bought service” and “per bought product”.

7.1 Accounting LCA for different stage performances (basic scenario)

This is the basic scenario. In the diagrams are the results from the opera and the theatre showed per sold ticket. Even if this is an accounting LCA study of the opera and the theatre, the results are presented together in the same graphs, see figure 8 to figure 11. The reason for that is to not boor the reader and save space. It is important to mention again that the visitors' transportation is not included in the results below.

The different departments are presented e.g. results for the building services, the transportation, the material and the restaurant. It is interesting for the management of the Regionteater Väst and the Göteborg Opera to gain knowledge of what department which contributes most to the environmental impact.

7.1.1 Total environmental impact

Depending on which impact category is displayed in the graphs, the results differ. Figure 8 shows resources used. The materials are high for the Göteborg Opera and reach around 55 grams of Sb_{equv}/one sold ticket. For the Regionteater Väst is the transport high with almost 20 grams of Sb_{equv}/one sold ticket. The equivalent is expressed as antimony (Sb_{equv}) and based on the total reserves in the world.

Figure 9 display global warming potential for the Regionteater Väst and the Göteborg Opera. The result for the Göteborg Opera is around 11 kg of CO_2 equivalents/one sold ticket and the result for the Regionteater Väst is around 6 kg of CO_2 equivalents/one sold ticket. The materials bar is high for the Göteborg Opera with almost 6 kg CO_2 equivalents/one sold ticket. For the Regionteater Väst is the transport bar high with around 3 kg CO_2 equivalents/one sold ticket.

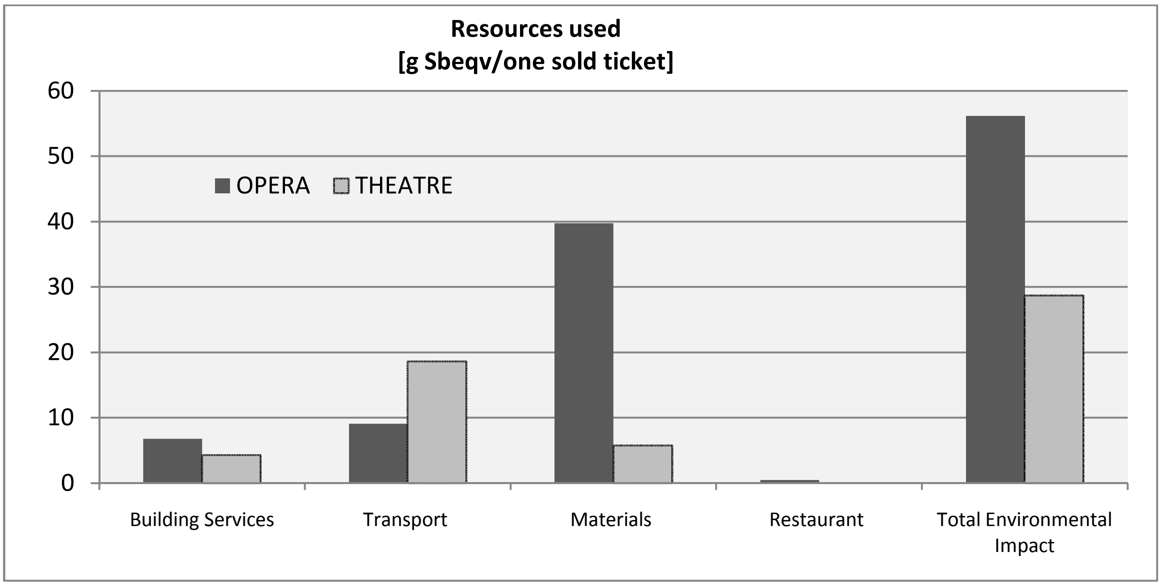

Figure 8 Resources used with the functional unit one sold ticket.

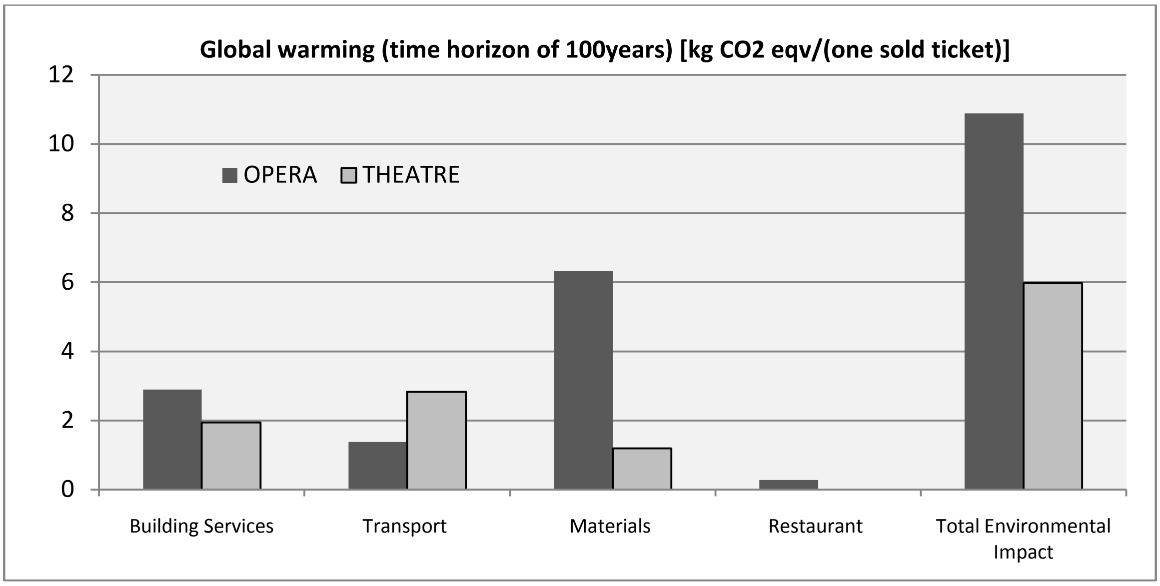

Figure 9 Global warming with the functional unit one sold ticket.

Figure 10 show acidification in gram SO_2 equivalents per one sold ticket. The Göteborg Opera has high acidification emissions from the materials usage. The acidification emissions from the Regionteater Väst are more equally distributed between the different categories.

Figure 11 display eutrophication in gram PO_4^{3-}equivalents per one sold ticket. The highest bar is from the materials in the Göteborg Opera, followed by the building services and the restaurant. For the Regionteater Väst is the transport the biggest contributor to the eutrophication emissions.

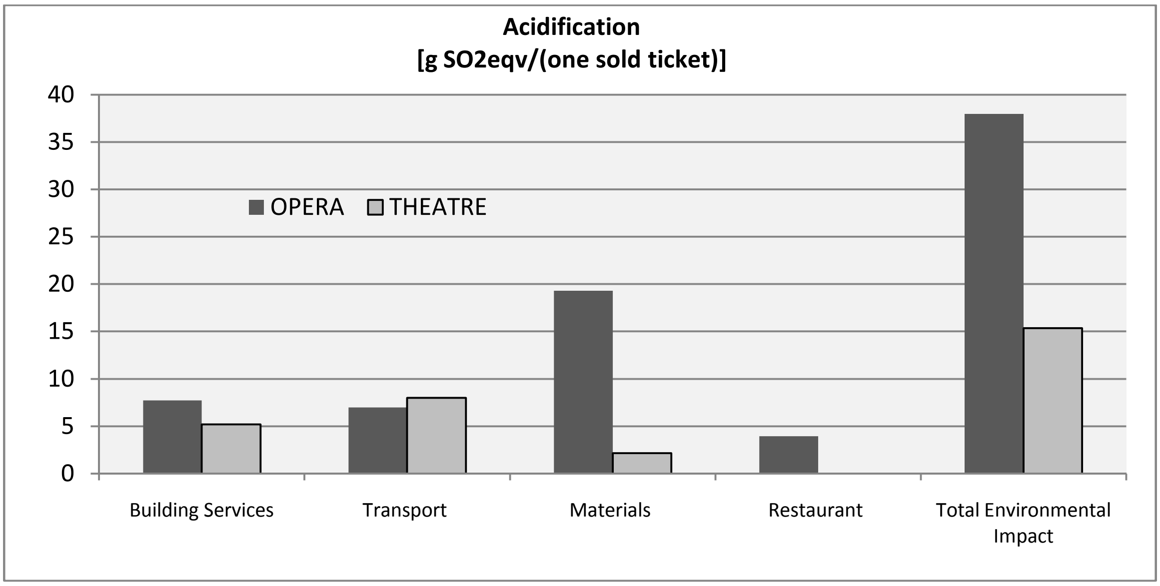

Figure 10 Acidification with the functional unit one sold ticket.

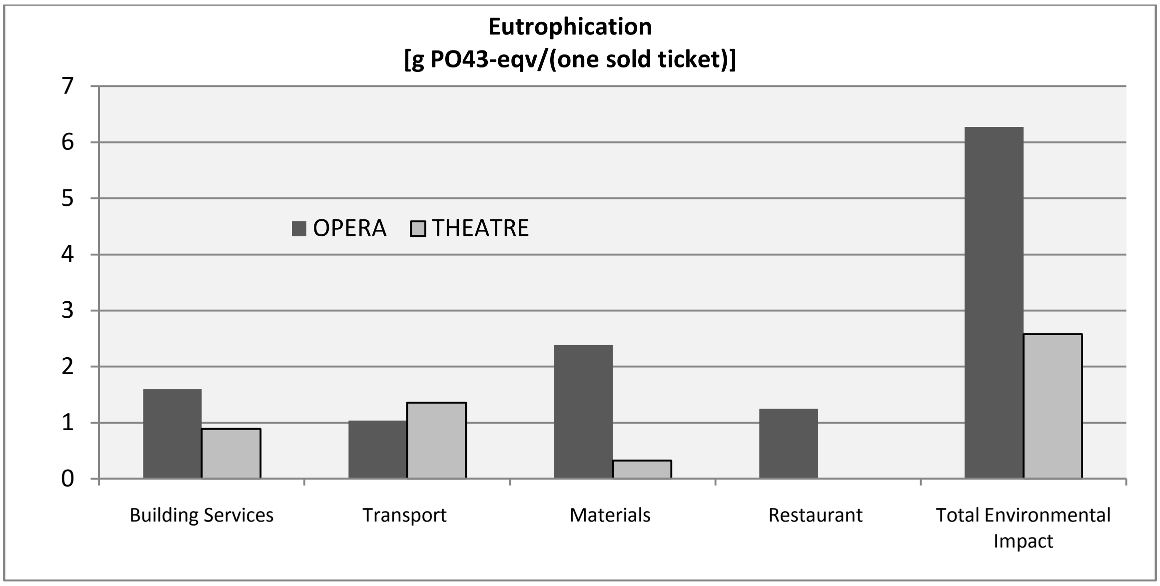

Figure 11 Eutrophication with the functional unit one sold ticket.

Figure 12 show material used for the Göteborg Opera. Largest share is "general or undefined materials" from background system". Paint is the second largest used material followed by wood and steel.

Figure 13 show material used for the Regionteater Väst. Largest share is "general or undefined materials from background system". The second largest is wood followed by plastic. Paper in the office is also an important factor for the Regionteater Väst.

Figure 14 displays the energy utilization in both the Göteborg Opera and the Regionteater Väst. The share of uranium comes from the electricity production in Sweden, because almost half of the production of electricity comes from nuclear power. All the energy carriers are re-calculated to MJ, so it should be possible to compare them against each other. The energy which comes from hard coal and lignite (brown coal) is also from the electricity production, because the electricity grid in Denmark, Norway and Finland is integrated within the region. Therefore sometimes electricity produced from coal is used in Sweden. A big share of crude oil is added for the Göteborg Opera because they bought roughly 8000 kg of polycarbonate plastic for the play *Thaïs*. Oil is the most common raw material in many types of plastic.

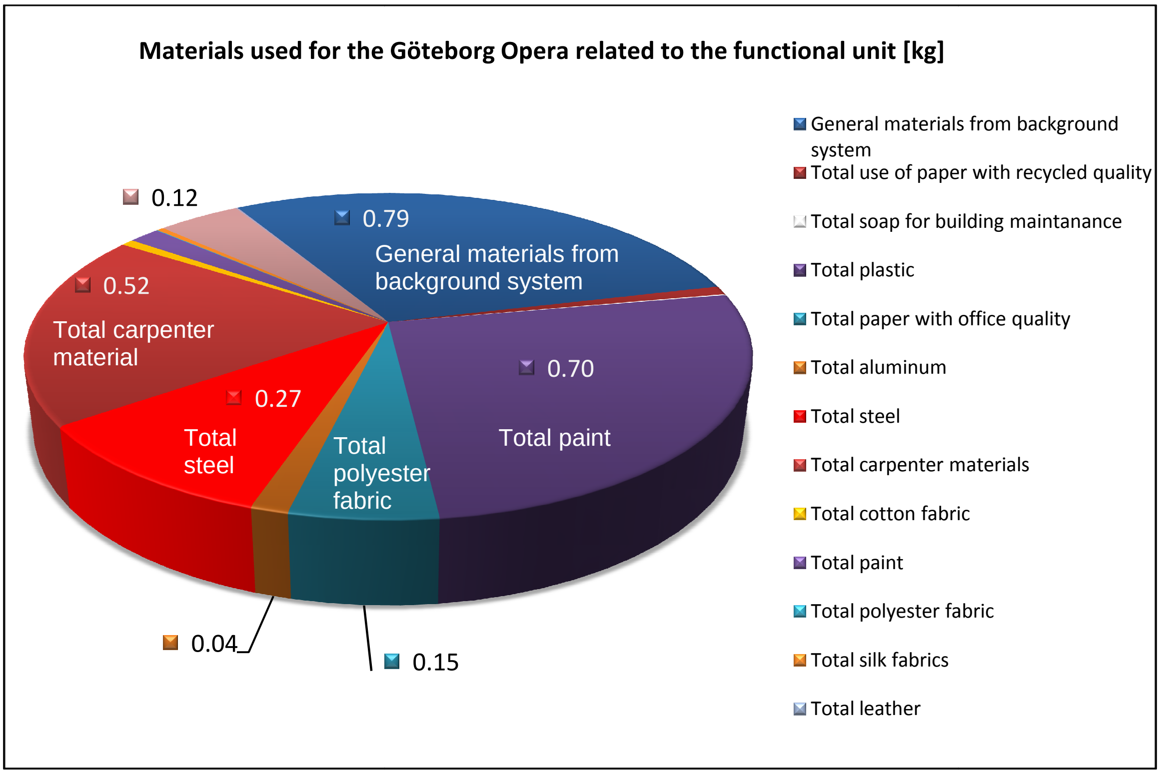

Figure 12 Materials usage for the Göteborg Opera with the functional unit one sold ticket.

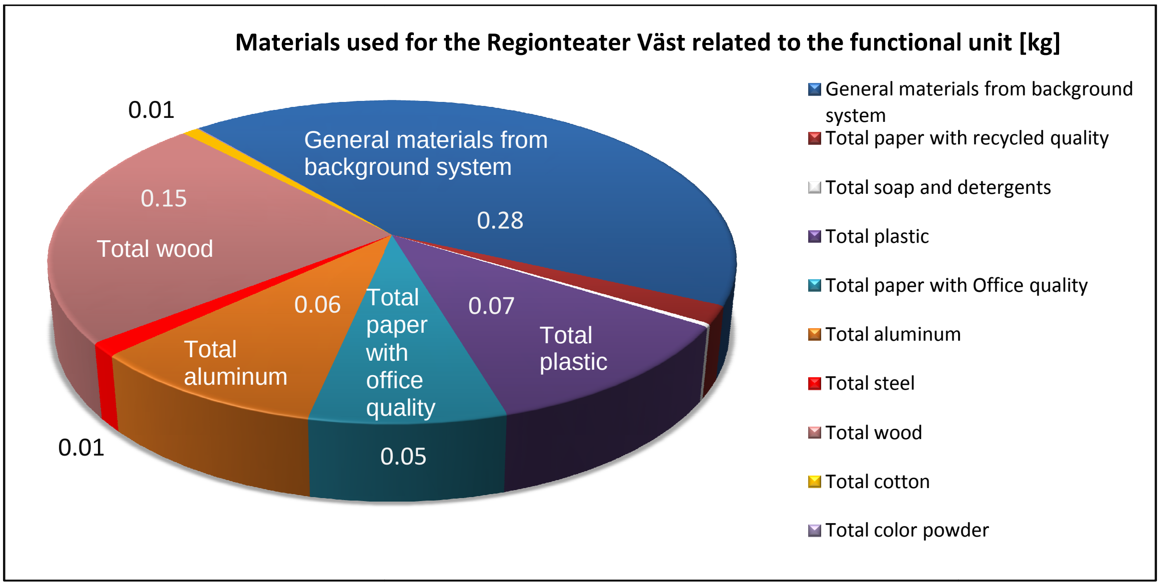

Figure 13 Materials usage for the Göteborg Opera with the functional unit one sold ticket.

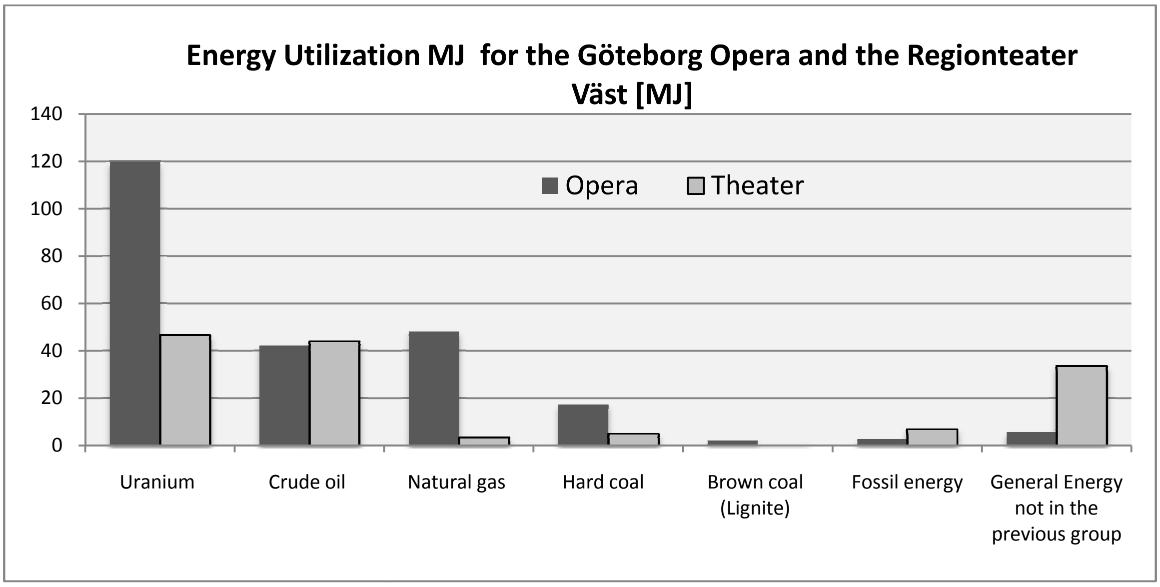

Figure 14 Energy utilization for the Göteborg Opera and the Regionteater Väst with the functional unit one sold ticket.

7.1.2 Building services environmental impact

The first category to analyze from the chapter total environmental impact (chapter 7.1.1) is the building services. The resource/emission groups are district heating, Swedish electricity, concrete building, drinking water, waste water and waste management.

Figure 15 shows resources used. The largest contributor to resources used for both the Regionteater Väst and the Göteborg Opera is the electricity usage. Then the second is resources used years ago when the theatre house or the opera house was built. The explanation why the opera has lower resource depletion for the building is because they produce more plays and other stage performances during a year. Hence, with the chosen allocation method stated in chapter 5.6, the Göteborg Opera is more productive compared to the Regionteater Väst. Worth to notice is the small negative impact for waste management. This is because some materials are recycled, like paper.

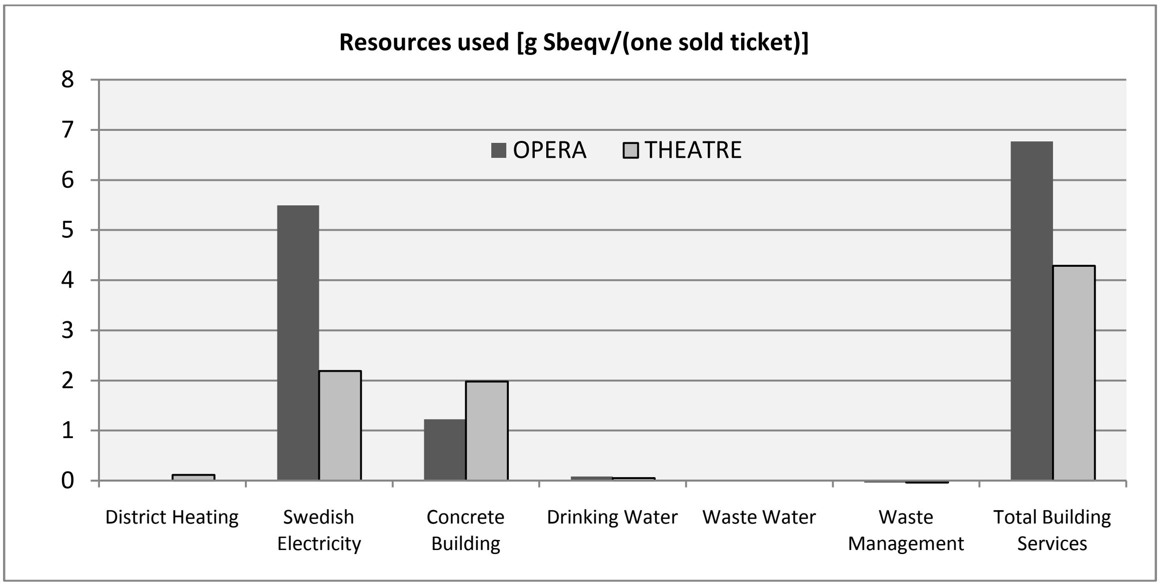

Figure 15 Resources used for building services with the functional unit one sold ticket.

Figure 16 and Figure 17 show global warming potential and acidification. The only difference from the result trend in Figure 15 is contribution to global warming and acidification for the district heating. These emissions are high from the Regionteater Väst. The energy company in Uddevalla used oil and peat during the year 2008 for their district heating network (Uddevalla Energi AB 2010). The district heating network in Gothenburg was more CO_2 free year 2008 compared to the district heating network in Uddevalla year 2008.

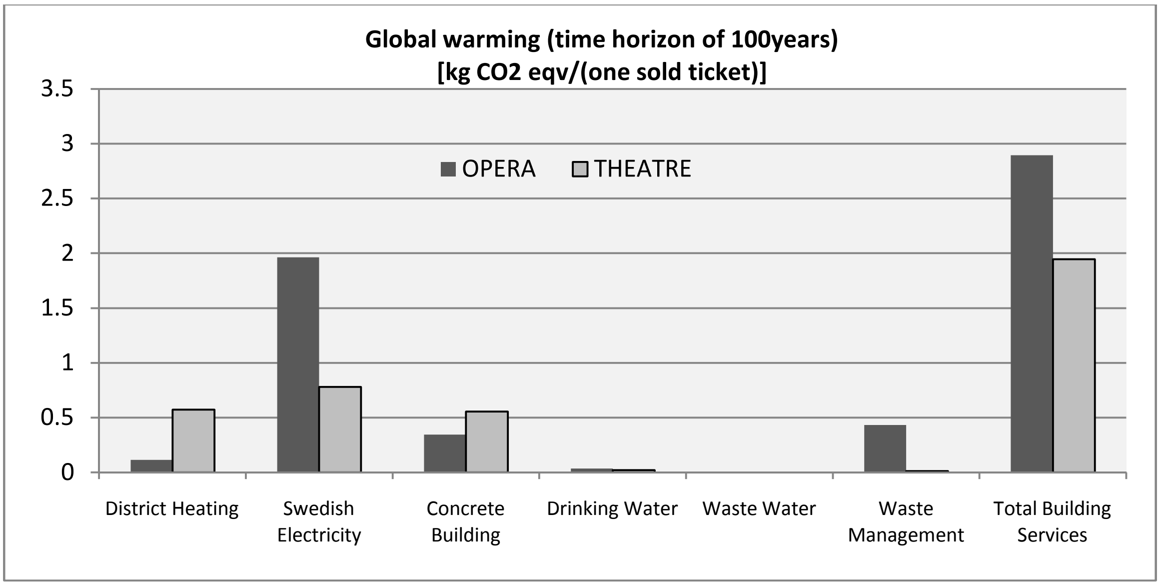

Figure 16 Global warming potentials for building services with the functional unit one sold ticket.

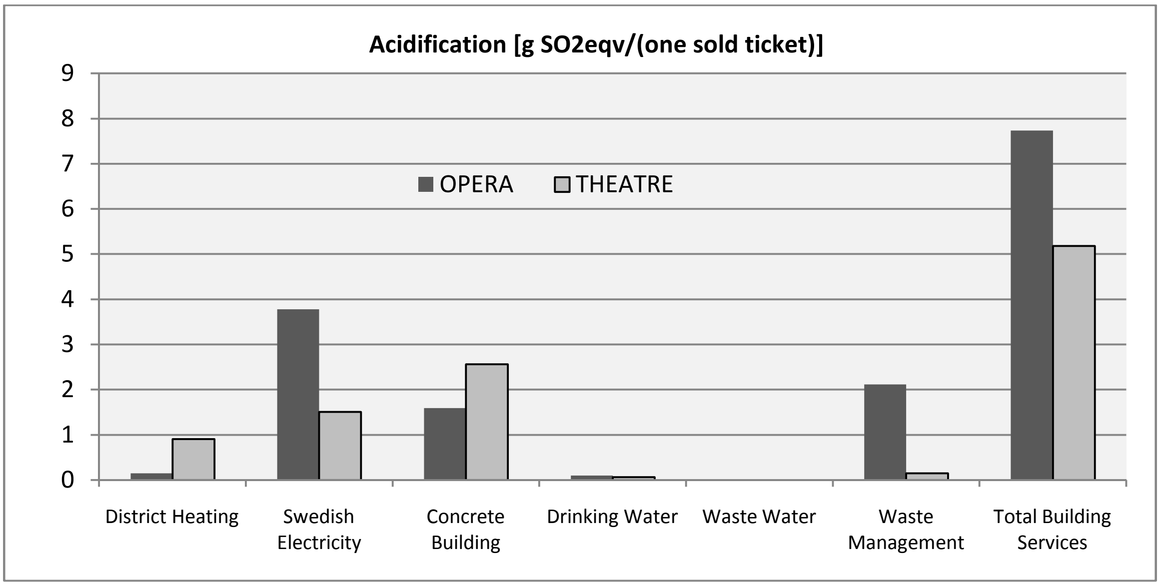

Figure 17 Acidification for building services with the functional unit one sold ticket.

Figure 18 show eutrophication. There are different results from before (Compared to tendency in Figure 15 to Figure 17). Biggest contributor to eutrophication for the Göteborg Opera is the waste water with 0.6 gram PO_4^3 equivalents/one sold ticket. One reason is that the Göteborg Opera uses more tap water per the functional unit one sold ticket compared to the Regionteater Väst, because the Göteborg Opera has a restaurant. Another reason could be that the Ryaverket waste water treatment plant is less efficient than the Skansverket waste water treatment plant.

Waste management and Swedish electricity are almost equal for the Göteborg Opera with 0.4 gram PO_4^3 equivalents/one sold ticket. For the Regionteater Väst is the concrete building the highest emitter with 0.4 gram PO_4^3 equivalents/one sold ticket.

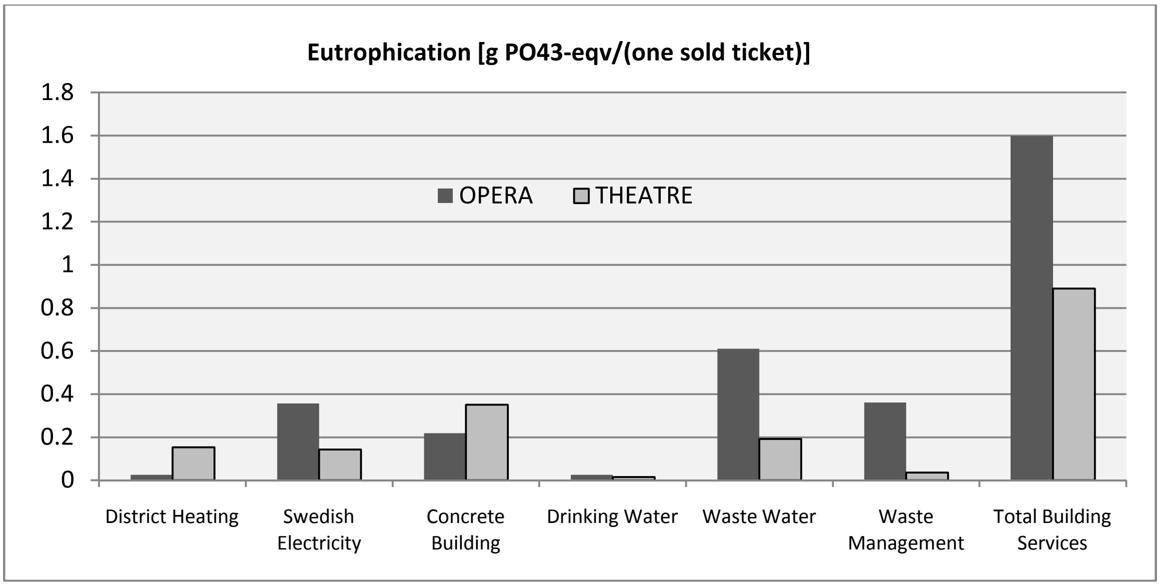

Figure 18 Eutrophication for building services with the functional unit one sold ticket.

7.1.3 Transportation environmental impact

The second group is how the transportation influences the environmental impact for the Göteborg Opera and the Regionteater Väst. Figure 19 to Figure 22 show the results from the environmental impact categories. With intern vehicles transport means what they transport goods and people with their own cars and trucks. The reason why it reaches 7.5 gram Sb_{eqv}/one sold ticket for the Regionteater Väst is:

- The Regionteater Väst does not always acquire the goods to be delivered to them. Instead they drive around and buy the goods or look in stores of what could be interesting to buy in the future.
- The Regionteater Väst has a tour. Then they use their own cars and a truck to different cultural houses around the region.

It is important to notice that the intern vehicles transport emissions in the Regionteater Väst are higher compared to the Göteborg Operas´, see Figure 19 to Figure 22.

With employee travel back and forth to work means the transportation every working day. It is the biggest contributor for the Göteborg Opera in all environmental impact groups, see figure 19 to figure 22. For the Regionteater Väst is employee transportation the biggest contributor to all the environmental impacts, except for global warming, see figure 20.

As can be seen in the figure 19 to figure 22, the transportation of materials is not important for the Göteborg Opera or the Regionteater Väst, e.g. wood to the carpentry or steel to the metal workshop. It does not influence the total transportation impacts much for the Regionteater Väst or the Göteborg Opera.

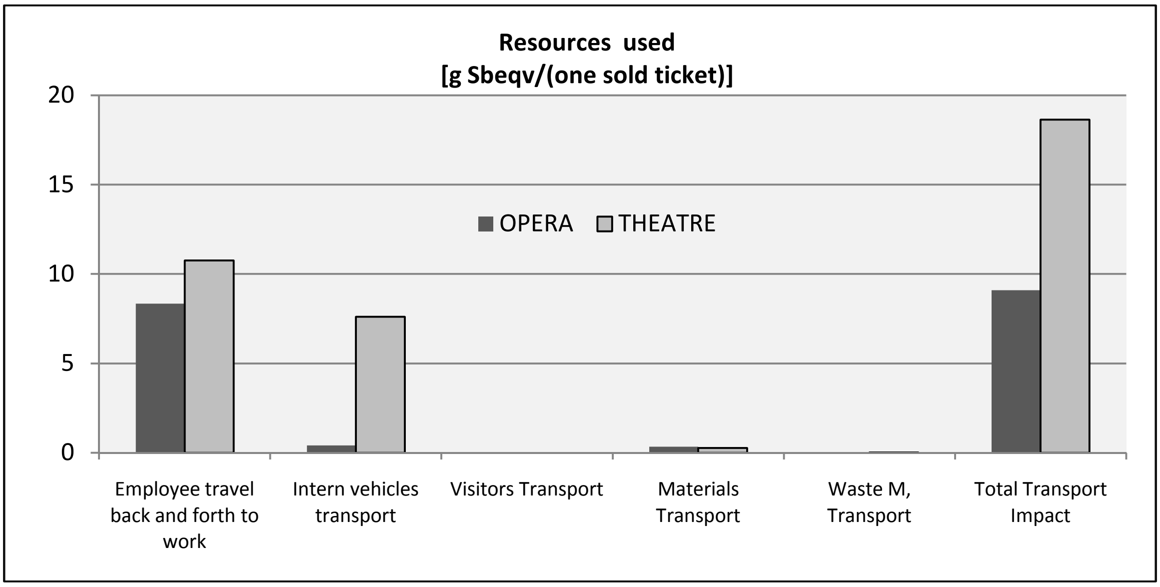

Figure 19 Resources used with the functional unit one sold ticket.

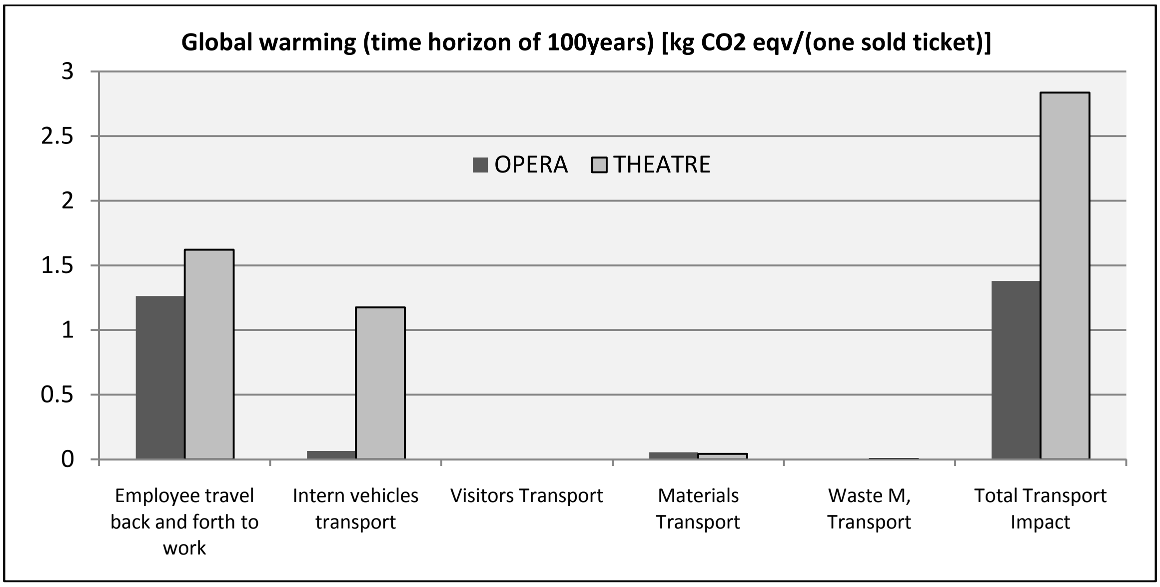

Figure 20 Global warming with the functional unit one sold ticket.

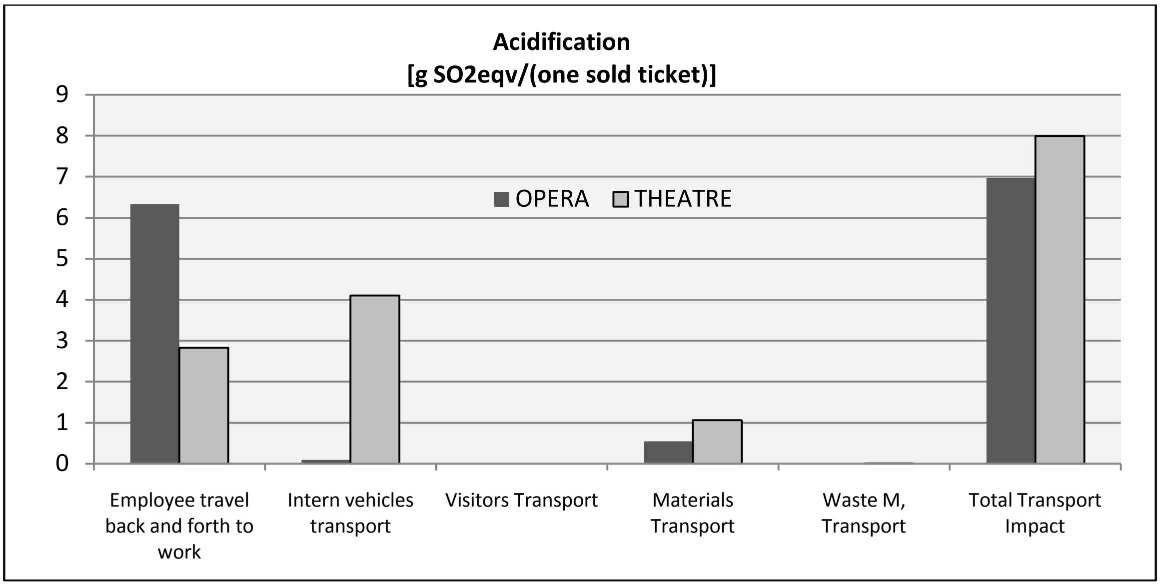

Figure 21 Acidification with the functional unit one sold ticket.

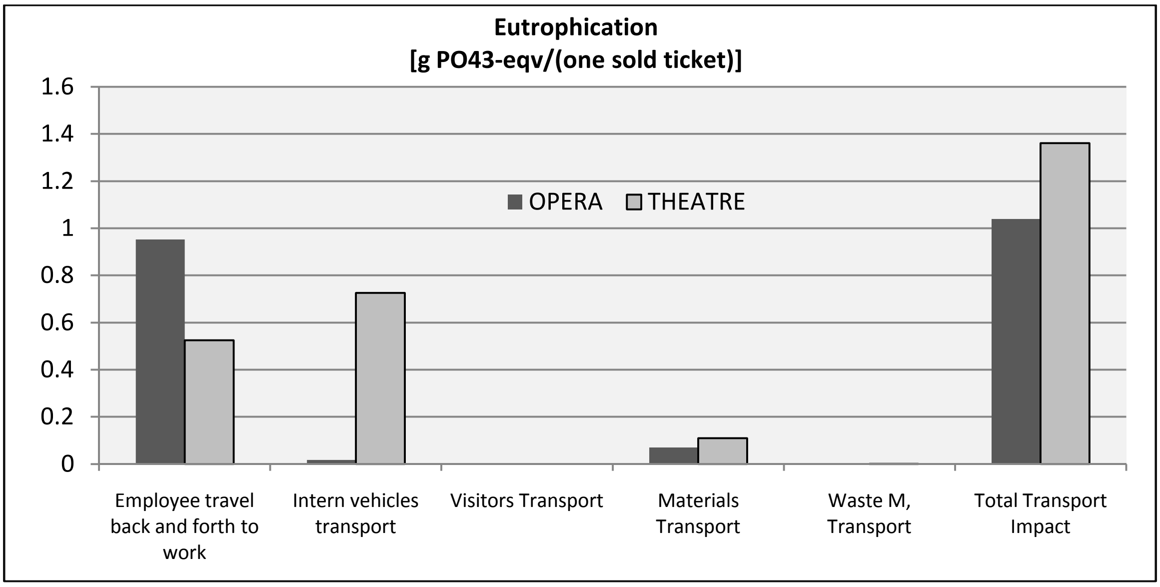

Figure 22 Eutrophication with the functional unit one sold ticket.

7.1.4 Material environmental impacts by departments

All the environmental impact categories for materials are totally dominating in the Göteborg Opera by the décor department, see Figure 23 to Figure 26. The reason for this is the huge amount of polycarbonate plastic, which is bought specifically for the play *Thaïs*. However, the metal workshops in the Regionteater Väst and in the Göteborg Opera have some emissions. For example, they reach almost 1 kg of CO_2 equivalents/one sold ticket in both cases.

Figure 23 shows the resource used. It reaches 35 gram Sb_{eqv}/one sold ticket for the décor department in the Göteborg opera. For the Regionteater Väst are the scenery/props highest with around 5 gram Sb_{eqv}/one sold ticket.

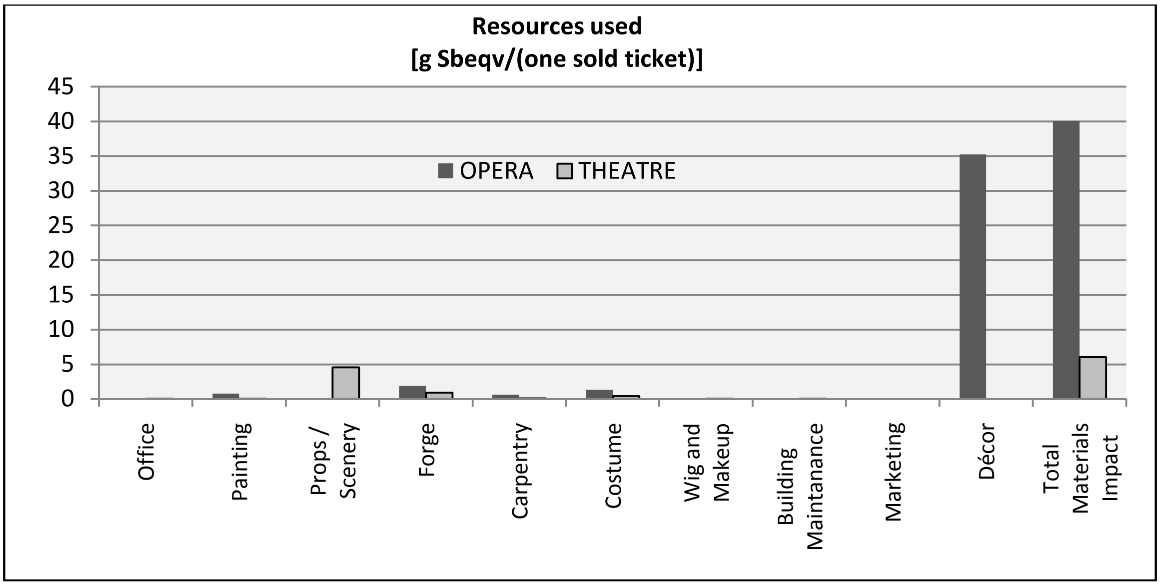

Figure 23 Resources used for department with the functional unit one sold ticket.

Figure 24 show the global warming. The emission from the décor department is highest for the Göteborg Opera with a bit over 5 kg CO_2 eqv/one sold ticket. For the Regionteater Väst is the forge the highest emitter with 1 kg CO_2 eqv/one sold ticket.

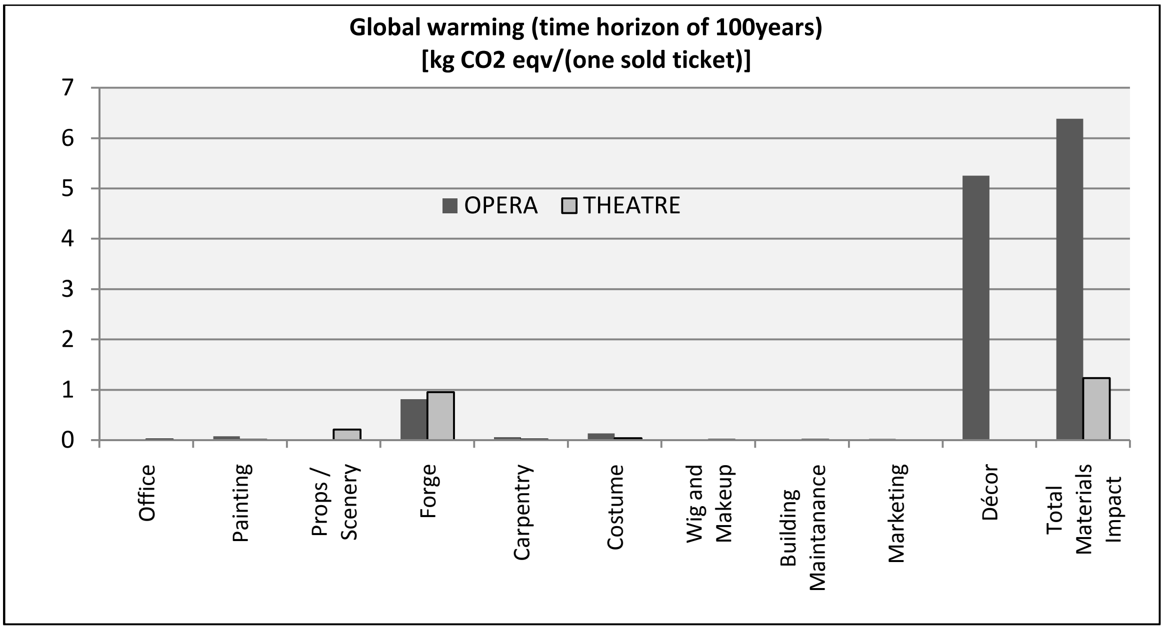

Figure 24 Global warming for departments with the functional unit one sold ticket.

Figure 25 show the acidification emissions. It reaches a bit over 15 gram SO_2 eqv/one sold ticket for the décor department in the Göteborg Opera. For the Regionteater Väst is the largest emitter of acidification equivalents the props/scenery with emissions of 2 gram SO_2 eqv/one sold ticket.

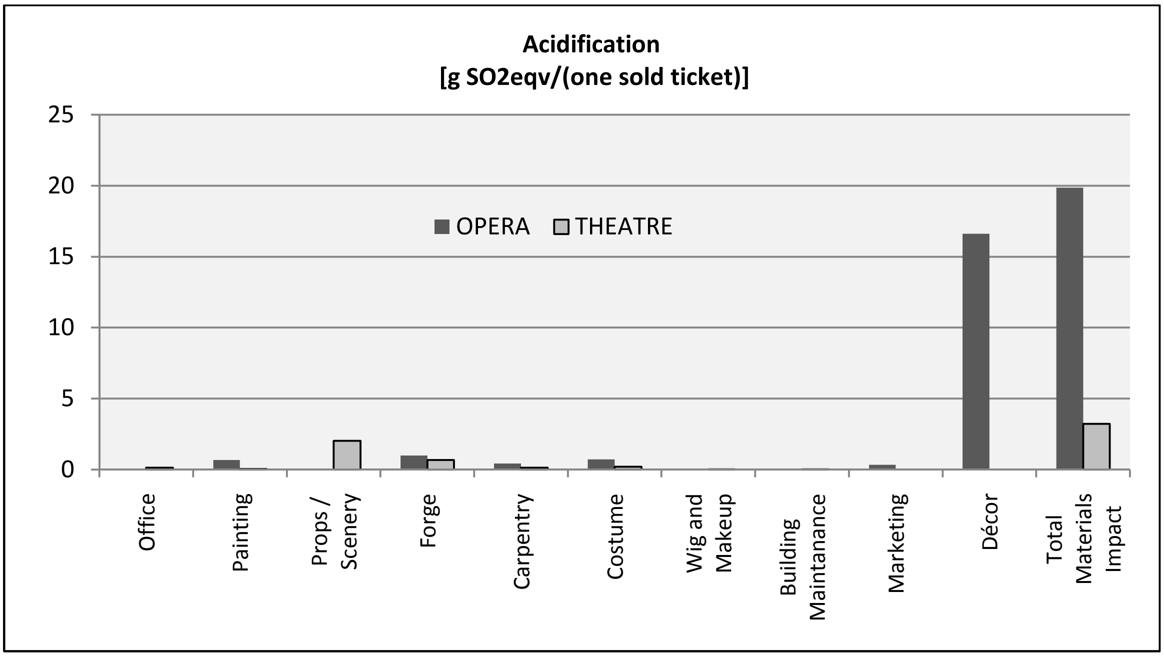

Figure 25 Acidification for departments with the functional unit one sold ticket.

The décor department in the Göteborg Opera has the largest emissions in the impact category eutrophication. The emission reaches 2 gram PO_4^3 eqv/one sold ticket. For the Regionteater Väst is the props/scenery the largest emitter with 0.3 gram PO_4^3 eqv/one sold ticket.

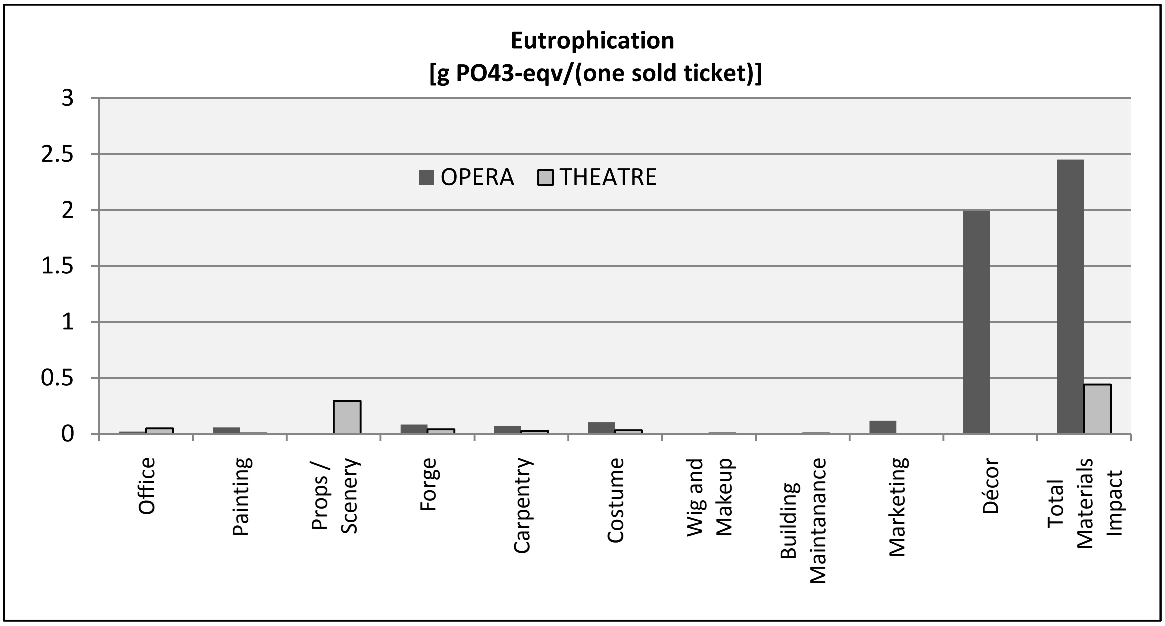

Figure 26 Eutrophication for departments with the functional unit one sold ticket.

7.1.5 Restaurant environmental impact in the opera

The last chapter differs a bit compared to the previous ones. Figure 27 to Figure 30 only include data from the Göteborg Opera, because the Regionteater Väst does not have any restaurant.

Figure 27 show the resources used for the restaurant. Beef production has the highest resources used with a bit over 0.2 gram Sb_{eqv}/one sold ticket. Fish catching has the second highest resources used with over 0.15 gram Sb_{eqv}/one sold ticket.

Beef production is the dominating CO_2 contributor with emissions over 0.15 kg CO_2 eqv/one sold ticket, see figure 28. Wine production has the second place with 0.05 kg CO_2 eqv/one sold ticket. Fish catching and milk production have the same emissions with 0.025 kg CO_2 eqv/one sold ticket.

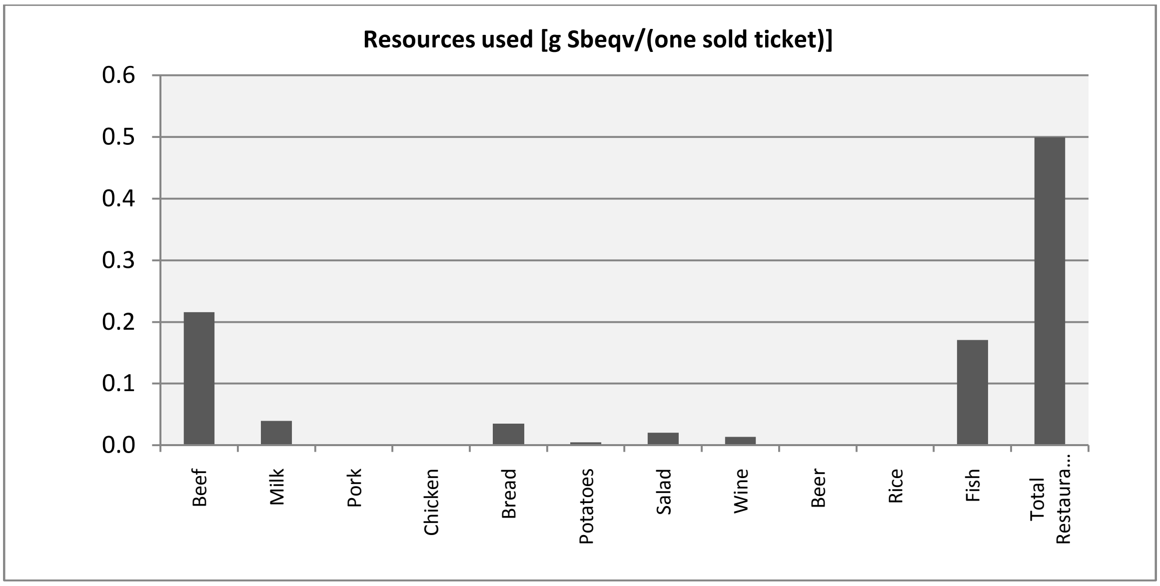

Figure 27 Resources used for restaurant with the functional unit one sold ticket.

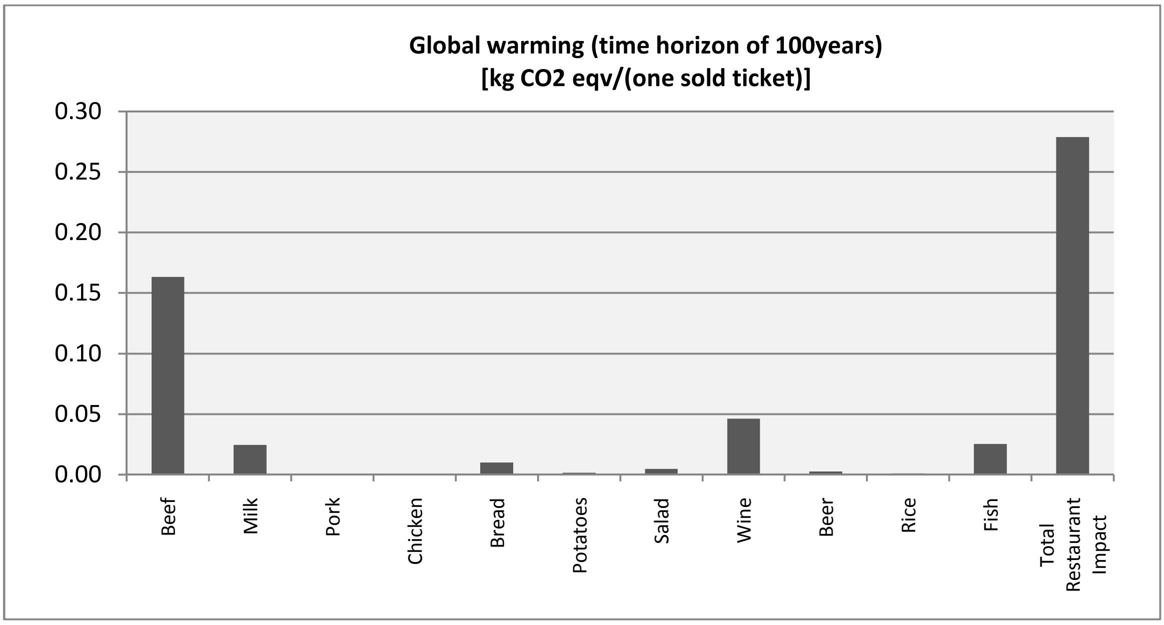

Figure 28 Global warming for restaurant with the functional unit one sold ticket.

Figure 29 show the acidification impact from the restaurant. Beef production is dominating and reaches 3 gram SO_2 eqv/one sold ticket. Emissions from fish catching and milk production with emissions under 0.5 gram SO_2 eqv/one sold ticket are small in comparison with the emissions from the beef production.

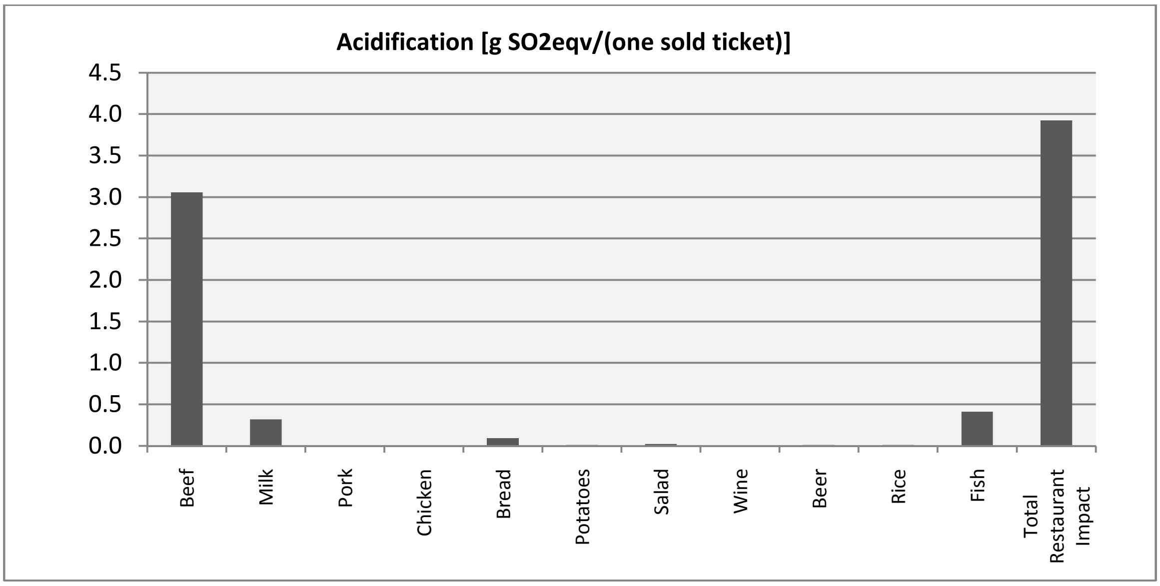

Figure 29 Acidification for restaurant with the functional unit one sold ticket.

Figure 30 show the eutrophication impact category. As for acidification emissions, the beef production dominates the eutrophication emissions. The beef production reaches almost 1 gram PO_4^{3} eqv/one sold ticket.

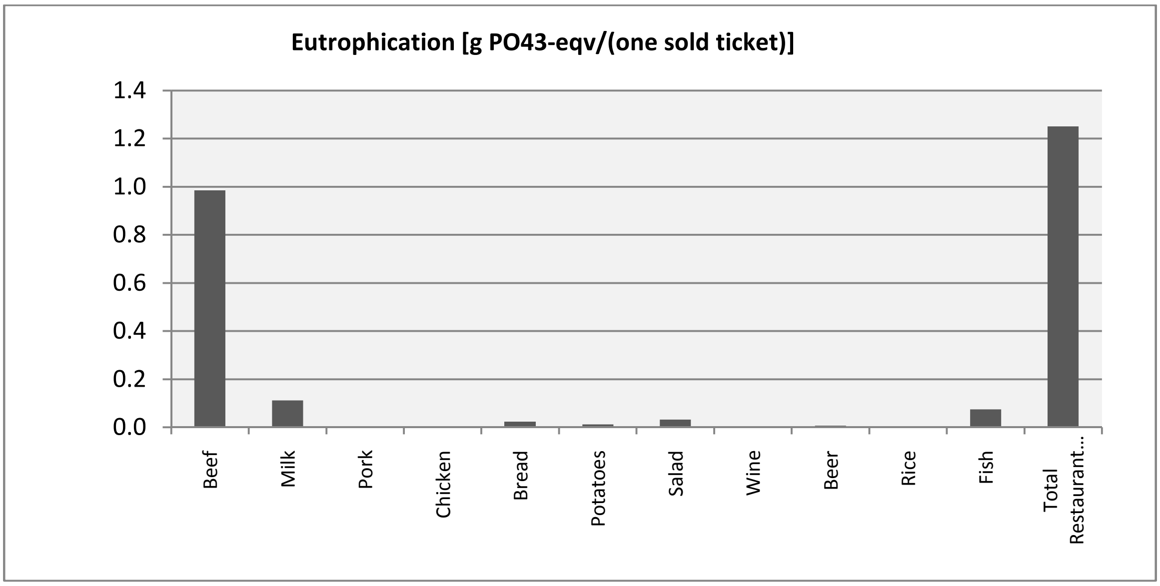

Figure 30 Eutrophication for restaurant with the functional unit one sold ticket.

7.1.6 Suggesting of environmental improvements for the Göteborg Opera

The biggest environmental influence is from the décor department. They use a lot of polycarbonate plastic to paint on, because wood changes its shapes with time. If the Göteborg Opera does not manage to sell the production of *Thaïs* to another opera house, they have two possibilities, to keep and store the production or scrap the production. Hence, the best choice is to minimize the usage of polycarbonate or try to change to paint on wood instead.

The polycarbonate plastic is not possible to recycle, so it will be incinerated in the future. Then at least some energy will be recovered.

From the chapter building services (7.1.2), Figure 15 to Figure 18 show that it is important to save electricity. If it is possible to save electricity, it will reduce the costs and burden on the environment at the same time.

The results from chapter 7.1.3 show that transportation back and forth to work for the employees is important. If it is possible to use more public transportation, the environmental impact will be lowered for the whole opera. Another alternative for the employees could be to start carpooling if it is possible to start and finish the work day at the same time.

7.1.7 Suggesting of environmental improvements for the Regionteater Väst

The environmental impact from the Regionteater Väst is more equally distributed between building services, transportation and materials. It is possible in chapter 7.1.1, Figure 8 to Figure 11 to see some results. The transportation has the highest emissions for all impact categories. The best choice and maybe the easiest way for the Regionteater Väst to reduce their environmental impacts are to use more public transportation for the employees. Today, the share of the employees who use a car back and forth to work are much higher for the theatre compared to the opera.

The transportation during the tour is a major factor for the environmental load. If it is possible to optimize these more, it would be possible to save fuel and the environment.

Electricity usage is an important factor. If it is possible to reduce the electricity consumption, it is be possible to save money and reduce the environmental load. Maybe district heating consumption will up if electricity consumption goes down. However, from an environmental point of view it is often better to heat a building with district heating instead of heat from electrical equipment due to the high exergy content in electricity. The heat in the district heating network in Uddevalla year 2010 comes to a large extent from Lillesjöverket, which is a new waste incineration combined heat and power plant (Uddevalla Energi AB 2010).

7.2 Comparative LCA of consuming stage performances

The objective of this chapter is to give the consumer a wider knowledge about the environmental impacts related to the cultural stage performances. Therefore, a comparison between the Göteborg Opera and the Regionteater Väst gives the consumer the answers to which of the two would be environmentally preferable to consume than the other.

The LCA comparison between the Regionteater Väst and the Göteborg Opera aims at defining which of the stage performances have the highest emissions and where are these located. To do a fair comparison between the Göteborg Opera and the Regionteater Väst from a consumer perspective, an analysis where the emissions caused by the transportation of the visitors is included. Furthermore, another situation is included called “real cost”, where subsidy money to the Regionteater Väst and the Göteborg Opera from the state and municipalities is cancelled. Then the Göteborg Opera and the Regionteater Väst need to raise the ticket prices instead to get the same amount of money.

One difference between the Göteborg Opera and the Regionteater Väst is the restaurant. The restaurant in the opera is included in the figures in this chapter, but the influences of the results are so small that it lacks importance.

7.2.1 Environmental impact - functional unit sold ticket

The main functional unit for the whole project is one sold ticket. With this unit, every resource use and emission is divided by the amount of sold tickets for the Regionteater Väst as well as for the Göteborg Opera. The general trend which could be seen in Figure 31 to Figure 34 is that the Göteborg Opera has higher resources used and total emissions. This is concentrated in the materials utilization. The underlying reason for that is all the polycarbonate plastic glass which is bought for the play *Thaïs*.

7.2.1.1 Resources used

Figure 31 shows the resources used for the Göteborg Opera and the Regionteater Väst. Worth to notice is the high bar for materials for the Göteborg Opera. The Regionteater Väst uses less of resources overall compared to the Göteborg Opera to produce the play. The transport and building services are rather equal, even if transport for the Regionteater Väst includes the tour around the western part of Sweden. The reason why resource used for the transport increase more for the Göteborg Opera compared to the Regionteater Väst from the basic scenario in chapter 7.1 is because the visitors’ transportation is much longer to the Göteborg Opera.

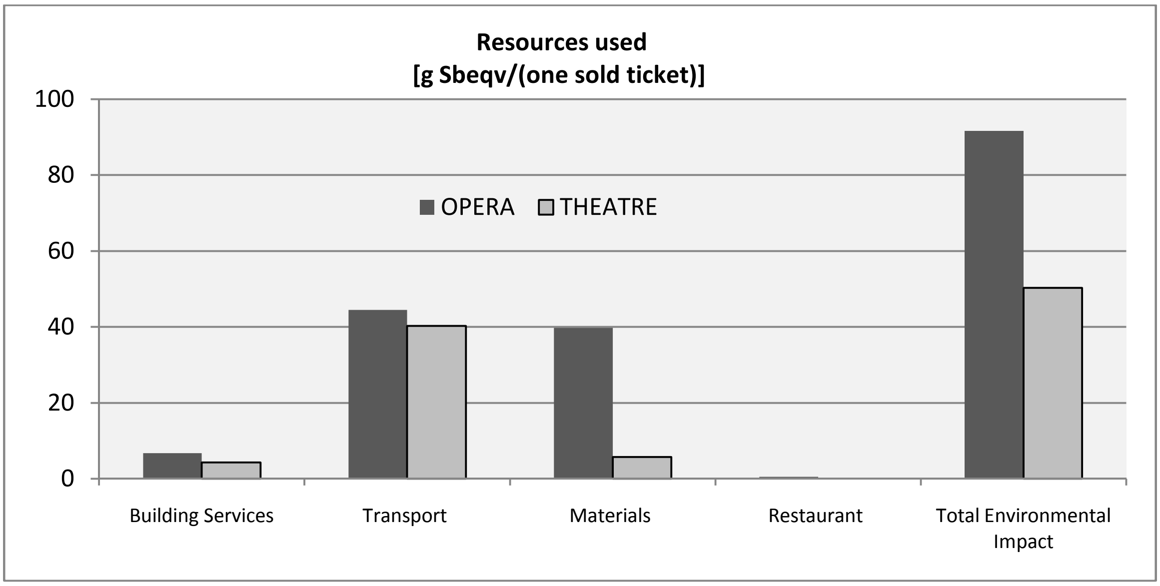

Figure 31 Resources used with the functional unit sold ticket.

7.2.1.2 Global warming

If a person decides to visit the Göteborg Opera instead of the Regionteater Väst, he or she emits roughly 3 kg of CO_2 equivalents/one sold ticket more compared to attending the Regionteater Väst, see figure 32. A lot of the CO_2 comes from the materials in the Göteborg Opera. Moreover, transportation and building services are almost equal between the Regionteater Väst and the Göteborg Opera. The reason why CO_2 emissions for the transport increase more for the Göteborg Opera compared to the Regionteater Väst from the basic scenario in chapter 7.1 is because the visitors' transportation is much longer to the Göteborg Opera.

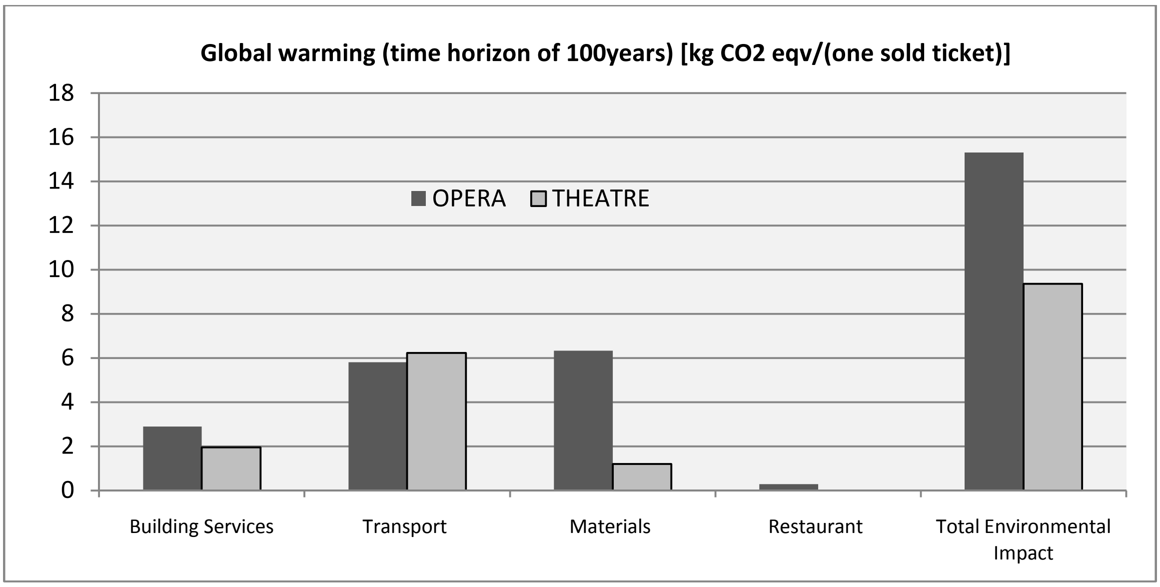

Figure 32 Global warming with the functional unit sold ticket.

7.2.1.3 Acidification

Figure 33 shows acidification in grams of SO_2 equivalents/one sold ticket. It is higher for the Göteborg Opera compared to the Regionteater Väst. The acidification from transport is higher for the Göteborg Opera compared to the Regionteater Väst. Worth to notice is that they were in the same level for resource used and global warming, see figure 31 to figure 32. The reason why acidification is higher for the Göteborg Opera compared to the Regionteater Väst is because the longer visitors transportation to the Göteborg Opera. In the basic case in chapter 7.1 were the acidification already rather high for the Göteborg Opera. Therefore, “grow” the acidification emission bar higher for the Göteborg Opera than the Regionteater Väst. The increase percent in emissions from the basic case for resource use, global warming, acidification and eutrophication is equal.

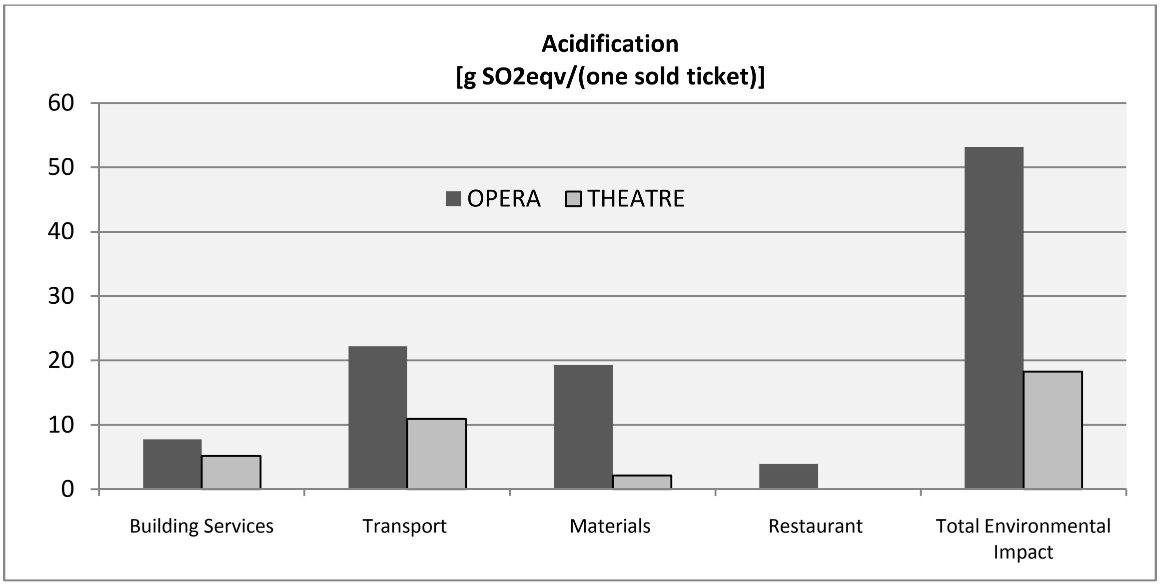

Figure 33 Acidification with the functional unit sold ticket.

7.2.1.4 Eutrophication

The same reasons stated in chapter 7.2.1.3 about the acidification emissions for the transport are valid for eutrophication also. However, the restaurant and building services have bigger shares of the total environmental impact for the Göteborg Opera, see Figure 34.

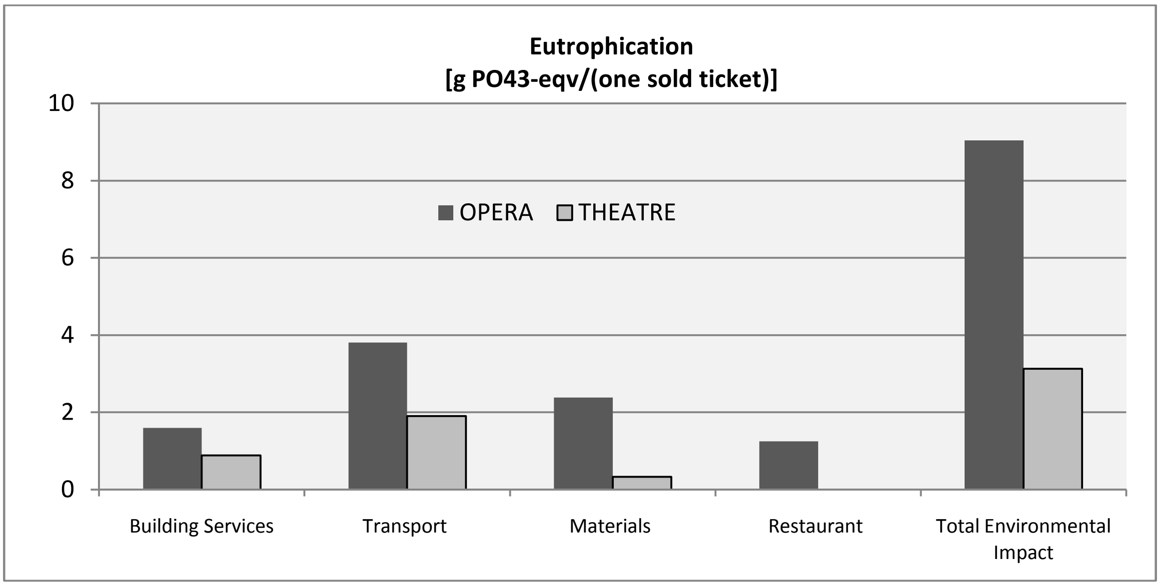

Figure 34 Eutrophication with the functional unit sold ticket.

7.2.2 Environmental impact for different functional units

In order to understand the environmental impact in the client perspective; the auxiliary functional units are used to compare the possible situations where the client pay a subsided price and a real price.

If Figure 35 and Figure 36 are compared, it is possible to observe that the Göteborg Opera has higher emissions per the functional units “one sold ticket” and “one sold ticket*hour than the Regionteater Väst; this maintains the tendency observed for the basic functional unit in chapter 6.

There are a reduction in all the impact categories for both the Göteborg Opera and the Regionteater Väst compared to the case with the functional unit “one sold ticket” when the functional unit “one sold ticket*hour” is used, see Figure 35 and Figure 36. However, the reduction is larger for the Regionteater Väst because the play *Plocka potäter i kostym* last longer than the opera *Thaïs* in the Göteborg Opera, see table 3 in chapter 5.

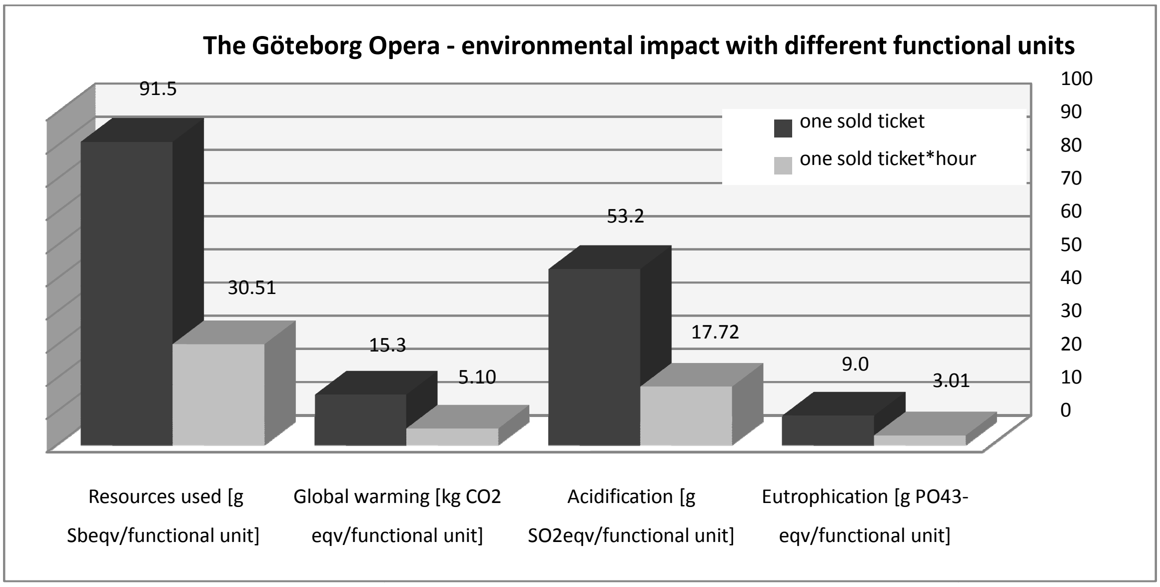

Figure 35 The Göteborg Opera with different functional units.

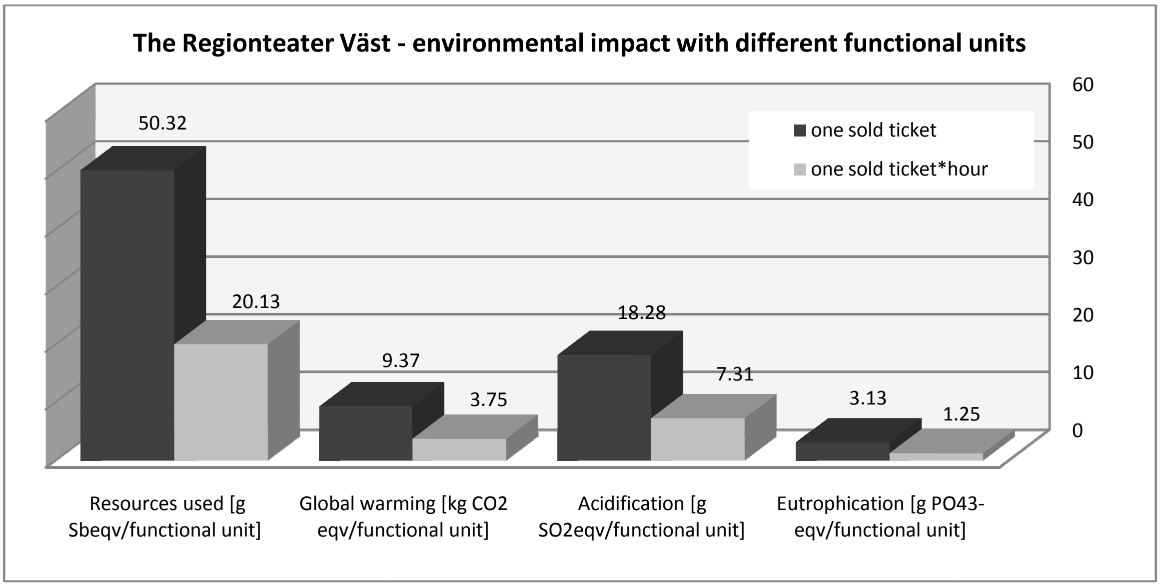

Figure 36 The Regionteater Väst with different functional units.

Figure 37 and Figure 38 show the resource used and the emissions from the different impact categories for the functional units “one sold ticket*SEK” and “one sold ticket*real price”. The Regionteater Väst has approximately twice as high resources used and global warming than the Göteborg Opera with these functional units. The acidification emissions and eutrophication emissions are only slightly higher for the Regionteater Väst compared to the Göteborg Opera.

The main reason for this result is mainly concentrated to the differences of the market prices of these stage performances, see table 3 in chapter 5.

Considering the results for the functional unit “one sold ticket*real price” for the Regionteater Väst and for the Göteborg Opera, it is possible to observe a low environmental impact from the Regionteater Väst. This is mainly because the large subsidies the Regionteater Väst is receiving from the state versus those the Göteborg Opera is receiving from the state, see table 3 in chapter 5.

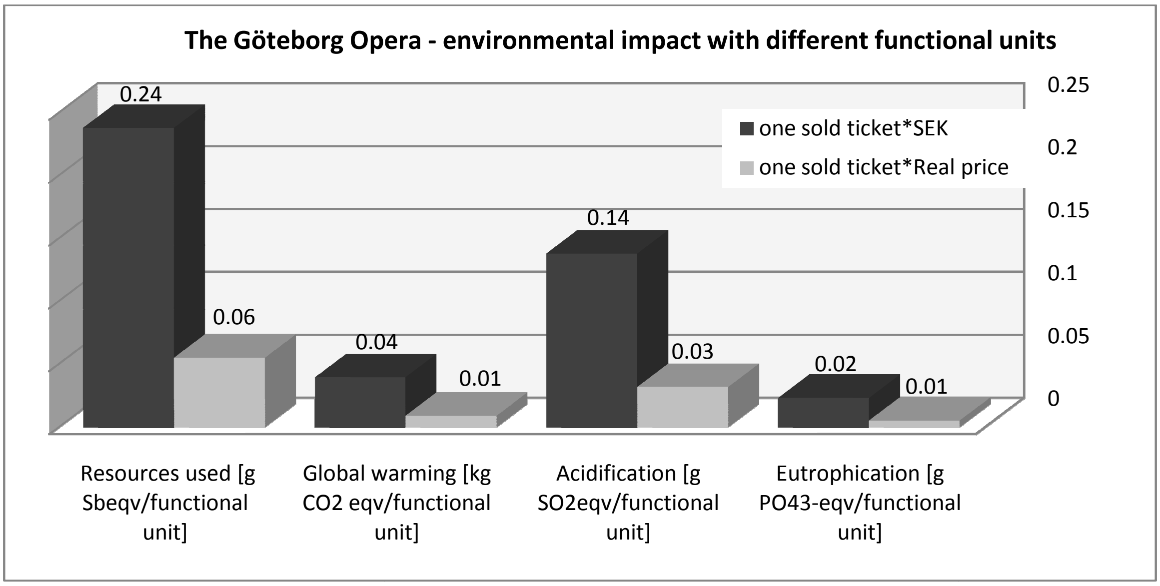

Figure 37 The Göteborg Opera with different functional units.

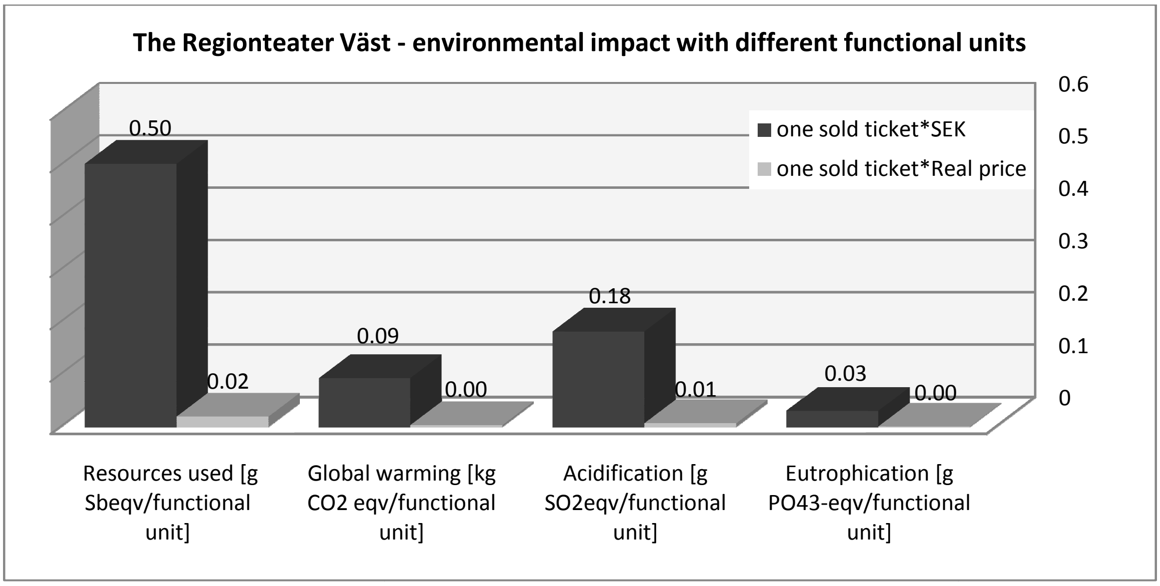

Figure 38 The Regionteater Väst with different functional units.

7.2.3 Suggestions for what is best to visit for the environment

Even with the different functional unit " one sold ticket", "one sold ticket*real price", one "sold ticket*SEK" and sold ticket*hour, the trend of the results show that it is better for the environment to visit a stage performance in the Regionteater Väst than visit a stage performance in the Göteborg Opera.

However, this suggestion does not take into consideration of "man made values", e.g. the stage performance is more complex in the Göteborg Opera compared to the stage performance in the Regionteater Väst. The taste of what people want to see is different. For some people, there is no parameter to compare the value of a Soprano or a Tenor performance with a very fine theatre performance.

7.3 Comparative LCA of consuming a product or a service

The study aims to analyze which would be the best choice for a customer; buy a product or a cultural service, focusing of the environmental aspects. The results from two cultural services, the Göteborg Opera and the Regionteater Väst, are compared with LCA results from a product, a T-shirt (Wedin 2007). The comparison is based on resources used, global warming, acidification, eutrophication, energy consumption, water consumption, hazardous or radioactive waste and the total transport in km. These indicators are analyzed in relation to the four functional units mentioned in table 2, see chapter 5.

In Table 6 is it possible to observe the total environmental impact in different categories with the three comparative functional units. The observed numbers show that the T-shirt has less environmental impact than any of the two services, though a cultural perception of the stage performance service can make a big difference in the final weighting. However, this is out of the scope of this study.

Table 6 Total environmental impact per functional unit.

Product/Service	Resources used [kg Sbeqv/functional unit]	Global warming (time horizon of 100years) [kg CO2 eqv/functional unit]	Acidification [kg SO2eqv/functional unit]	Eutrophication [kg PO43-eqv/functional unit]
one sold ticket in the Göteborg Opera	0.092	15.31	0.053	0.009
one sold ticket in the Regionteater Väst	0.050	9.37	0.018	0.003
one sold T-shirt	0.016	3.41	0.007	0.001

If the resources used are compared, it is possible to observe that the T-shirt emissions are 1/5 of those from one sold ticket in the Göteborg Opera and 1/3 of the emissions from a sold ticket in the Regionteater Väst. The value of 0.016 [kg Sb_{eqv}/one sold T-shirt] is mainly due to the utilization of minerals and of fossil fuels during the transportation of the buyers in Sweden. For the Göteborg Opera, the main contributors are the fossil fuels to produce the polycarbonate for the décor department and the fossil fuels for the transportation of visitors. For the theatre, the depletion is mainly caused by all the transportation.

In the global warming potential, the T-shirt emission is 1/5 of the Göteborg Opera CO_2 equivalents, and 1/3 of those from the Regionteater Väst. Further details can be found in chapter 7.3.1.3.

80% of the acidification emissions from the T-shirt are caused during the manufacture process and the rest by the washing and drying. The main contributor in the Göteborg Opera is the transport of the client to the stage performance, followed by the polycarbonate used in the décor department. For the Regionteater Väst, the main contributor is the transport of the stage performance to the different cultural houses around the western part of Sweden. The eutrophication from the T-shirt follows the same trend as the acidification.

There are some more impact categories in this comparative LCA study e.g. energy consumption, water consumption, hazardous/radioactive waste and total transport. The LCA study of the T-shirt does not include impact categories like resources used, acidification and eutrophication. To be able to compare the Göteborg Opera/ the Regionteater Väst with the T-shirt in more than just global warming, some additional impact categories are chosen which are not included in the LCA studies in chapter 7.1 and 7.2.

7.3.1.1 Energy consumption

The energy consumption of the T-shirt includes manufacture and use phase. This is compared with the energy used for the Göteborg Opera and the Regionteater Väst, see Figure 39. It is possible to see that a T-shirt consumes less energy and therefore is more environmentally friendly from an energy point of view.

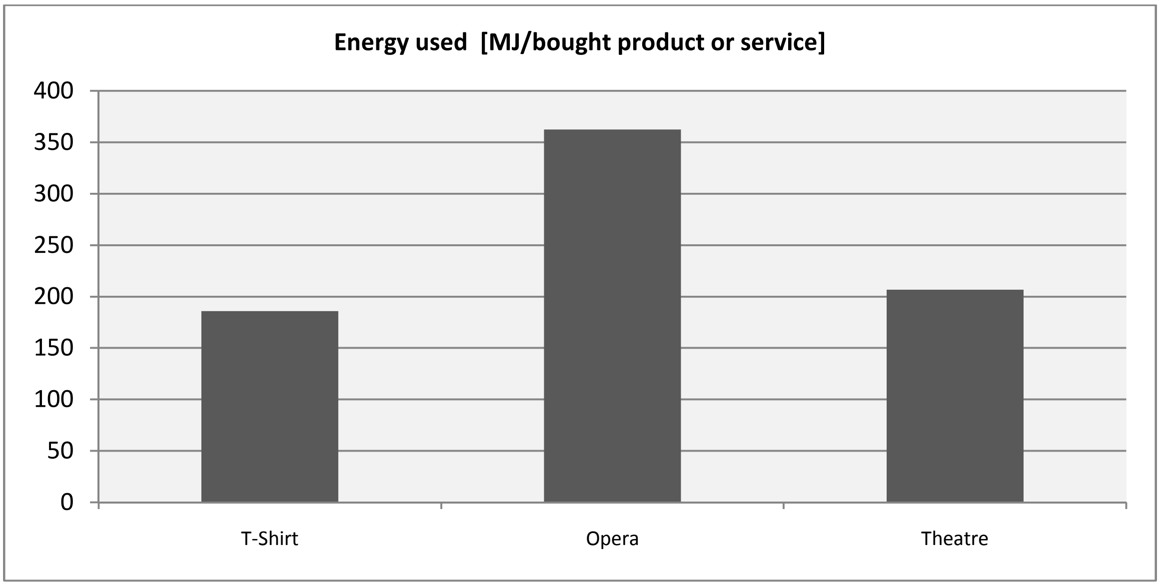

Figure 39 Energy used for the comparison.

7.3.1.2 Water consumption

It is observed that the water utilization is around 700 kg per bought T-shirt, see figure 40. The Regionteater Väst use a bit over 200 kg per bought ticket and the Göteborg Opera use around 900 kg per bought ticket. The main water consumption in the Göteborg Opera and in the Regionteater Väst is focused on the building services. However, the restaurant in the Göteborg Opera is the main user of water. This is the reason why the water consumption is even higher than for the T-shirt. The consumption of water for the T-shirt is concentrated to two main areas, the cotton cultivation during manufacturing phase and the washing and drying during the use phase (Wedin 2007).

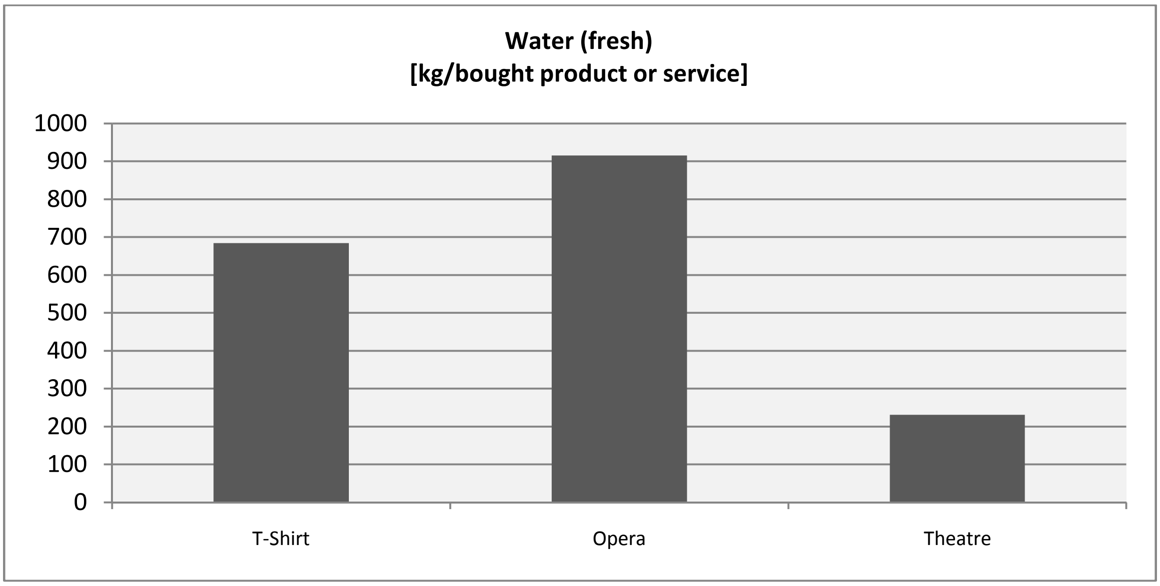

Figure 40 Water for the comparison.

7.3.1.3 Global warming potential in CO2 equivalents

Figure 41 shows the comparison between the T-shirt, Göteborg Opera and Regionteater Väst. The manufacturing of the T-shirt is responsible for 75% of the CO2 equivalents of a total of 0.95 kg of CO2 equivalents/bought product. The drying is responsible for 15% and the rest is shared between the washing and the disposal. However, the biggest emission of CO_2 equivalents is when the buyer does the shopping tour, which is around 2.4 kg CO_2 equivalents/bought product.

The main contributors in the Göteborg Opera are the materials for the décor, the client transportation, and the electricity for the building. The emissions are 6.3, 5.8, and 2.9 kg of CO2 equivalents/one sold ticket respectively. The total is 15.3 kg of CO2 equivalents/one sold ticket.

The transportation in the Regionteater Väst is the main contributor with a total of 6.2 kg of CO2 equivalents/one sold ticket, where the visitors´ transportation is the most important emitter followed by the employee transportation. Building services and materials have emissions of 1.9 and 1.2 kg of CO2 equivalents/one sold ticket respectively.

Energy consumption and global warming has a strong relation. High energy consumption often results in high global warming emissions. The reasons why energy use is high for the T-shirt while the global warming is low are:

- The T-shirt only counts electricity and fossil fuels as energy while the Göteborg Opera and Regionteater Väst also count renewable energy in figure 39.
- The average electricity production in Sweden is almost CO_2 free and 40% of the energy consumption for the T-shirt originates from the laundry (Wedin 2007).
- The energy for producing materials which is used in the Regionteater Väst or in the Göteborg Opera is counted as fossil or renewable, depending on the source.
- Waste heat from industries which is utilized in the district heating system in Gothenburg and Uddevalla is accounted in MJ, but not the corresponding CO_2. They are allocated to the industries main products.

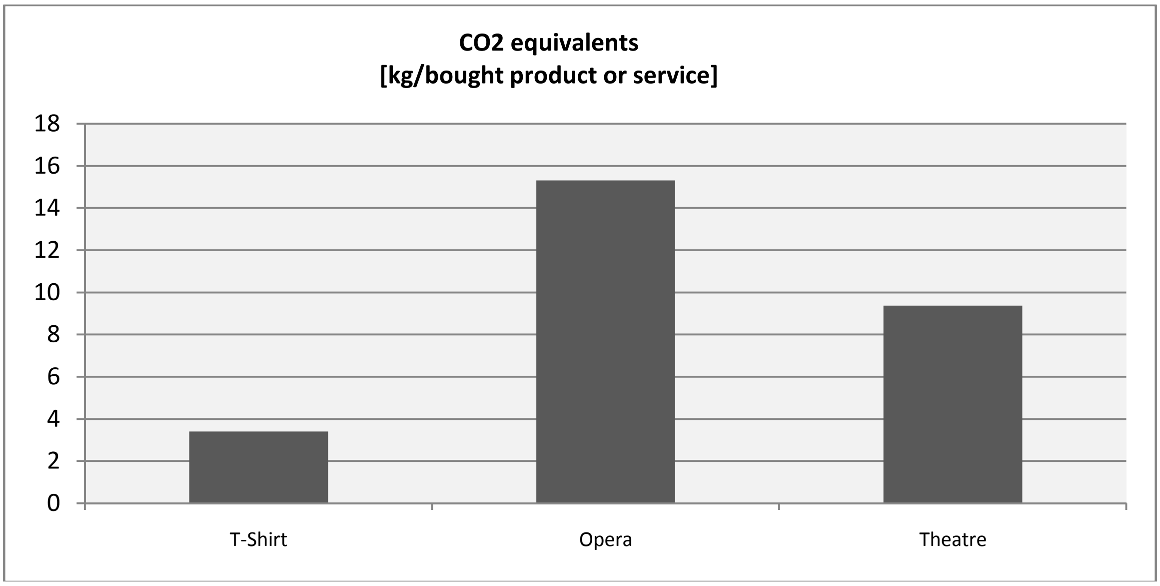

Figure 41 Carbon dioxide for the comparison.

7.3.1.4 Hazardous or radioactive waste

The hazardous materials in the T-shirt correspond to 8 grams per T-shirt, see Figure 42. They originate mainly from chemicals in cotton cultivation and chemicals for coloring purposes. For the Regionteater Väst and the Göteborg Opera originates the waste mainly from electricity production from nuclear power plants. The reason to put hazardous waste and radioactive waste in the same figure was to be able to compare the Göteborg Opera and the Regionteater Väst with the T-shirt. The LCA of the T-shirt only count hazardous waste (Wedin 2007) while the opera count both hazardous and radioactive waste.

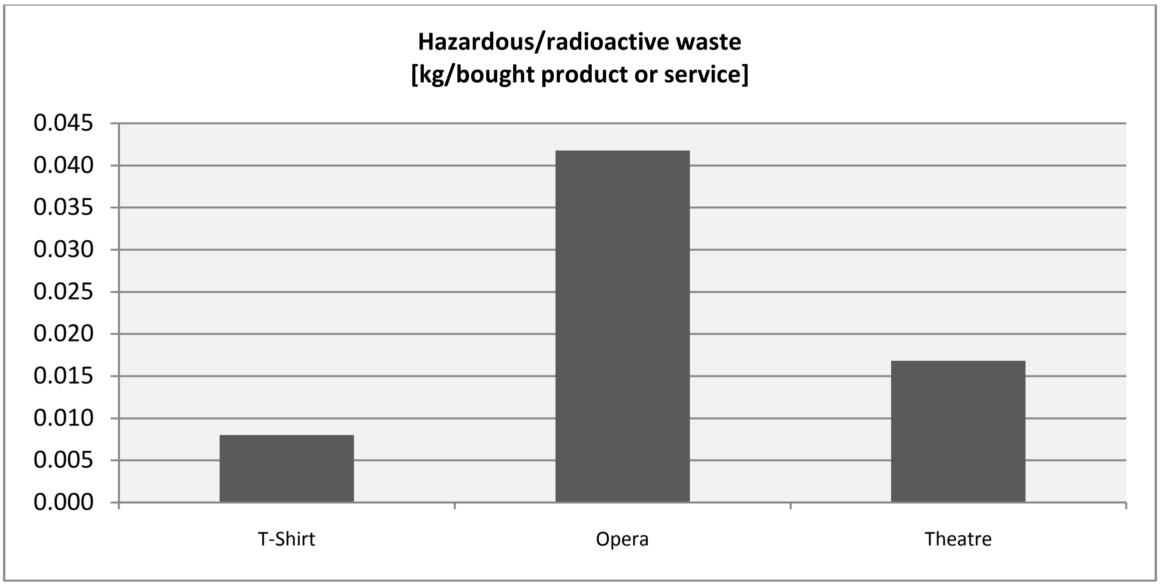

Figure 42 Waste for the comparison.

7.3.1.5 Total used transport

The total transportation related to the T-shirt is completely out of range compared to the Göteborg Opera and the Regionteater Väst, see Figure 43. The T shirt LCA considers transportation per the functional unit "bought T-shirt" of persons back and forth to Sri Lanka from Sweden and transportation of cotton half around the globe (Wedin 2007). The whole business is different for the Göteborg Opera and the Regionteater Väst, since the costumers do not consume a product, they consume a service which is not possible to "weight and touch" with the functional unit per bought ticket. Hence, for the Göteborg Opera and the Regionteater Väst, the longest transportation per functional unit is from the visitors travel back and forth to the stage performances.

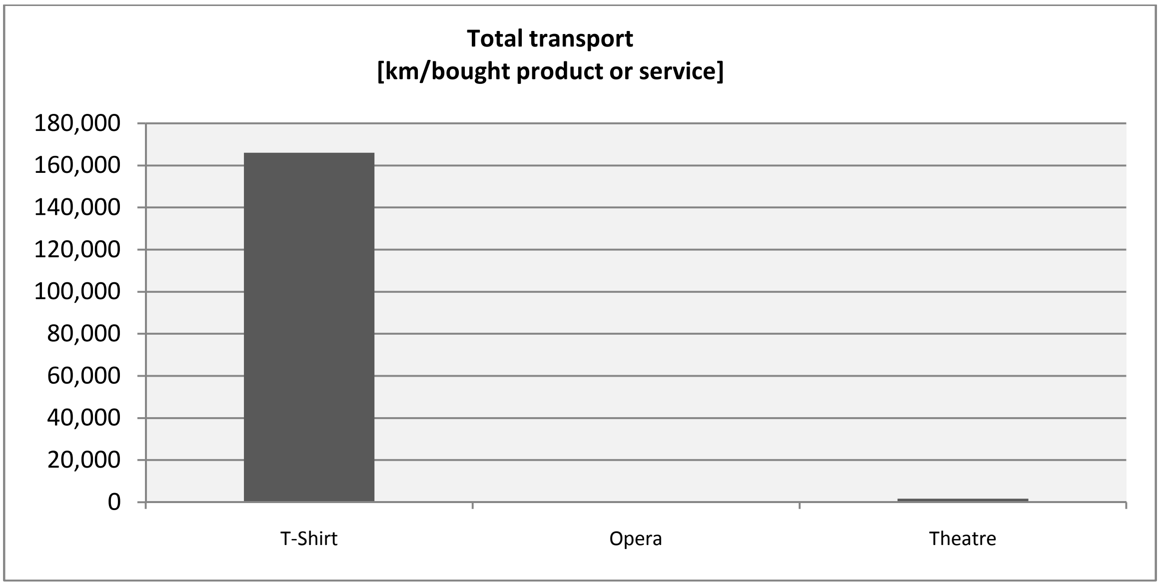

Figure 43 Transported km for comparison.

7.3.2 Suggestions for consuming a product or a service

Table 6 and Figure 39 to Figure 43 show that consume a T-shirt are more environmentally friendly compared to visit a stage performance in the Göteborg Opera or the Regionteater Väst. For example, the consumption of a product emits 3.4 kg CO_2 equivalents/T-shirt inclusive the shopping tour and the use phase. Visiting a stage performance in the Göteborg Opera result in 15.3 kg CO_2 equivalents/one sold ticket. Visiting a stage performance in the Regionteater Väst result in 9.4 kg CO_2 equivalents/one sold ticket.

The breakeven for the analysis in CO_2 emissions show that a consumer has to do five shopping tours and buy one T-shirts each time in order to reach the opera level in CO_2 emissions. To be able to reach the CO_2 emissions from the theatre a consumer need to do three similar shopping tours for T-shirts.

Therefore, the conclusion is that it is better to consume a T-shirt than a stage performance from an environmental point of view.

8 VARIATION ANALYSIS

Some important factors are found during the project which could influence the results. To be able to check these factors, a variation analysis is done with the functional unit "one sold ticket". The method worked like this: Change one parameter and check out the results, then change back the parameter and change another one. Hence, parameters are changed one by one to be able to see how much it is possible for the results to differ between extreme cases.

For a LCA study of a product is often a sensitivity analysis done. The electricity mix is frequently one of the parameters which are changed in analysis of that type. However, this is an LCA study over services and the results from chapter 7 shows that the visitors and their transportation are much more important for services. Therefore, some scenarios are investigated in a variation analysis.

The parameters which are changed:

- The number of visitors to the play in the Regionteater Väst and to the opera in the Göteborg Opera, see chapter 8.1.
- Change of vehicle for the visitors to the play in the Regionteater Väst and to the opera in the Göteborg Opera, see chapter 8.2.
- Change to wood instead of polycarbonate for the décor department in the Göteborg Opera, see chapter 8.3.

8.1 Increase and decrease the number of visitors

To be able to understand the importance of the number of visitors to the Göteborg Opera and the Regionteater Väst, a decrease of 15% relative to the basic case is shown to the left in Figure 44. An increase of 15% relative to the basic case is shown to the right in Figure 44. It is possible to see that with increased number of visitors, the emissions go down per sold ticket. An increase or decrease of 15% of the visitors seems to be a realistic choice because the business could decrease or grow depending on the societal and consumption patterns. The conclusion from this chapter is; the more tickets it is possible to sell, the lower the environmental load.

Figure 44 shows that the total decrease in CO_2 emissions is linear for the two cases. Furthermore, the decrease for the Regionteater Väst and the Göteborg Opera seem to be proportional. With an increase in sold tickets instead of a decrease in sold tickets, the emissions are going down by 2 kg CO_2 equivalents/one sold ticket in the Göteborg Opera and 2 kg CO_2 equivalents/one sold ticket in the Regionteater Väst.

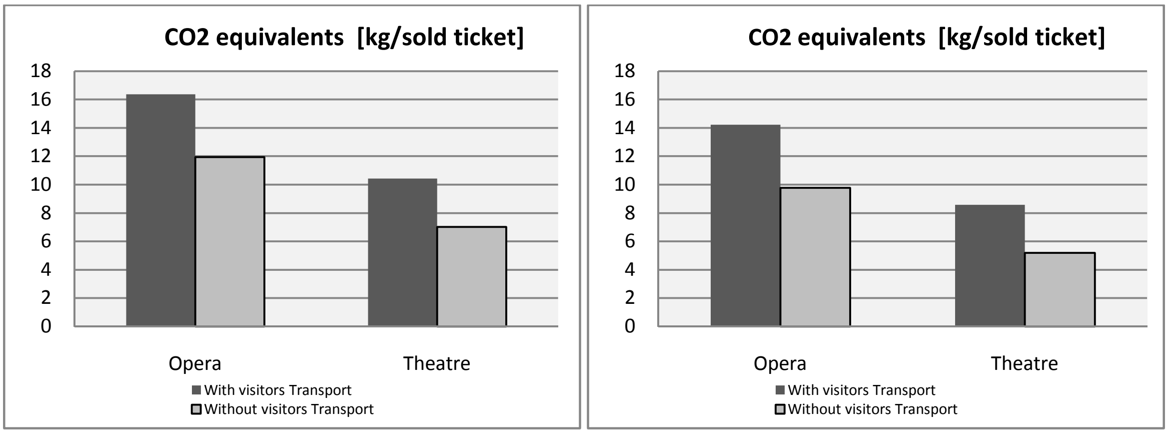

Figure 44 CO_2 equivalents. Visitors decrease with 15% to the left and visitors increase with 15% to the right in relation to the basic scenario.

Figure 45 shows the different groups (Building services, Transport, Materials etc) in the Regionteater Väst and the Göteborg Opera. The biggest reduction in CO_2 emissions originates from the materials category. This is because the emissions from the materials are divided with the number of visitors. The other groups, like building services and restaurant are functions of the number of visitors and do not decrease more than marginal. However, some reduction of transportation in the Regionteater Väst happens because the influences of the tour decrease.

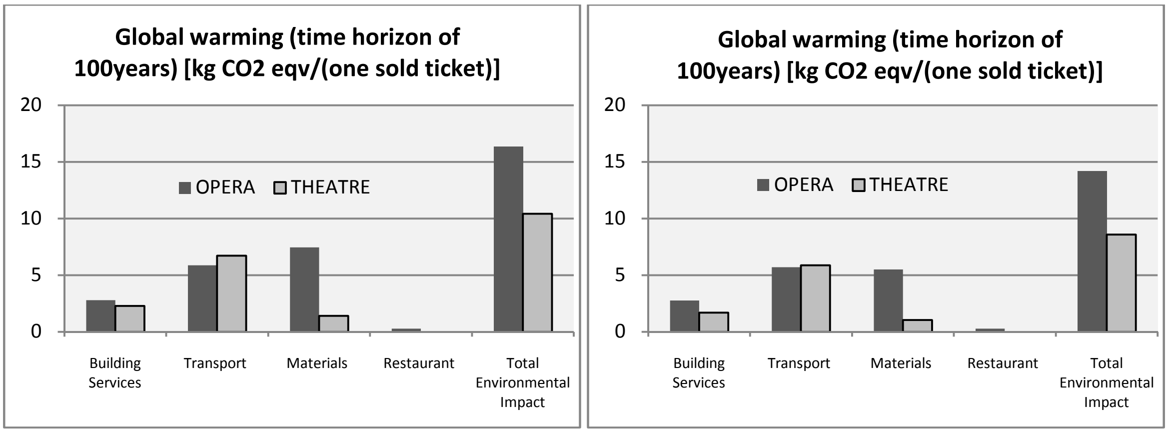

Figure 45 Global warming. Visitors decrease with 15% to the left and visitors increase with 15% to the right in relation to the basic scenario.

The results from the other impact categories are similar to the results presented for the CO_2 equivalents emissions. If the results are presented exclusive of the transportation of the visitors, the trend from Figure 44 to Figure 45 are the same. The only difference would be the lower transportation emissions.

8.2 Change the travel for the visitors

The travel of the visitors back and forth to the stage performances is an important factor. Depending on the travel share between car, busses and trains, the environmental impact differs. There is a base case and the three different scenarios for the Gothenburg Opera, see Appendix 5. The first scenario assumes that buses are used to a greater extent compared to the basic scenario. The second scenario assumes an increased car share compared to the basic scenario and the last scenario has an increased tram and train share compared to the basic scenario.

The visitors´ travel back and forth to the stage performances for the Regionteater Väst at the rustic cites is assumed in a different way, because they attract another audience. In the basic scenario, all people are assumed to use cars. But in the other scenario, half the people walk instead of use cars.

The results in chapter 8.2.1 and 8.2.2 are presented for the visitors transport. The over groups, like transportation of materials or transportation of employees does not change when the visitors change transportation vehicle.

8.2.1 The Göteborg Opera

The graph below shows the results from the environmental impact for the basic case and the three scenarios. The most environmentally friendly locomotion is to use train transport, see Figure 46. Train case lowers the CO_2 emissions by half compared to the car case. The base case environmental impact is somewhere between the car case and the train case.

Resources used are lowest for the train case and do not reach 32 gram Sb_{eqv}/one sold ticket. It is highest for the car case with 37 gram Sb_{eqv}/one sold ticket.

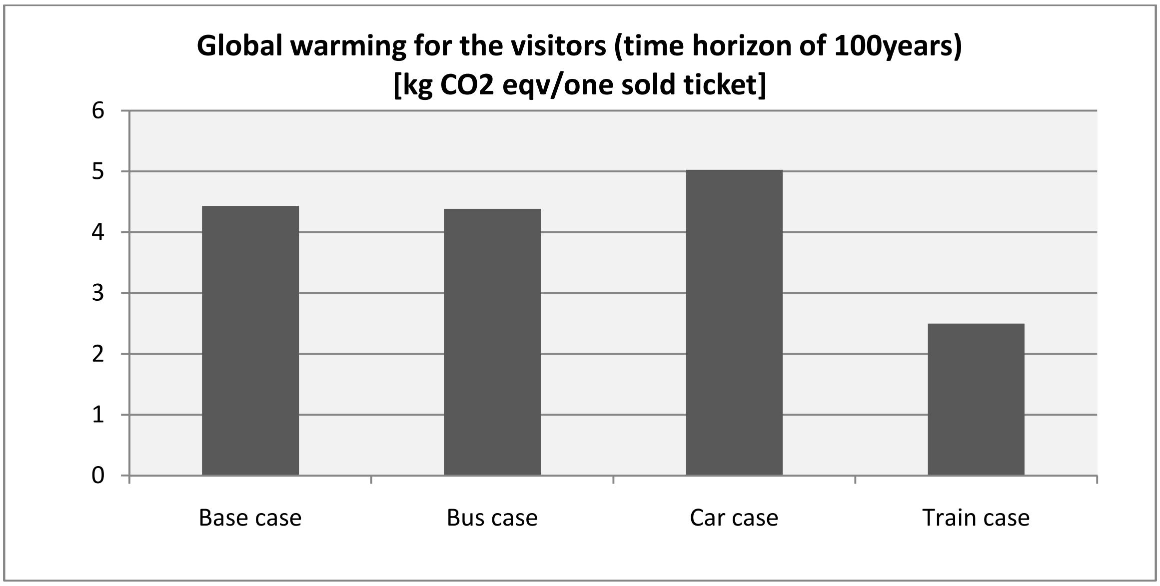

Figure 46 Resources used and Global warming for the Göteborg Opera.

The results from the other impact categories are presented below:

- Resources used are lowest for the train case with 32 gram Sb_{eqv}/one sold ticket. It is highest for the car case with 37 gram Sb_{eqv}/one sold ticket.
- The acidification emissions are lowest for the train case with 13 gram SO_2 eqv /one sold ticket. The car case emits 18 gram SO_2 eqv /one sold ticket.

- Eutrophication is lowest for the train case with 355 gram PO_4^3 eqv/one sold ticket. The car case has the highest emissions and reaches 365 gram PO_4^3 eqv/one sold ticket.

8.2.2 The Regionteater Väst

Figure 47 shows the two scenarios for the Regionteater Väst; all visitors go by car or half the people walk. If half the people walk, the environmental load decreases in all environmental impact categories. For example, it is possible to reduce emissions by more than 1.5 kg CO_2 eqv/one sold ticket.

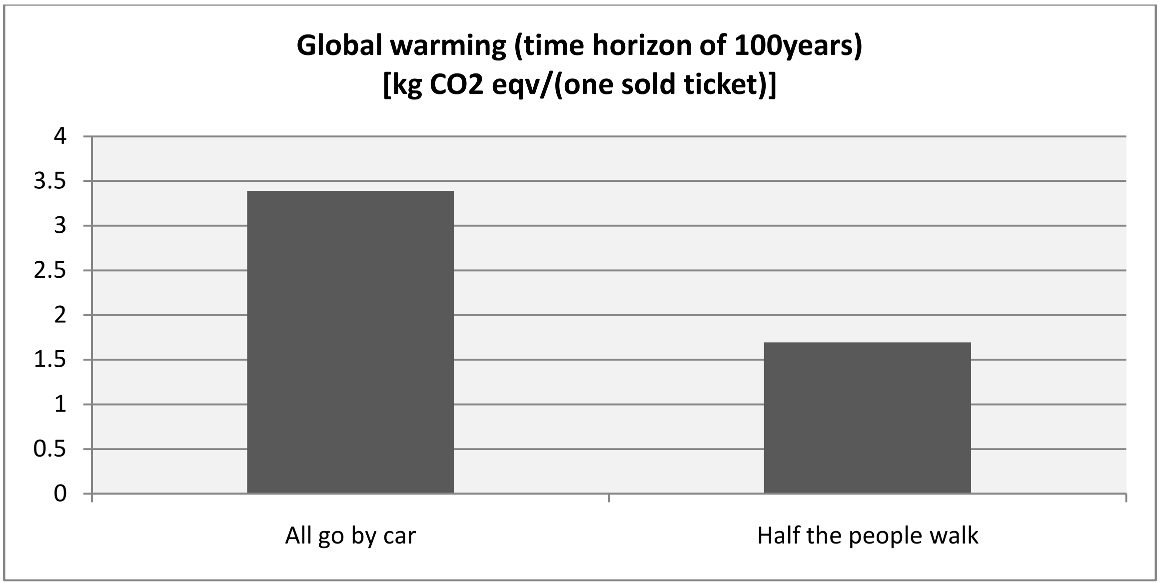

Figure 47 Global warming for the Regionteater Väst.

The results from the other impact categories are presented below:

- Resources used when half the people walk is 11 gram Sb_{eqv}/one sold ticket. When all the people go by car to the rustic sites, the resource used is 21 gram Sb_{eqv}/one sold ticket.
- The acidification emissions are 1.7 gram SO_2 eqv /one sold ticket when half the people walk. When all people go by car to the play, the acidification emissions are 3.4 gram SO_2 eqv /one sold ticket.
- Eutrophication is 0.28 gram PO_4^3 eqv/one sold ticket when half the people walk. When all people go by car to the play, the eutrophication reaches almost 0.6 gram PO_4^3 eqv/one sold ticket.

8.3 Change to wood instead of polycarbonate for the décor department in the Göteborg Opera

If the polycarbonate plastic is changed to wood instead, the environmental load goes down for all environmental impact categories:

- The resources used goes down from 35 gram Sb_{eqv}/one sold ticket to 2 gram Sb_{eqv}/one sold ticket for the décor department.
- The emission of acidification equivalents goes down from 16 gram SO_2 eqv/one sold ticket to 5 gram SO_2 eqv/one sold ticket for the décor department.
- The eutrophication emissions go down from 2 gram PO_4^3 eqv/one sold ticket to 0.2 gram PO_4^3 eqv/one sold ticket.

An example of a result graph from the change to wood instead of polycarbonate plastic scenario is shown in figure 48. If the shift is done, a reduction of about 5 kg of CO_2 equivalents/one sold ticket is possible to achieve for the décor department. Notice the scales between the left graph and the right graph in figure 48. If the same scale is used, it is not easy to see the reduction for the décor department.

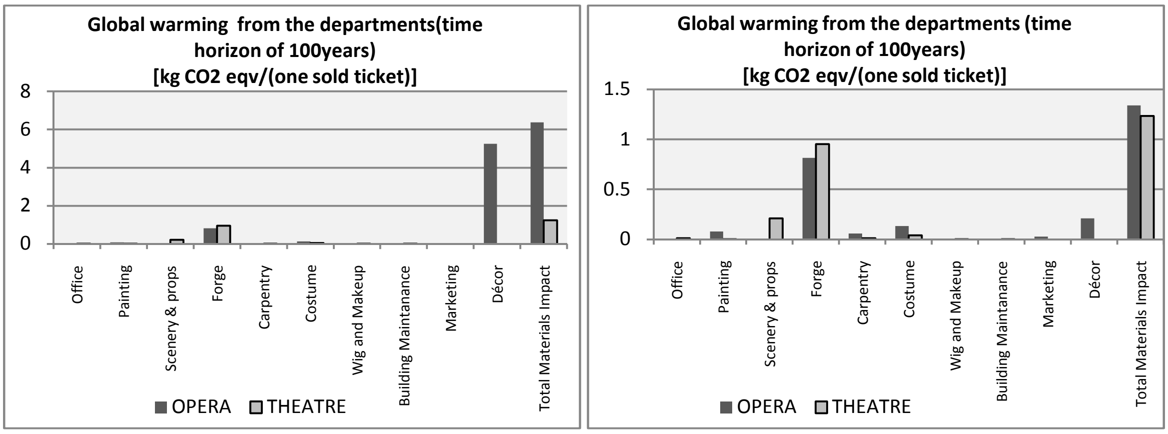

Figure 48 Global warming for the Göteborg Opera. To the right is with wood and to the left is with polycarbonate plastic.

9 OTHER STUDIES IN THE SAME FIELD

Recently different LCA methods have been used to analyze services in the world. The most common way to handle services with LCA methodology is with input-output analysis or with "process LCA". The most common method is process LCA and gives more detailed information about the processes inside the service compared to the input-output method. This is because many of the data are site specific for process LCA. The biggest drawback with process LCA is the time consumption compared to the input-output studies. The input-output method uses pre-prepared statistics, which give more rough estimations of the results (Brunklaus 2010).

Some results from a literature study are presented in chapter 9.1 and chapter 9.2. The results are then compared with the LCA study in chapter 9.3.

9.1 Input output analysis

A Swedish research report shows that the environmental load between pleasures is equal. For example, theatres, museums, operas and clothes have the same emissions of 0.016 kg CO_2/SEK ((Carlsson-Kanyama and Räty 2007). Maybe this is due to statistic data from the Netherlands (Brunklaus 2010).

In the book "Konsumera mera- dyrköpt lycka", one thousand SEK is spent during a weekend for different pleasures, and then the corresponding CO_2 emissions are calculated (Formas 2007). Some examples of the results:

- Travel to mountains in the winter time gives 284 kg CO_2
- Stay in the town, eat a dinner in a restaurant and visit a concert gives 19 kg CO_2
- Go shopping in a mall gives 50 kg CO_2
- Invite your friends for dinner gives 67 kg CO_2

Another input output study shows that recreation uses more energy compared to buying clothes, which leads to higher CO_2 emissions for recreation (Hertwich 2005).

9.2 Process LCA

The results from a Swedish rock concert LCA show that the transportation of the visitors back and forth to the stage performance and the transportation of the musicians are the largest CO_2 emitters. The management of the arena only contributes to a minor extent (Wallin 2008).

The result from a LCA study of a football competition shows the same results; the transportation of the visitors has the greatest impact on the CO_2 emissions (Pladerer 2009).

A LCA study of hotel services shows that the transportation of the employees back and forth to work every day is important. However, transportation of visitors is not covered at all in the study (Ronning and Brekke 2009).

Furthermore, a study of 160 IKEA malls shows that the customers' transportation back and forth to the mall is the biggest contributor to the CO_2 emissions (Brunklaus 2010).

The LCA study which concerns this project most is one from Austria which compares a visit to a theatre or drink beers at a restaurant during the time of 2-3 hours. The study shows that a visit to a theatre needs more resources than drinking beer during the same time frame of 2-3 hours. However, the focus of the LCA study is on material flows and energy flows and not of CO_2 emissions (Juric and Vogel 2005).

9.3 Comparison of the literature research and the result from the conducted LCA study

To be able to compare the results from some other studies presented in chapter 9.1 and chapter 9.2, carbon dioxide emissions are listed from the conducted LCA study for the Göteborg Opera and the Regionteater Väst:

CO_2 emissions for the Göteborg Opera:

1 15.3 kg CO_2 eqv/(one sold ticket) if the visitors transport is included.
2 0.04 kg CO_2 eqv/(one sold ticket*SEK) if the visitors transport is included.
3 10.9 kg CO_2 eqv/(one sold ticket) without the visitors transportation.
4 0.03 kg CO_2 eqv/(one sold ticket*SEK) without the visitors transportation.

CO_2 emissions for the Regionteater Väst:

1 9.4 kg CO_2 eqv/(one sold ticket) if the visitors transport is included.
2 0.09 kg CO_2 eqv/(one sold ticket*SEK) if the visitors transport is included.
3 6 kg CO_2 eqv/(one sold ticket) without the visitors transportation.
4 0.06 kg CO_2 eqv/(one sold ticket*SEK) without the visitors transportation.

The results from line two and line four stated above for the Göteborg Opera and the Regionteater Väst show that the results from the conducted LCA study are in the same range as the results from the Swedish report about theatre, museum, opera and clothes (Carlsson-Kanyama and Räty 2007).

A study in the book "Konsumera mera- dyrköpt lycka" is about visiting a concert and a restaurant, which result in emissions of 19 kg CO_2. This is similar to the results from the conducted LCA study about the Göteborg Opera and the Regionteater Väst, se line one and line three for both the Göteborg Opera and the Regionteater Väst.

There is process LCA study about visiting a Swedish rock concert (Wallin 2008). The results show that the transportation of the visitors and the musicians have a major environmental impact. This is the same as for the conducted LCA study about the Göteborg Opera and Regionteater Väst, the transportation of visitors and the employees have a major influence over the CO_2 emissions. See chapter 7 for further information.

The LCA study about the Göteborg Opera and the Regionteater Väst includes data from a LCA study about a T-shirt (Wedin 2007). The results show that it is worse to consume an opera in the Göteborg Opera or a play in the Regionteater Väst than buy and use a T-shirt. The same conclusion is possible to draw from a LCA study about what visiting a theatre in Austria or drinking beers (Juric and Vogel 2005).

The conclusion from chapter nine is that the results from the LCA study about the Göteborg Opera and the Regionteater Väst are reasonable even though all studies mentioned above have different assumptions, system boundaries and data sources.

10 CONCLUSIONS

The present study is composed of three minor LCA studies, all of them related to stage performances. The base study is an accounting LCA; where the Regionteater Väst, and the Göteborg Opera are analyzed individually. This study determines which processes in the play *Plocka potäter i kostym* from Regionteater Väst and which processes in the opera *Thaïs* from the Göteborg Opera contribute most to the total environmental impact. This LCA study presents the results according to the business manager perception. The results show that the main contributors to the environmental impact in the play *Plocka potäter i kostym* are concentrated in the building services, the transport and the materials with impacts of 2 kg CO_2 eqv/one sold ticket, 3 kg CO_2 eqv/one sold ticket and 1.5 kg CO_2 eqv/one sold ticket respectively. The transport is important because all the clients are traveling by car. On the other hand, the results of the opera *Thaïs* in the Göteborg Opera show that the main contributor is the material utilization with 6 kg CO_2eqv/one sold ticket followed by the building services and the transport with 3 kg CO_2 eqv/one sold ticket and 1.7 kg CO_2eqv/one sold ticket respectively.

The obtained results show that in a general point of view, The Regionteater Väst is more environmentally friendly compared to the Göteborg Opera. The Göteborg Opera still has larger environmental impacts than the Regionteater Väst.

The second LCA study is a comparative study. This LCA answers what is worst for the environment from a consumer scenario; consume a stage performance in the Regionteater Väst or in the Göteborg Opera. The transportation of the visitors is included in this study and for the results display, three functional units are added; which were introduced in the goal and scope. The results show that it is better to consume a stage performance in the Regionteater Väst compared to the Göteborg Opera from an environmental point of view. The total emission from the Regionteater Väst is 9.4 kg CO_2 eqv/one sold ticket and for the Göteborg Opera it is 15.3 kg CO_2 eqv/one sold ticket.

The conclusion from the obtained results shows that the Regionteater Väst is more environmentally friendly compared to the Göteborg Opera. Even with different functional units which take into consideration money and time, and the trend in the results is the same. The Göteborg Opera still has larger environmental impact than the Regionteater Väst.

Also important to mention is that no scale factor exists between the Göteborg Opera and the Regionteater Väst, i.e. even if the Göteborg Opera sells 10 times more tickets compared to the Regionteater Väst for a stage performance, the environmental load is not correlated between these two situations.

The third comparative LCA study answers what is worst for the environment; consume a stage performance in the Regionteater Väst/the Göteborg Opera or a T-shirt? This is important in a wider perspective, because a choice in the society to consume either services or products could be based on a scientific research. The emission for the T-shirt is 3.4 kg CO_2 eqv/T-shirt inclusive the shopping tour. Therefore, it is more environmentally friendly to consume a T-shirt instead of seeing the play *Plocka potäter i kostym* in the Regionteater Väst or the opera *Thaïs* in the Göteborg Opera.

11 DISCUSSION

This project is a screening LCA, which has been modified to accounting and comparing LCA's for different scenarios. Lots of data are collected and put together to a database in Microsoft Excel. The accuracy of all the sources for the data is not always confirmed. Sometimes wide assumptions are done to be able to go further. Hence, the obtained results may differ if somebody else would perform an LCA study for the Göteborg Opera and the Regionteater Väst irrespective of this screening LCA. However, this is one of the firsts LCA studies in this field. Therefore, this LCA could be seen as a pilot study.

Even if the detailed results from this study may be inaccurate, the guidance from this project will be important. When this project ends, the Göteborg Opera and the Regionteater Väst will perfectly know where they should put in an effort to lower the environmental impacts without the risk of sub optimizing and raising the environmental load in another part of their business.

A proper study of the visitors' travel back and forth to the stage performances is important to do in order to get rid of the uncertainty and remove this parameter from the variation analysis. With the uncertainty of the visitors' transportation, the environmental impacts change many percent between the two extreme cases; almost everyone travels by car and almost everyone travels by train/tram.

To compare consumption of a T-shirt with a service, like an opera stage performance or a theatre stage performance is difficult. Subjective values of satisfaction cannot be included in mathematical methods. For example, how should you measure the satisfaction of shopping compared to the satisfaction of seeing a play? The answer will certainly depend on whom you ask. Even with these problems, this project has tried to answer the question of what is worse, consuming a T-shirt or a stage performance?

Since the study is requested by the Region Västra Götaland´s culture board, the report has to be summarized but still transparent with identified sources for the data. The report may be made public, but this decision is up to the Göteborg Opera, the Regionteater Väst and the Region Västra Götaland´s culture board.

This LCA may have to be reviewed, or at least checked, by experts in statistics who can give their advice about the validity of the assumptions. It would also be good that a LCA expert validates the study.

12 RECOMMENDATIONS

In chapter 12.1 and chapter 12.2 follow some recommendations to be able to lower the environmental impacts for the Göteborg Opera and the Regionteater Väst. Chapter 12.3 has some recommendations for the Region Västra Götaland.

12.1 Recommendations for the Göteborg Opera

If the Göteborg Opera wants to reduce their environmental load, they should try to:

- Reduce the usage of polycarbonate plastic in the décor department.
- Reduce the electricity consumption.
- Reduce the long transportation for the visitors by car.
- Reduce the transportation of the employees by car.

The best would be if the Göteborg Opera reduces the usage of polycarbonate plastic in the décor department, or change to wood instead. Then the Göteborg Opera could be more environmentally friendly.

12.2 Recommendations for the Regionteater Väst

If the Regionteater Väst wants to reduce their environmental load, they should try to:

- Reduce the transportation of the employees by car.
- Optimize the transportation in the tour.
- Reduce the electricity consumption.

The best would be if the Regionteater Väst reduces the transportation for the employees by car. Today a large share of employees uses a car back and forth to work.

12.3 Recommendations for Region Västra Götaland

In order to make any policy or a decision for the market, the study should be complemented with other studies which sustain the results from this study, like LCA studies about the Art of Film, the Art of Literature and the Art of Spare Time (Nielsen 2009). A vice decision should also be to read the study "The manuscript of consumption – illustrating consumption patterns in five acts" (Lundgren and Svensson 2010).

Conduct another similar LCA study about theatres´ in order to repeat and confirm the results from this LCA study.

13 FINAL COMMENTS

The results from this LCA study should answer, or be a part of an overall composed answer to several LCA studies. SP Sveriges Tekniska Forskningsinstitut will put together the common answer of the questions for the LCA contractor, which is Region Västra Götaland (VGR).

Based on the fact that Public Service has a big share in the commercial market, this LCA study may be a guidance in methodological issues of how to conduct LCA studies in the future about Public Services. Traditionally, LCA studies have only been conducted for products.

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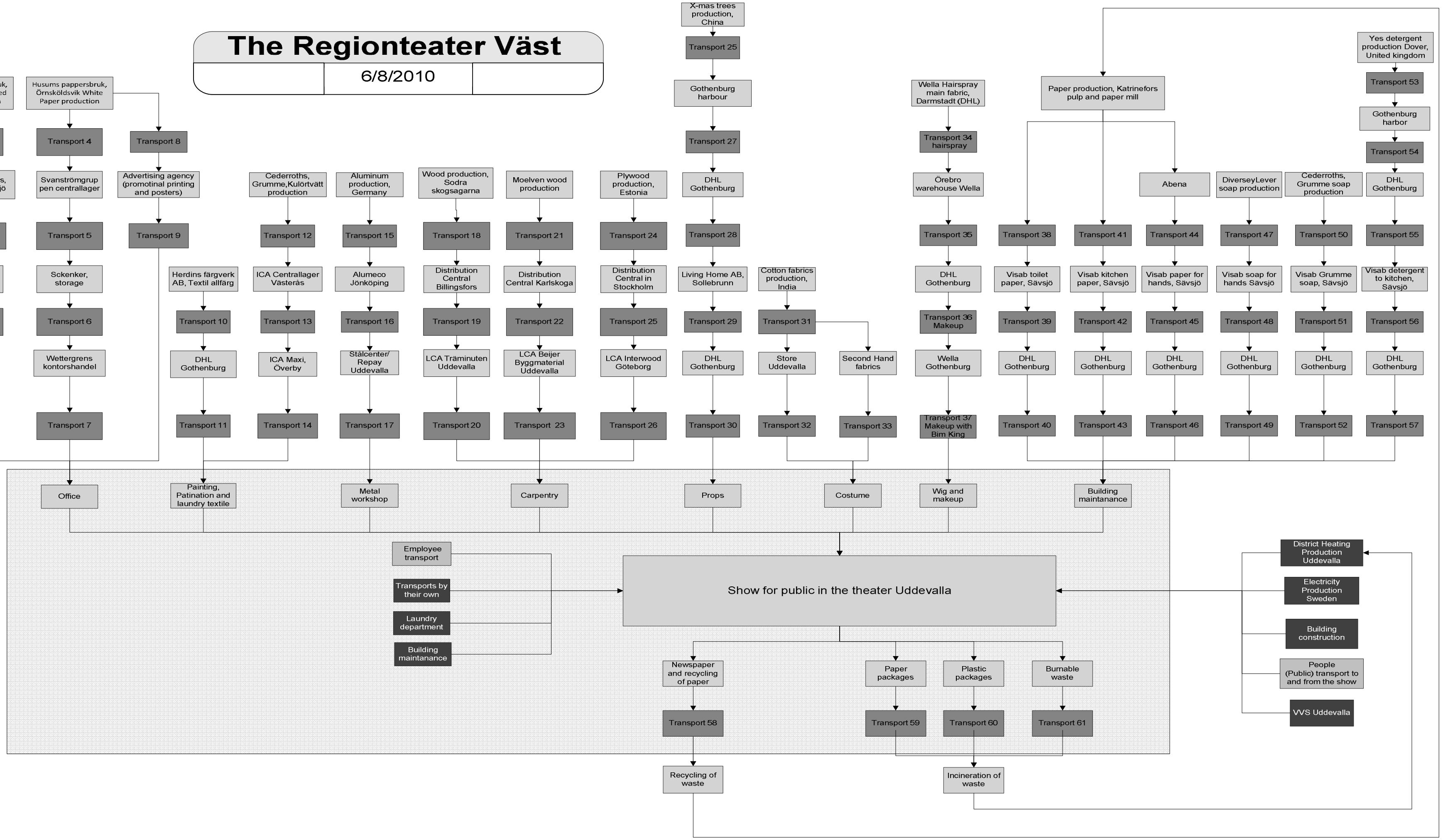
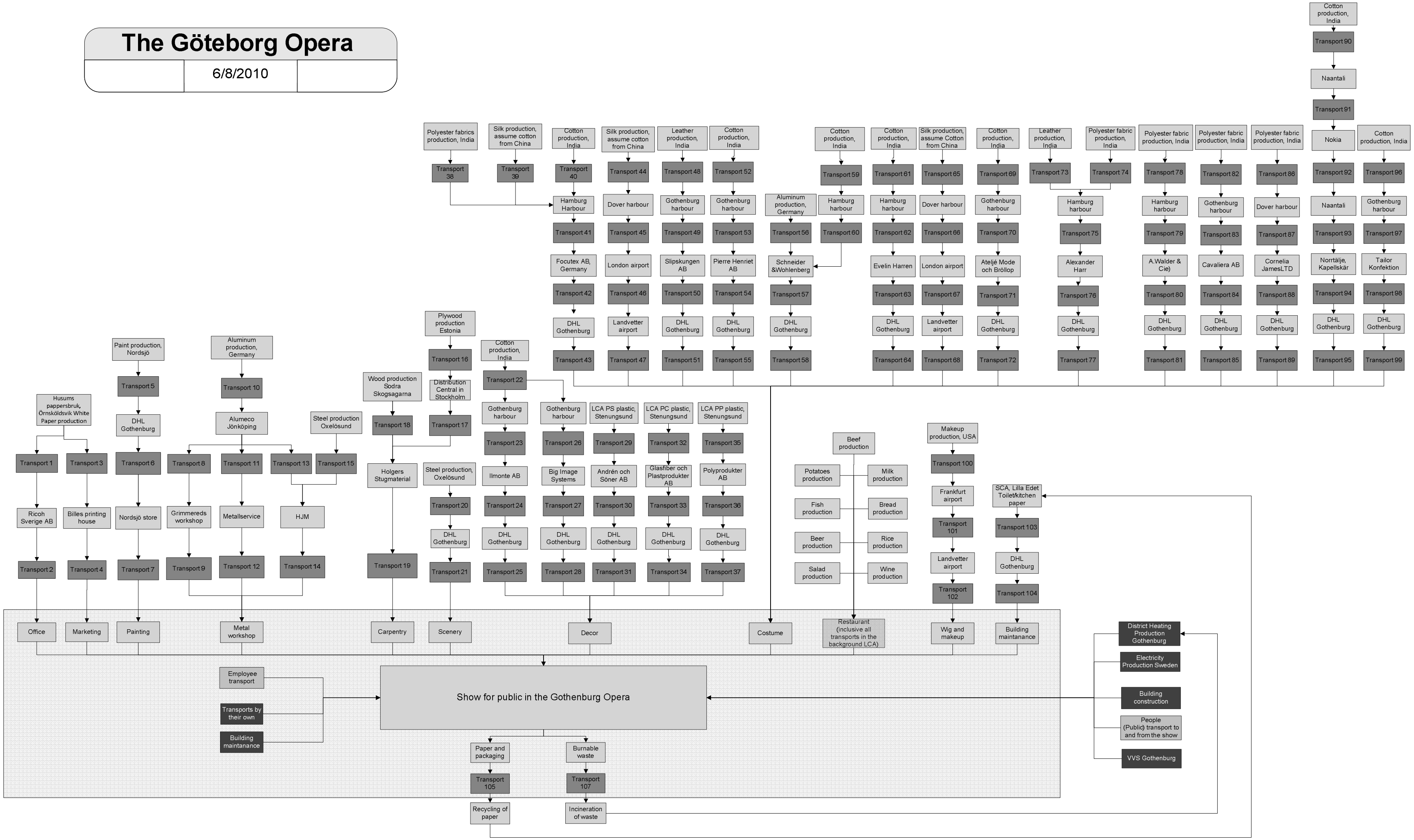
LIST OF APPENDIXES

APPENDIX 1 FLOW CHARTS





The Göteborg Opera
6/8/2010
Cotton production, India
Transport 90
Naantali
Transport 91
Polyester fabrics production, India
Silk production, assume cotton from China
Cotton production, India
Silk production, assume cotton from China
Leather production, India
Cotton production, India
Cotton production, India
Cotton production, India
Silk production, assume Cotton from China
Cotton production, India
Leather production, India
Polyester fabric production, India
Polyester fabric production, India
Polyester fabric production, India
Polyester fabric production, India
Nokia
Cotton production, India
Transport 38
Transport 39
Transport 40
Transport 44
Transport 48
Transport 52
Transport 59
Transport 61
Transport 65
Transport 69
Transport 73
Transport 74
Transport 78
Transport 82
Transport 86
Transport 92
Transport 96
Hamburg Harbour
Dover harbour
Gothenburg harbour
Gothenburg harbour
Aluminum production, Germany
Hamburg harbour
Hamburg harbour
Dover harbour
Gothenburg harbour
Hamburg harbour
Hamburg harbour
Gothenburg harbour
Dover harbour
Naantali
Gothenburg harbour
Transport 41
Transport 45
Transport 49
Transport 53
Transport 56
Transport 60
Transport 62
Transport 66
Transport 70
Transport 75
Transport 79
Transport 83
Transport 87
Transport 93
Transport 97
Focutex AB, Germany
London airport
Slipskungen AB
Pierre Henriet AB
Schneider &Wohlenberg
Evelin Harren
London airport
Ateljé Mode och Bröllop
Alexander Harr
A.Walder & Cie)
Cavaliera AB
Cornelia JamesLTD
Norrtälje, Kapellskär
Tailor Konfektion
Transport 42
Transport 46
Transport 50
Transport 54
Transport 57
Transport 63
Transport 67
Transport 71
Transport 76
Transport 80
Transport 84
Transport 88
Transport 94
Transport 98
DHL Gothenburg
Landvetter airport
DHL Gothenburg
DHL Gothenburg
DHL Gothenburg
DHL Gothenburg
Landvetter airport
DHL Gothenburg
DHL Gothenburg
DHL Gothenburg
DHL Gothenburg
DHL Gothenburg
DHL Gothenburg
DHL Gothenburg
Transport 43
Transport 47
Transport 51
Transport 55
Transport 58
Transport 64
Transport 68
Transport 72
Transport 77
Transport 81
Transport 85
Transport 89
Transport 95
Transport 99
Plywood production Estonia
Transport 16
Distribution Central in Stockholm
Transport 17
Cotton production, India
Transport 22
Gothenburg harbour
Gothenburg harbour
LCA PS plastic, Stenungsund
LCA PC plastic, Stenungsund
LCA PP plastic, Stenungsund
Transport 23
Transport 26
Transport 29
Transport 32
Transport 35
Ilmonte AB
Big Image Systems
Andrén och Söner AB
Glasfiber och Plastprodukter AB
Polyprodukter AB
Transport 24
Transport 27
Transport 30
Transport 33
Transport 36
DHL Gothenburg
DHL Gothenburg
DHL Gothenburg
DHL Gothenburg
DHL Gothenburg
Transport 25
Transport 28
Transport 31
Transport 34
Transport 37
Steel production, Oxelösund
Transport 20
DHL Gothenburg
Transport 21
Wood production Sodra Skogsagarna
Transport 18
Holgers Stugmaterial
Transport 19
Paint production, Nordsjö
Transport 5
DHL Gothenburg
Transport 6
Nordsjö store
Transport 7
Aluminum production, Germany
Transport 10
Alumeco Jönköping
Transport 8
Transport 11
Transport 13
Steel production Oxelösund
Transport 15
Grimmereds workshop
Metallservice
HJM
Transport 9
Transport 12
Transport 14
Husums pappersbruk, Örnsköldsvik White Paper production
Transport 1
Transport 3
Ricoh Sverige AB
Billes printing house
Transport 2
Transport 4
Beef production
Potatoes production
Milk production
Fish production
Bread production
Beer production
Rice production
Salad production
Wine production
Makeup production, USA
Transport 100
Frankfurt airport
Transport 101
Landvetter airport
Transport 102
SCA, Lilla Edet Toilet/kitchen paper
Transport 103
DHL Gothenburg
Transport 104
Office
Marketing
Painting
Metal workshop
Carpentry
Scenery
Decor
Costume
Restaurant (inclusive all transports in the background LCA)
Wig and makeup
Building maintanance
Employee transport
Transports by their own
Building maintanance
Show for public in the Gothenburg Opera
District Heating Production Gothenburg
Electricity Production Sweden
Building construction
People (Public) transport to and from the show
VVS Gothenburg
Paper and packaging
Burnable waste
Transport 105
Transport 107
Recycling of paper
Incineration of waste

APPENDIX 2 QUESTIONNAIRES FOR TRANSPORTATION OF EMPLOYEES IN THE GÖTEBORG OPERA AND THE REGIONTEATER VÄST

Thaïs

Hej

Mitt namn är Johan Tengström och jag håller på att göra en miljöundersökning av er opera i en masteruppsats. Jag skulle behöva ha svar följande frågor:

Fråga 1:

Med vilket transportmedel tar du dig till jobbet?

____

Fråga 2:

Om du svarade bil i föregående fråga, vilken typ av bränsle tankar du?

____

Fråga 3:

Hur långt (enkel väg) har du till jobbet?

_____ km

Fråga 4:

Hur många dagar i veckan åker du till jobbet?

____

Fråga 5:

Ungefär många dagar under ett år arbetade du med Thaïs?

____

Med vänliga hälsningar, Johan

Plocka potäter i kostym

Hej

Mitt namn är Johan Tengström och jag håller på att göra en miljöundersökning av er teater i en masteruppsats. Jag skulle behöva ha svar följande frågor:

Fråga 1:

Med vilket transportmedel tar du dig till jobbet?

____

Fråga 2:

Om du svarade bil i föregående fråga, vilken typ av bränsle tankar du?

____

Fråga 3:

Hur långt har du till jobbet (enkel väg)?

_____ km

Fråga 4:

Ungefär många dagar under ett år arbetade du med Plocka potäter i kostym?

____

Med vänliga hälsningar, Johan

APPENDIX 3 EMPLOYEE TRANSPORTATION TABLES FOR THE GÖTEBORG OPERA AND THE REGIONTEATER VÄST

Transportation for the Employees who worked in the theatre specifc with the Plocka Potäter i Kostym								
The employee	Transport vehicle	What kind of fuel	Distance (back and forth)	Unit	How many times a week do you	How many days during the year did you	Total way	Unit
Transport 4	Car, short distance	Gasoline	34	km	5	90	3060	pkm
Transport 5	Car, long distance	Gasoline	70	km	5	10	700	pkm
Transport 6, Bim King makeup artist, wor	Train	Electricity	167.4	km	5	15	2511	pkm
Transport 6, Bim King makeup artist, wor	Buss, long distance	diesel	167.4	km	5	15	2511	pkm
Transport 7	Car, short distance	diesel	18	km	5	3	54	pkm
Transport 9	Car, long distance	Gasoline	70	km	5	45	3150	pkm
Transport 11	Car, long distance	Gasoline	82	km	5	60	4920	pkm
Transport 12	walking	None	4	km	5	40	160	pkm
Transport 13	Train	Electricity	165.8	km	5	45	7461	pkm
Sum up of total							24527	pkm

Transportation for the rest of the employees in the theatre								
The employee	Transport vehicle	What kind of fuel	Distance (back and forth)	Unit	How many times a week do you travel	How many days during the year did you worked with this	Total way	Unit
Transport 10, Kenny	Car, short distance	Gasoline	24	km	5	254	6096	pkm
Transport 8	Car, long distance	Gasoline	48	km	5	254	12192	pkm
Transport 1	Car, long distance	Gasoline	60	km	5	254	15240	pkm
Transport 2	Bicycle	None	2	km	5	254	508	pkm
Transport 3	Car, short distance	Gasoline	40	km	5	254	10160	pkm
Transport 14, train half the ti	Train	Electricity	90	km	4	203.2	18288	pkm
Transport 14, bus half the tim	Bus, long distance	Diesel	90	km	4	203.2	18288	pkm
Transport 15	Train	Electricity	150	km	5	254	38100	pkm
Transport 16	Bicycle	None	4	km	5	254	1016	pkm
Transport 18	Train	Electricity	160	km	4	203.2	32512	pkm
Sum up of total							152400	pkm

Transportation for the Employees in the workshops back and forth for Thais

The employee	How many people	Transport vehicle	What kind of fuel	Distance (back	Unit	How many times a week do you travel	How many days during the year did you worked with this play?	Total way	Unit
Transport 1	1	Airplane	Jet fuel	1288	km	0	7	9016	pkm
Transport 2	1	Bicycle	None	5.6	km	5	50	280	pkm
Transport 3	1	Train/tram	Electricity	14	km	5	50	700	pkm
Transport 4	1	Walking	None	5	km	0.5	51	255	pkm
Transport 5	1	Bicycle	None	6	km	5	40	240	pkm
Transport 6	1	Bicycle	None	14	km	5	80	1120	pkm
Transport 7	1	Car, short distance	Gasoline	40	km	5	35	1400	pkm
Transport 8	1	Bicycle	None	16	km	5	35	560	pkm
Transport 9	1	Car/Moped, short distance	Gasoline	14	km	5	35	490	pkm
Transport 10	1	Bicycle	None	10	km	5	30	300	pkm
Transport 11	1	Car, short distance	Gasoline	10	km	5	40	400	pkm
Transport 12	1	Bus	Diesel	9	km	5	35	315	pkm
Transport 13	1	Car, long distance	Gasoline	60	km	5	60	3600	pkm
Transport 14	1	Car, short distance	Gasoline	40	km	5	60	2400	pkm
Transport 15	1	Bus	Diesel	40	km	5	60	2400	pkm
Transport 16	1	Bus	Diesel	6	km	5	60	360	pkm
Transport 17	1	Walking	None	6	km	5	60	360	pkm
Transport 18	1	Bicycle	None	15	km	5	75	1125	pkm
Transport 19	1	Walking	None	6	km	5	60	360	pkm
Transport 20	1	Bus, long distance	Diesel	170	km	5	35	5950	pkm
Transport 21	1	Train/tram	Electricity	8	km	5	60	480	pkm
Transport 22	1	Bus,long distance	Diesel	70	km	5	90	6300	pkm
Transport 23	1	Bicycle	None	5	km	5	35	175	pkm
Transport 24	1	Bicycle	None	1	km	5	40	40	pkm
Transport 25	1	Bicycle	None	10	km	5	35	350	pkm
Transport 26	1	Bus, long distance	Diesel	60	km	5	12	720	pkm
Transport 27	1	Car, short distance	Gasoline	15	km	4	10	150	pkm
Transport 28	1	Bicycle	None	6	km	5	10	60	pkm
Transport 29	1	Bicycle	None	6	km	5	30	180	pkm
Transport 30, one way bus	0.5	Bus, long distance	Diesel	22	km	5	120	2640	pkm
Transport 30, one way car	0.5	Car, long distance	Gasoline	22	km	5	120	2640	pkm
Transport 31	1	Train/tram	Electricity	60	km	5	40	2400	pkm
Transport 32	1	Train/tram	Electricity	8	km	5	30	240	pkm
Transport 33	1	Boat, archipelago	Diesel	6	km	5	25	150	pkm
Transport 34	1	Bicycle	None	12	km	5	30	360	pkm
Transport 35	1	Train/tram	Electricity	100	km	5	30	3000	pkm
Transport 36	1	Car, short distance	Gasoline	40	km	4	50	2000	pkm
Transport 37	1	Walking	None	4	km	5	50	200	pkm
Transport 38, half the time	0.5	Bus, long distance	Diesel	80	km	5	50	4000	pkm
Transport 38, half the time	0.5	Train/tram	Electricity	80	km	5	50	4000	pkm
Transport 39	1	Train/tram	Electricity	16	km	5	50	800	pkm
Transport 40	1	Bus, long distance	Diesel	40	km	5	30	1200	pkm
Transport 41	1	Train/tram	Electricity	10	km	5	30	300	pkm
Transport 42	1	Boat, archipelago	Diesel	8	km	5	30	240	pkm
Transport 43	1	Train/tram	Electricity	44	km	5	50	2200	pkm
Transport 44	1	Walking	None	4	km	5	30	120	pkm
Transport 45	1	Bicycle	None	2.4	km	5	65	156	pkm
Transport 46	1	Train/tram	Electricity	10	km	5	10	100	pkm
Transport 47, half the time	0.5	Car, long distance	Gasoline	38	km	3	5	190	pkm
Transport 48, half the time	0.5	Bus, long distance	Diesel	38	km	3	5	190	pkm
Transport 49	1.0	Bus, long distance	Diesel	50	km	5	5	250	pkm
Total for employees	48			2650	km	239.5	2185	67462	pkm

Transportation for the Employees for the whole opera year 2009									
The employee	How many people	Transport vehicle	What kind of fuel	Distance (back and forth)	Unit	How many times a week do you travel	How many days during the year	Total way	Unit
Transport 1	1.0	Airplane	Jet fuel	1288	km	0	30	38640	pkm
Transport 2	1.0	Bicycle	None	5.6	km	5	226	1265.6	pkm
Transport 3	1.0	Train/tram	Electricity	14	km	5	226	3164	pkm
Transport 4	1.0	Walking	None	5	km	0.5	226	1130	pkm
Transport 5	1.0	Bicycle	None	6	km	5	226	1356	pkm
Transport 6	1.0	Bicycle	None	14	km	5	226	3164	pkm
Transport 7	1.0	Car, short distance	Gasoline	40	km	5	226	9040	pkm
Transport 8	1.0	Bicycle	None	16	km	5	226	3616	pkm
Transport 9	1.0	Car/Moped, short distanc	Gasoline	14	km	5	226	3164	pkm
Transport 10	1.0	Bicycle	None	10	km	5	226	2260	pkm
Transport 11	1.0	Car, short distance	Gasoline	10	km	5	226	2260	pkm
Transport 12	1.0	Bus	Diesel	9	km	5	226	2034	pkm
Transport 13	1.0	Car, long distance	Gasoline	60	km	5	226	13560	pkm
Transport 14	1.0	Car, short distance	Gasoline	40	km	5	226	9040	pkm
Transport 15	1.0	Bus	Diesel	40	km	5	226	9040	pkm
Transport 16	1.0	Bus	Diesel	6	km	5	226	1356	pkm
Transport 17	1.0	Walking	None	6	km	5	226	1356	pkm
Transport 18	1.0	Bicycle	None	15	km	5	226	3390	pkm
Transport 19	1.0	Walking	None	6	km	5	226	1356	pkm
Transport 20	1.0	Bus, long distance	Diesel	170	km	5	226	38420	pkm
Transport 21	1.0	Train/tram	Electricity	8	km	5	226	1808	pkm
Transport 22	1.0	Bus,long distance	Diesel	70	km	5	226	15820	pkm
Transport 23	1.0	Bicycle	None	5	km	5	226	1130	pkm
Transport 24	1.0	Bicycle	None	1	km	5	226	226	pkm
Transport 25	1.0	Bicycle	None	10	km	5	226	2260	pkm
Transport 26	1.0	Bus, long distance	Diesel	60	km	5	226	13560	pkm
Transport 27	1.0	Car, short distance	Gasoline	15	km	4	226	3390	pkm
Transport 28	1.0	Bicycle	None	6	km	5	226	1356	pkm
Transport 29	1.0	Bicycle	None	6	km	5	226	1356	pkm
Transport 30, one way bus	0.5	Bus, long distance	Diesel	22	km	5	226	4972	pkm
Transport 30, one way car	0.5	Car, long distance	Gasoline	22	km	5	226	4972	pkm
Transport 31	1.0	Train/tram	Electricity	60	km	5	226	13560	pkm
Transport 32	1.0	Train/tram	Electricity	8	km	5	226	1808	pkm
Transport 33	1.0	Boat, archipelago	Diesel	6	km	5	226	1356	pkm
Transport 34	1.0	Bicycle	None	12	km	5	226	2712	pkm
Transport 35	1.0	Train/tram	Electricity	100	km	5	226	22600	pkm
Transport 36	1.0	Car, short distance	Gasoline	40	km	4	180.8	7232	pkm
Transport 37	1.0	Walking	None	4	km	5	226	904	pkm
Transport 38, half the time	0.5	Bus, long distance	Diesel	80	km	5	226	18080	pkm
Transport 38, half the time	0.5	Train/tram	Electricity	80	km	5	226	18080	pkm
Transport 39	1.0	Train/tram	Electricity	16	km	5	226	3616	pkm
Transport 40	1.0	Bus, long distance	Diesel	40	km	5	226	9040	pkm
Transport 41	1.0	Train/tram	Electricity	10	km	5	226	2260	pkm
Transport 42	1.0	Boat, archipelago	Diesel	8	km	5	226	1808	pkm
Transport 43	1.0	Train/tram	Electricity	44	km	5	226	9944	pkm
Transport 44	1.0	Walking	None	4	km	5	226	904	pkm
Transport 45	1.0	Bicycle	None	2.4	km	5	226	542.4	pkm
Transport 46	1.0	Train/tram	Electricity	10	km	5	226	2260	pkm
Transport 47, half the time	0.5	Car, long distance	Gasoline	38	km	3	135.6	5152.8	pkm
Transport 47, half the time	0.5	Bus, long distance	Diesel	38	km	3	135.6	5152.8	pkm
Transport 48	1.0	Bus, long distance	Diesel	50	km	5	226	11300	pkm
Transport 49	1.0	Train/tram	Electricity	260	km	5	226	58760	pkm
Transport 50	1.0	Bicycle	None	10	km	5	226	2260	pkm
Transport 51	1.0	Bicycle	None	8	km	5	226	1808	pkm
Transport 52	1.0	Car, short distance	Gasoline	20	km	5	226	4520	pkm
Transport 53	1.0	Bus	Diesel	10	km	5	226	2260	pkm
Transport 54	1.0	Car, long distance	Gasoline	80	km	5	226	18080	pkm
Transport 55	1.0	Car, short distance	Gasoline	20	km	5	226	4520	pkm
Transport 56	1.0	Walking	None	3	km	5	226	678	pkm
Transport 57	1.0	Car, short distance	Gasoline	30	km	5	226	6780	pkm
Transport 58	1.0	Bus, long distance	Diesel	40	km	5	226	9040	pkm
Transport 59	1.0	Train/tram	Electricity	6	km	5	226	1356	pkm
Transport 60	1.0	Train/tram	Electricity	6	km	5	226	1356	pkm
Transport 61	1.0	Train/tram	Electricity	6	km	5	226	1356	pkm
Transport 62	1.0	Train/tram	Electricity	10	km	5	226	2260	pkm
Transport 63	1.0	Bus	Diesel	6	km	5	226	1356	pkm
Transport 64	1.0	Bicycle	None	8	km	4	180.8	1446.4	pkm
Transport 65	1.0	Walking	None	2.6	km	5	226	587.6	pkm
Transport 66	1.0	Car, long distance	Gasoline	50	km	5	226	11300	pkm
Transport 67	1.0	Car, long distance	Gasoline	44	km	5	226	9944	pkm
Total for employees	67			3269.6	km	333.5	15352.8	477441.6	pkm

APPENDIX 4 TRANSPORTATION OF VISITORS FOR THE GÖTEBORG OPERA AND THE REGIONTEATER VÄST

Transportation table for the visitors for Plocka potäter i kostym									
	Type of vehicle	Distance km (back and forth)	Unit	How many persons in the vehicle	Unit	How many persons at the show	How many vehicles	Amount	Unit
Sätila Bygdegård (0301-42116)	Car	40	km	2	persons	166	83	3320	pkm
Saleby Bygdegård (0708-183732)	Car	20	km	2	persons	72	36	720	pkm
Hällekis Folkets hus (0510-540231)	Car	10	km	2	persons	30	15	150	pkm
Bokenäs Bygdegård (0709-51 7765)	Car	40	km	2	persons	60	30	1200	pkm
Töllsjö Ordenshus (033-287328)	Car	20	km	2	persons	142	71	1420	pkm
Calculated sum		130	km	10	persons	470	235	6810	pkm
Average distance per person								14.4893617	pkm/(one scene play/person

Transportation table for the visitors to Thais							
	Share	Person share	Distance km (back and forth)	Unit	People in the car	Amount	Unit
	100%	1	Data from average distances calculation tables				
Inside Gothenburg (51%)	**0.51**						
Car, short distance	0.40	0.2	17.0	km	2.0	1.7	pkm
Buss, short distance	0.30	0.2	17.0	km		2.6	pkm
Tram, short distance	0.30	0.2	17.0	km		2.6	pkm
Around Gothenburg (20%)	**0.20**						
Car, short distance	0.50	0.1	52.0	km	2.0	2.6	pkm
Buss, short distance	0.25	0.1	52.0	km		2.6	pkm
Tram/Commuter train, short distance	0.25	0.1	52.0	km		2.6	pkm
In the county (15%)	**0.15**						
Car, long distance	0.80	0.1	186.0	km	2.0	11.2	pkm
Buss, long distance	0.10	0.0	186.0	km		2.8	pkm
Train, long distance	0.10	0.0	186.0	km		2.8	pkm
In Sweden (14%)	**0.14**						
Car, long distance	0.40	0.1	494.3	km	2.0	13.8	pkm
Buss, long distance	0.30	0.0	494.3	km		20.8	pkm
Train, long distance	0.30	0.0	494.3	km		20.8	pkm
Total for car, short distance						4.3	pkm
Total for car, long distance						25.0	pkm
Total for bus, short distance						5.2	pkm
Total for bus, long distance						23.6	pkm
Total for tram/tommuter train, short distance						5.2	pkm
Total for train X2000, long distance						23.6	pkm

APPENDIX 5 GENERAL AND SPECIFIC ASSUMPTIONS FOR THE GÖTEBORG OPERA, THE REGIONTEATER VÄST AND THE T-SHIRT

General assumptions table for the Regionteater Väst and the Göteborg opera
Swedish average electricity production mix data is used (ELCD database electricity Sweden 2010).
The houses are assumed to be ordinary concrete buildings and last for 50 years.
A LCA of concrete is used for the building which have a functional unit of square meter floor area (Björklund, Jönsson and Tillman 1996). Then the total floor area in the theatre or in the opera is multiplied by the data in the concrete LCA to get the resources, emissions and wastes during the construction and demolition phase.
Average European drinking water data is used for the tap water (ELCD database 2010).
When steel is used for the theatre or opera, it is assumed to be hot rolled steel coil. (ELCD database steel hot rolled coil 2010).
If aluminum is used for the theatre or opera, it is assumed that the data from an extrusion profile will be suitable (ELCD database Aluminum extrusion profile 2010).
The electricity utilization in different processes, for example in wood and paper manufacturing which are inside the Swedish geographical border are considered under the Swedish characteristic technology mixture for electricity production. The corresponding emissions are calculated based on this mixture.
The burnable waste is incinerated with usage of Swedish average incineration data (Tillman 1999). For waste which is going to landfill, data is used for average landfill in Sweden (Tillman 1999). Recycling of paper uses a different approach. Office paper produced by 100% pure fibers, which is supplied by M-real and Husum pulp and paper mill, is used in the office. This paper is then recycled and manufactured as toilet paper in Katrinefors pulp and paper mill. Hence, the toilet paper is manufactured from 100% recycled fibers (Metsäliitto Group AB 2008). To be able to credit the LCA for recycling of office paper, an assumption is made that toilet paper is manufactured of pure fibers in Husum pulp and paper mill. Then the emissions from the fictive production of toilet paper in Husum pulp and paper mill are subtracted by the real production of toilet paper in Katrinefors pulp and paper mill.

General assumptions table for the Regionteater Väst and the Göteborg opera
There are no material losses during the stage performance phase.
When it is not possible to track the whole upstream flows in the flow charts or when suppliers do not share site specific data, average data are used from the ELCD database or the CPM database. Other LCA studies of similar products are also used.
The shortest ways for the transports are always chosen with GPS data (Eniro 2010). Hence, if the truck driver takes a longer way or chose another way for some reason it is not included in the study.
All transports on sea are assumed to take the shortest way by GPS data from a website which track distances between harbors' (Distances 2010). The only ship that is used in this study is a large one (Baumann and Tillman 2004).
The fuel which is used in the transport chain is purchased on an international market. Hence, the environmental impacts from the fuel chain are taken into account (Baumann and Tillman 2004).
For transportation with long distance truck, it is assumed that 70% of the load capacity is used. For short distances, it is assumed that 50% of the load capacity is used (Baumann and Tillman 2004).
Load capacity in trucks is limited by weight in all cases. Limitation for load by volume is not used.
When transport companies are not stated, the transport is with DHL. This company has a loading and unloading station in Gothenburg which the goods pass through.
For personnel transport, short distance is below 20 km and long distance above or equal to 20 km.
The usage of paper in the office is mainly considered. Usage of pens, pencils, tape, staples etc are not taken into consideration. They are assumed not to be the mayor environmental impact from the office.

General assumptions table for the Regionteater Väst and the Göteborg Opera
A price of 100 Swedish crowns is assumed for the T-shirt. The shopping time is assumed to be 3 hours.
The share between Cr3 and Cr6 in the waste water is 80% and 20% respectively(Laholms kommun 2008)
Inflows of energies/materials in the background system that do not fit in Table 2 in resource used are summarized in the inflows categories electricity, water (fresh), general energy, general materials and general radioactive materials.
Outflows from the background system are summarized in the corresponding outflows categories stated above.
Lots of materials which are used in the background system have not been possible to trace backwards to the cradle. Instead other LCA are used to simulate these background data. The reason why it is very hard to get site specific data is mainly due to wholesalers which have a confidential restriction about their distribution and supplier chain.

Specific assumptions table for the Regionteater Väst
Transportation to the plays in small villages for the public are assumed always to be according to private Swedish average cars with catalytic converters.
When second hand clothes are used, it is assumed that they have been used in an earlier production. Hence, the resource use and emissions are reduced by half compared to buying new fabrics. The system is credited for this by an assumption that the total amounts of fabrics are reduced by half compared to if the same amount of fabrics would be bought new.

Table for the background assumptions in the Regionteater Väst

Type of data from theatre	Assumption	Used data	Source
Birch Plywood	Use any kind of plywood	LCA Plywood USA	(Wilson & Sakimoto, 2006)
Drinking water	Use average data, water	ELCD water	(ELCD database drinking water, 2010)
Hairspray from Wella	Split it up, measure weight of aluminum and plastic. Assume polyester	ELCD database aluminum, LCA polyester	(ELCD database Aluminum extrusion profile, 2010) (Kalliala & Nousiainen, 1999)
Grumme kulörtvätt (detergent)	Use any kind of detergent	LCA detergents	(Widheden & Ringström, 2007)
Herdins Textile allfärg (color)	Use powder color	LCA powder color	(Axelsson, Widell, Jarnhammar, & Jernberg, 1999)
Clothes	Use only cotton	LCA cotton India	(Kalliala & Nousiainen, 1999)
Toilet/Kitchen paper	Use recycled paper from Katrinefors pulp and paper	Site specific data	(Metsäliitto Group, 2008)
X-mas trees in plastic	Use data for polyester plastic	LCA polyester	(Kalliala & Nousiainen, 1999)
Steel for X-mas trees	Use data for steel hot rolled coil	ELCD steel	(ELCD database steel hot rolled coil, 2010)
Aluminum to forge	Use aluminum, extruded profiles	ELCD aluminum	(ELCD database Aluminum extrusion profile, 2010)
Theater programs	Use data from the ordinary office paper	Site specific data from Husum pulp and paper mill	(Metsäliitto Group, 2008)
Letter of invitations			
Flyers			
Posters			
Tickets			

Table for transportation assumptions in the Regionteater Väst

Transport number	Assumptions	For what background data
8 to 9	Grafisk precision have been closed down. All these printed materials are assumed to be from this company. The paper are assumed to be from Husum pulp and paper mill	Theater programs
		Letter of invitations
		Flyers
		Posters
		Tickets
10 to 11	The transport will start at Herdins färgverk in Falun.	Herdins Textil allfärg (color)
31 to 33	The transports start in New Mangalore in India. Then reach Gothenburg harbor and will be transported with DHL.	Clothes
12	The transport start at Cederroths	Grumme kulörtvätt (detergent)
25 to 30	The transport starts in the harbor of Shanghai	X-mas trees in plastic
		Steel for X-mas trees
15	The transport starts in the middle of Germany from the point that Google map points out if Germany is typed in. Then it goes to Alumeco in Jönköping.	Aluminum to forge
24 to 25	Transport starts in Tallin harbor and travels by boat to Stockholm.	Birch Plywood
34 to 37	The hairspray is manufactured at Wella main factory in Darmstadt, Germany	Hairspray from Wella
38 to 46	All produced at Katrinefors pulp and paper mill. But different sub suppliers depending on what kind of paper	Toilet/Kitchen paper
47 to 49	Starts with transport from DiverseyLever in Stockholm	Soap for hands (No background data)
50 to 52	Transport starts from Cederroths in Falun	Soap for cleaning floor (No background data)
53 to 55	Transport starts from harbor in Dover	Detergent for kitcken (No background data)

Specific assumptions table for the Göteborg Opera
Emission data for district heating is from Göteborg Energi AB (Nilsson 2010).
Emission data for the waste water is from Ryaverket in Gothenburg (Davidsson 2008).
Every beer which is served is a Heineken beer.
Every glass of wine which is served is from France.
It is not possible to get data from the restaurant, except of how much money they spent on buying wine, beer and food. Hence, assumptions are made of an average wine price of 100 SEK, a beer price of 13 SEK, and how much beef, chicken, milk, etc it is possible to buy for the food budget in the restaurant (Kauffmann 2010).

Table over transportation assumptions for different scenarios in the Göteborg Opera	Base case: Assumptions of the different shares of the transportation between car, busses and train/trams	First scenario: The opera arranges Bus transportation for the clients, most of the buses go through the city but there are also buses outside the city	Seccond scenario: The car use increases because of lower cost of car and higher of public transportation	Third scenario: The tram and train use increases because of very expensive fuels and very cheap electricity
Inside Gothenburg (51%)	**0.51**	**0.51**	**0.51**	**0.51**
Car, short distance	0.40	0.20	0.80	0.10
Bus, short distance	0.30	0.70	0.10	0.10
Tram, short distance	0.30	0.10	0.10	0.80
Around Gothenburg (20%)	**0.20**	**0.20**	**0.20**	**0.20**
Car, short distance	0.50	0.30	0.70	0.15
Bus, short distance	0.25	0.50	0.10	0.10
Tram/Commuter train, short dis	0.25	0.20	0.20	0.75
In the county (15%)	**0.15**	**0.15**	**0.15**	**0.15**
Car, long distance	0.80	0.50	0.60	0.20
Bus, long distance	0.10	0.40	0.30	0.20
Train, long distance	0.10	0.10	0.10	0.60
In Sweden (14%)	**0.14**	**0.14**	**0.14**	**0.14**
Car, long distance	0.40	0.30	0.40	0.20
Bus, long distance	0.30	0.50	0.40	0.30
Train, long distance	0.30	0.20	0.20	0.50

Table for the background assumptions in the Göteborg Opera

Type of data from the opera	Assumption	Used data	Source
Drinking water	Use average data, water	ELCD water	(ELCD database drinking water, 2010)
Looking equipment in steel	Use data for steel hot rolled coil	ELCD steel	(ELCD database steel hot rolled coil, 2010)
Wire of steel	Use data for steel hot rolled coil	ELCD steel	(ELCD database steel hot rolled coil, 2010)
Tamp of plastic	Use polyester fibers	LCA polyester India	(Kalliala & Nousiainen, 1999)
Clothes, cotton	Use only cotton fibers	LCA cotton India	(Kalliala & Nousiainen, 1999)
Clothes, silk	Use only cotton fibers	LCA cotton India	(Kalliala & Nousiainen, 1999)
Clothes, polyester	Use only polyester fibers	LCA polyester India	(Kalliala & Nousiainen, 1999)
Leather	Use leather from India	LCA leather India	(Joseph & Nithya, 2009)
Aluminum	Use aluminum, extruded profiles	ELCD aluminum	(ELCD database Aluminum extrusion profile, 2010)
Plastic paint	Use water based paint	LCA paint	Jarnhammar, & Jernberg, 1999)
Deal wood in theatre chairs	Use only deal wood	Data from Moelven	(Andersson, 1996)
Birch Plywood	Use any kind of plywood	LCA Plywood	(Wilson & Sakimoto, 2006)
Cotton carpets	Use only cotton fibers	LCA cotton India	(Kalliala & Nousiainen, 1999)
PS plastic mirrors	Use PS granulate	ELCD PS granulate	(ELCD database PS granulate, 2010)
PC glass	Use PC granulate	ELCD PC granulate	(ELCD database PC granulate, 2010)
PP rope	Use PP granulate	ELCD PP granulate	(ELCD database PP granulate, 2010)
Office papers	All is ordinary and same type of paper	Husum pulp and paper mill	(Metsäliitto Group, 2008)
Opera programs for Thais General programs Letter of invitations Flyers Posters Drinking tickets Tickets	Use data from the ordinary office paper	Site specific data from Husum pulp and paper mill	(Metsäliitto Group, 2008)
Wine	All wine used is from France and the same type	LCA of wine production in France	(Gonzales, Klimchuk, & Martin, 2006)
Beer	All beer is a Heineken beer	LCA Heineken beer	(Heineken, 2008)
Rice	Use data for rice production in Thailand	LCA Rice	Paengjuntuek, Saikhwan, & Phungrassami, 2009)
Fish (Cod)	Use data for Cod catching	LCA of fish	(Ziegler, 2006)
Beef Milk Bread Potatoes Salad Fish (Cod)	Use data for production of these	LCA study of 7 food products	(Ahlmén, 2002)

Table for the transportation assumptions in the Göteborg opera

Transport number	Transportation assumptions	For what background data
3 to 4	All these printed materials are assumed to be from Billes printing company. The paper is assumed to be from Husum pulp and paper mill.	Marketing
1 to 2	All office paper comes from Husum pulp and paper mill	Office papers
5 to 7	All paint is from Nordsjö paint factory	Painting
10 to 15	All aluminum is produced in Germany. All steel in Oxelösund	Forge
16 to 19	All timber is from Södra Skogsägarna. All plywood from Estonia.	Carpentry
20 to 21	All steel comes from Oxelösund	Scenery
22 to 28	Transportation of cotton from India	Decor
29 to 31	Transport of PS plastic granulate from Stenungsund	
32 to 34	Transport of PC plastic granulate from Stenungsund	
35 to 37	Transport of PP plastic granulate from Stenungsund	
38 to 43	Transportation for Focutex AB (Polyester, Silk and Cotton from India)	Costume
44 to 47	Transportation of silk from China	
48 to 51	Transportation for Slipskungen AB (Leather from India)	
52 to 55	Transportation for Pierre Henriet (Cotton from India	
56 to 60	Transportation for Schneider & Wohlenberg (Aluminum from Germany, Cotton from India	
61 to 64	Transportation for Evelin Harren (Cotton from India)	
65 to 68	Transportation of silk from China	
69 to 72	Transportation for Ateljé Mode och Bröllop (Cotton India)	
73 to 77	Transportation for Alexander Harr (Leather and Polyester from India)	
78 to 81	Transportation for A.Walder & Cie) (Polyester fabrics from India)	
82 to 85	Transportation for Cavaliera AB (Polyester fabrics from India)	
86 to 89	Transportation for Cornelia JamesLTD (Polyester fabrics from India)	
90 to 95	Transportation of cotton from India	
96 to 99	Transportation of cotton from India	
100 to 102	Transportation of makeup from USA	Wig and Makeup
103 to 104	Transportation of makeup from USA	Building maintanace
105	Transportation of recycled paper	Waste management

T-shirt

To be able to compare the T-shirt with the stage performances, a basic assumption is made that the time spent while buying the T-shirt is the time of value that the client enjoys. This time is assumed to be 3 hours.

APPENDIX 6 ALLOCATION PROBLEMS FOR THE GÖTEBORG OPERA AND THE REGIONTEATER VÄST

Problem	Type of data from opera/theatre	Allocation problem	Solution
A	Electricity	How can electricity consumption be divided between plays when the measurement of electricity is stated for one year?	Multiply the electricity consumption with the time share that the production of the play consumes.
B	District heating	How can district heating consumption be divided between plays when the measurement of district heating is stated for one year?	Multiply the district heating consumption with the time share that the production of the play consumes.
C	Tap water	How can tap water consumption be divided between plays when the measurement of tap water is stated for one year?	Multiply the tap water consumption with the time share that the production of the play consumes.
D	Waste water	How can waste water be divided between plays when the measurement of waste water is stated for one year?	Multiply the waste water with the time share that the production of the play consumes.
E	Transportation that is not specifc for only a specfic play	How can transportation be divided between plays when the measurement of that transportation is stated for one year?	Multiply the transportation with the time share that the production of the play consumes.
F	Bought office products which is measured for a whole year	How can bought office products be divided between plays when they are not bought specifically for one play?	Multiply bought office products with the time share that the production of the play consumes.
G	Bought cleaning products which is measured for a whole year	How can bought cleaning products be divided between plays when they are not bought specifically for one play?	Multiply bought office products with the time share that the production of the play consumes.
H	Concrete building	How can the building be divided between plays when the lifte time is assumed to be 50 years?	Calculate the time share that the play will occupy in one year. Then calculate an average amount of plays which will be possible to produce in 50 years.
G	Waste incineration	How can the opera or the theater be credited for collecting waste to incinerate?	Use system expansion to credit the opera or the theater for heat generated by waste incineration.

APPENDIX 7 FOREGROUND DATA FOR THE REGIONTEATER VÄST

THEATER in UDDEVALLA

The forground (INFLOWS)	Inflow	Qualitative data (Information about it)	Amount (quantitative data) (E.g. numbers)	Units	Units related to the functional unit one sold ticket	
Building data						
Electricity usage	Inflow	75% used for the theater according to Rolf Mellberg	99750	kWh/year	25.20	MJ
District heating	Inflow	75% used for the theater according to Rolf Mellberg	90000	kWh/year	22.47	MJ
Water usage	Inflow	75% used for the theater according to Rolf Mellberg	501.75	m^3/year	0.03	m^3
Building area for the theater	Inflow	Correct value	3000	m^2	0.0042	m^2
Transportation for the tour						
Cars (gasoline with catalyst, long distance	Inflow	Used during the tour	7364.3	pkm	4.47	pkm
Train	Inflow	Used during the tour	170.8	pkm	0.10	pkm
Mercedes Benz truck (diesel)	Inflow	Used during the tour	9558000	kgkm	5803.28	kgkm
Visitor cars (gasoline with catalyst, short distance)	Inflow	Used by the visitors, OBS 470 instead of 1647 becaus	6810	pkm	14.49	pkm
Transportation with Olof's car						
Car, förmånsbil (gasoline)	Inflow	Used by the VD, Olof Lindqvist	18880	pkm/year	1.31	pkm
Wig and Makeup						
Hairspray without driving gas, Wella (Total weight)	Inflow	" Makeup artist Bim King" They tried to use as litte n	0.372	kg	0.00023	kg
Aluminum for the pressure tube		Measured weight	0.083	kg	0.00005	kg
Plastic cover (Assume Polyester)		Measured weight	0.009	kg	0.00001	kg
Total aluminum for wig and makeup					0.00005	kg
Total plastic for wig and makeup					0.00	kg
Costume						
New Cotton fabrics in cloth (density 0.215kg/m^2)	Inflow	Asume all is cotton fabrics, Asumme the density is the same as HP 100% cotton fabrik, dimension 1.4	11.2	m^2	0.0015	kg
New Cotton for own produced pants (density 0.215kg/m^2)	Inflow	meter width	4.2	m^2	0.0005	kg
Second hand Cotton fabrics in cloth (density 0.215kg/m^2)	Inflow	Assume second hand is used once befor and that all is Cotton. Hence, the environmental load will be	29.4	m^2	0.0038	kg
Total cotton for costume					0.0058	kg
Painting, Patination textile and laundry						
Grumme kulörtvätt, detergents	Inflow	Cederroth?? Köpt på Maxi stormarknad. Assume anc	1	kg	0.0006	kg
Herdins Textil allfärg	Inflow	Questioners, supplier Herdins	1	kg	0.0006	kg
Total detergents for painting, patination textile and laundry					0.0006	kg
Total color for painting, patination textile and laundry					0.0006	kg
Building maintanance (1 year)						
Toapapper Vendor (weight 0.35 kg)	Inflow	Questioners, Visab	192	rullar	0.0047	kg
Hushållspapper Katrin (weight 0.15 kg)	Inflow	Questioners, Visab	156	rullar	0.0016	kg
Papper för att torka händerna Abena (weight 0.4 kg)	Inflow	Questioners, Visab	192	rullar	0.0053	kg
Tvål påse, Fresh, Lever Line (0.6 kg) (ONLY TRANSPORT)	Inflow	Questioners, Visab	12	flaskor	0.0005	kg
Diskmedel YES, vanlig (ONLY TRANSPORT)	Inflow	Questioners, Visab,12 bottles a 0.5 liter	6.72	kg	0.0005	kg
Grumme Såpa (density 1035 kg/m^3) (ONLY TRANSPORT)	Inflow	Questioners, Visab	5	liter	0.0004	kg
Total recycled paper for building maintanance					0.01	kg
Total soap and detergents for building maintanance					0.00	kg
Carpentry						
Hyvlad gran o/s (95*95) 28 meter (density 380 kg/m^3, 18% Humidity)	Inflow	Träminuten Uddevalla, Bengt/Ove	0.2527	m^3	0.0583	kg
Råplan gran (45*120) 7 meter (density 380 kg/m^3, 18% Humidity)	Inflow	Träminuten Uddevalla, Bengt/Ove	0.0378	m^3	0.0087	kg
Finsågad gran (28*120) 31 meter (density 380 kg/m^3, 18% Humidity)	Inflow	Träminuten Uddevalla, Bengt/Ove	0.10416	m^3	0.0240	kg
Finsågad gran (28*120) 27 meter (density 380 kg/m^3, 18% Humidity)	Inflow	Beijer Byggmaterial Uddevalla, Anette Berglund	0.09072	m^3	0.0209	kg
Furu (33*69) 17 meter (density 480kg/m^3, 18% Humidity)	Inflow	Beijer Byggmaterial Uddevalla, Anette Berglund	0.038709	m^3	0.0113	kg
Furu (33*95) 7 meter ((density 480kg/m^3, 18% Humidity))	Inflow	Beijer Byggmaterial Uddevalla, Anette Berglund	0.021945	m^3	0.0064	kg
Björk plywood (4mm) 17 m^2 (density 585kg/m^3)	Inflow	Interwood Göteborg, Joakim Nyman	0.068	m^3	0.0242	kg
Total Wood for carpentry					0.1538	kg
Props						
Plastic trees (150cm,12 st, weight 2 kg, foot 0.5 kg steel)	Inflow	Data from the theater. Assume plastic is polyester.	24	kg	0.01	kg
Plastic trees (180cm, 4 st, weight 5.35 kg foot 0.5 kg steel)	Inflow	Data from the theater. Assume plastic is polyester.	21.4	kg	0.01	kg
Plastic trees (210cm, 4 st, weight 6.025 kg, foot 0.5 kg steel)	Inflow	Data from the theater. Assume plastic is polyester.	24.1	kg	0.01	kg
Plastic trees (240cm, 8 st, weight 6.7 kg, foot 0.5 kg steel)	Inflow	Data from the theater. Assume plastic is polyester.	53.6	kg	0.03	kg
Plastic flowers Geranium 35 cm, PG22 (2 st)	Inflow	Data from the theater, assume that there are 1/10 o	0.2	kg	0.00	kg
Steel feet to the X-mas trees	Inflow	Data from the theater, steel feet	14	kg	0.01	kg
Total plastic for props					0.07	kg
Total Steel for props					0.01	kg
Forge						
Aluminum (density 2700 kg/m^3)	Inflow	Data from the theater, bought from Stålcenter i Udd	104.9922	kg	0.0637	kg
Total aluminum for forge					0.064	kg
Office						
White paper A4, Nordic Office (0.08kg/m^2) (Area=0.06237 m^2)	Inflow	Data from Kenny, the caretaker, (Svanström grupper	10000	ark/year	0.0035	kg
Colored paper A4, Fashion (0.08kg/m^2) (Area=0.06237 m^2)	Inflow	Data from Kenny, the caretaker (Corporate Express !	5000	ark/year	0.0017	kg
White paper A3, Canon (0.08kg/m^2) (Area 0.12474 m^2)	Inflow	Data from faktura/invoice, Corporate Express, Borås	1250	ark/year	0.0009	kg
Theater Programs (weight 0.009 kg) (30cm x21 cm.)	Inflow	Company bankruptcy, Grafisk precision , transport by	1000	programs	0.0055	kg
Letter of invitations (weight 0.011 kg) (flyer 10.5mm x20.5 mm and en	Inflow	Company bankruptcy, Grafisk precision , transport by	200	etter invitation	0.0013	kg
Flyers weight (0.005 kg flyer 10.5 mm x20.5 mm)	Inflow	Company bankruptcy, Grafisk precision , transport by	5000	flyers	0.0152	kg
Posters (weight 0.035 kg)(60 cm x 30 cm)(28 kg total)	Inflow	Company bankruptcy, Grafisk precision , transport by	800	posters	0.0170	kg
Tickets(weight 0.007 kg) (7.3 cm x21 cm)	Inflow	Data from the theater. Assume all people print a tick	1647	Tickets/play	0.0070	kg

APPENDIX 8 FOREGROUND DATA FOR THE GÖTEBORG OPERA

Opera	Inflow	Category	Qualitative data	Amount (quantitative)	Unit	In units related to the functional unit	one sold ticket
		(E.g. resource use	(Information about it)	(E.g. numbers)			
INFLOWS							
Building data							
Electricity usage	Inflow	Resource use	Data from 2009. Multiplied with 1000 to get it in kWh	4171000	kWh/year	63.2320	MJ
District heating	Inflow	Resource use	Data from 2009, multiplied with 1000 to get it in kWh	1943000	kWh/year	27.4837	MJ
Water usage	Inflow	Resource use	Data from 2009	13417	m^3/year	0.0572	m^3
Building area for the theater	Inflow	Resource use	Area of the Opera (BTA)	30325	m^2	0.0026	m^2
Transportation by their own for this play							
Cars (gasoline with catalyst, short distance, hence <20 km)	Inflow	Resource use	Data year 200X for the whole Opera (WSP) Assume ca	2900	pkm	0.2249	pkm
Cars (gasoline with catalyst, long distance, hence <20 km)	Inflow	Resource use		0	pkm	0.0000	pkm
Train	Inflow	Resource use	No use of this	0	pkm	0.0000	pkm
Heavy distribution truck	Inflow	Resource use	Assume truck uses 3.5 liter/10 km. Assume the trucks	950000	kgkm	73.6834	kgkm
Mini-bus	Inflow	Resource use	Data year 200X for the whole Opera (WSP). Used for t	150	pkm	0.0116	pkm
Scenery							
Looking equipment in steel for the scene	Inflow	Resource use	8 times 1.5 kg steel (Supplier De-Sta-co)	12	kg	0.0009	kg
Wire of steel (density 7800 kg/m^3)	Inflow	Resource use	4 times 10 meter with diameter 3 mm (Supplier Certe	2.21	kg	0.0002	kg
Tamp of plastic	Inflow	Resource use	Assume polystyrene (density 1050 kg/m^3), 200 mete	16.49	kg	0.0013	kg
Total steel for scenery						0.0011	kg
Total plastic polyester fabric for scenery						0.0013	kg
Costume							
Cotton fabric (Focutex)	Inflow	Resource use	Bought from Focutex, Amtsgericht Augsburg	63.1	kg	0.0049	kg
Polyester fabric (Focutex)	Inflow	Resource use	Bought from Focutex, Amtsgericht Augsburg	2.01	kg	0.0002	kg
Silk fabric (Focutex)	Inflow	Resource use	Bought from Focutex, Amtsgericht Augsburg. Assume	4.24	kg	0.0003	kg
Silk fabric (New Rainbow)	Inflow	Resource use	Bought from New Rainbow, London. Assume and use	80.24	kg	0.0062	kg
Leather gloves (Slipskungen)	Inflow	Resource use	Bought from Slipskungen, Tyresö, Stockholm	0.72	kg	0.0001	kg
Cotton fabric (Pierre Henriet)	Inflow	Resource use	Bought from Pierre Henriet, Bergsbrunnsgatan 1C, Up	13.56	kg	0.0011	kg
Aluminium (Schneider & Wohlenberg)	Inflow	Resource use	Bought from Schneider & Wohlenberg, Friedrichsgabe	0.2	kg	0.00002	kg
Cotton fabric (Schneider & Wohlenberg)	Inflow	Resource use	Bought from Schneider & Wohlenberg, Friedrichsgabe	13.7	kg	0.0011	kg
Polyester fabric (Evelin Harren)	Inflow	Resource use	Bought from Evelin Harren, Boumannstrasse 77, Berli	5.9	kg	0.0005	kg
Silk paint (Creative company)	Inflow	Resource use	Bought from Creativ company, Hisingsgatan 30, Götel	4	kg	0.0003	kg
Silk fabric (Cloth house)	Inflow	Resource use	Bought from Cloth house, Berwick Street, London. As	1.1	kg	0.0001	kg
Silk fabric (Broadway Silks)	Inflow	Resource use	Bought from Broadway Silks London. Assume and use	42.42	kg	0.0033	kg
Cotton fabric (Ateljé Mode och Bröllop AB)	Inflow	Resource use	Bought from Ateljé Mode och Bröllop AB, Storgatan 1	1.12	kg	0.0001	kg
Polyester fabric (Alexander Harr)	Inflow	Resource use	Bought from Alexander Harr, Schubertstrasse 30, Rav	6.4	kg	0.0005	kg
Leather (Alexander Harr)	Inflow	Resource use	Bought from Alexander Harr, Schubertstrasse 30, Rav	0.08	kg	0.00001	kg
Polyester fabric (A.Walder & Cie)	Inflow	Resource use	Bought from 24, rue Auguste-Comte 690002 Lyon Fra	5.2092	kg	0.0004	kg
Cotton fabric (Cavaliera AB)	Inflow	Resource use	Bought from Cavaliera AB, Bäckeskogsgatan 2, Borås	3.28	kg	0.0003	kg
Cotton gloves (Cornelia James ltd)	Inflow	Resource use	Bought from Cornelia James LTD, Cliff industrial estat	0.5	kg	0.00004	kg
Cotton fabric (Nanso Group Oy)	Inflow	Resource use	Bought from Nanso group oy, Nokia Finland	3	kg	0.0002	kg
Cotton gloves (Tailor Konfektion)	Inflow	Resource use	Bought from Tailor Konfektion, Källbäcksrydsgatan 5.	1.8	kg	0.0001	kg

Opera	Inflow	Category	Qualitative data	Amount (quantitative)	Unit	In units related to the functional unit	one sold ticket
		(E.g. resource use	(Information about it)	(E.g. numbers)			
Cotton fabrics	Inflow	Resource use	Asume all is cotton fabrics, Asumme the density is the	99.66	kg	0.0077	kg
Polyester fabrics	Inflow	Resource use		19.5192	kg	0.0015	kg
Silk fabrics	Inflow	Resource use		128	kg	0.0099	kg
Leather	Inflow	Resource use		0.8	kg	0.0001	kg
Aluminium	Inflow	Resource use		0.2	kg	0.00002	kg
Total fabrics for costume						0.0192	kg
Painting							
Plastic paint (Akzo Nobel)	Inflow	Resource use	Akzo Nobel, 205 17 Malmö	516.1	kg	0.0400	kg
Plastic paint (Haussmann)	Inflow	Resource use	Siek, Mannhagen 2, Hamburg, Germany	65	kg	0.0050	kg
Total tape for painting						0.0029	kg
Total paint for painting						0.0451	kg
Building maintanance (1 year)							
Toilet paper (266*6)	Inflow	Resource use	Weight 1.33 kg (SCA)	2138.64	kg	0.0091	kg
Express paper (260*12)	Inflow	Resource use	Weight 0.37 kg (SCA)	1154.4	kg	0.0049	kg
Minitork paper for hands (288*12*0.62)	Inflow	Resource use	Weight 0.620 kg (SCA)	2142.72	kg	0.0091	kg
Total recycled paper for building maintanance						0.0232	kg
Total soap for building maintanance						0.0026	kg
Carpenter							
Old Theater chairs in deal	Inflow	Resource use	From Örebro. Assumed weight 7 kg, 75 chairs. They a	262.5	kg	0.0204	kg
Deal bar order (density 480kg/m^3, 18% Humidity)	Inflow	Resource use	Holgers Stugmaterial, Borås	2.05164	m^3	0.0764	kg
Deal shaved (density 480kg/m^3, 18% Humidity)	Inflow	Resource use	Holgers Stugmaterial, Borås	0.69876	m^3	0.0260	kg
Birch/deal plywood (density 585kg/m^3)	Inflow	Resource use	Holgers Stugmaterial, Borås	8.7127456	m^3	0.3953	kg
Total carpenter materials						0.5200	kg
Decor							
Cotton fabrics and carpets (Ilmonte AB)	Inflow	Resource use	Ilmonte AB, Nattflyvägen 7, Åled (Halmstad)	74.37363	kg	0.0058	kg
PS Plastic miror gold and dark silver (2100 X 1000 X 2, Andrén & Söner)	Inflow	Resource use	Andrén & Söner, Exportgatan 63, Hisings backa	40.41	kg	0.0031	kg
PS Plastic miror gold and dark silver (2100 X 1000 X 2, Glasfiber och Plastprodukter AB)	Inflow	Resource use	Glasfiber och Plastprodukter AB, Magasinsgatan 16, K	140.112	kg	0.0109	kg
PC Glass (Glasfiber och Plastprodukter AB)	Inflow	Resource use	Glasfiber och Plastprodukter AB, Magasinsgatan 16, K	8450.46	kg	0.6554	kg
PP Rope in plastic (Poly Produkter AB)	Inflow	Resource use	Poly produkter AB, Magasinsgatan 16, Kungsbacka	390.6	kg	0.0303	kg
Cotton fabrics, Curtain with printed art	Inflow	Resource use	Big Image Systems, Pontongränd 3, Täby. Area=10*20	57.14	kg	0.0044	kg
Total cotton fabrics for decor						0.0102	kg
Total plastic for decor						0.6997	kg
Forge							
Aluminum (Grimmereds verkstad AB)	Inflow	Resource use	Bought from Grimmereds verkstad, Frölunda	7.776	kg	0.0006	kg
Aluminum (HJM-Ett Stena Stålföretag AB)	Inflow	Resource use	Bought from HJM, Gothenburg	390	kg	0.0302	kg
Aluminum (Metallservice AB)	Inflow	Resource use	Bought from Metallservice AB, Järnmalsgatan 3	87	kg	0.0067	kg
Steel (HJM-Ett Stena Stålföretag AB)	Inflow	Resource use	Bought from HJM, Gothenburg	3450	kg	0.2676	kg

Opera	Inflow	Category	Qualitative data	Amount (quantitative)	Unit	In units related to the functional unit	one sold ticket
		(E.g. resource use	(Information about it)	(E.g. numbers)			
Total aluminum for forge						0.0376	kg
Total steel for forge						0.2676	kg
Office (1 year)							
Office papers	Inflow	Resource use	Bought from Ricoh Sverige AB	5069	kg	0.0216	kg
Total paper for office						0.0216	kg
Marketing (1 year)							
Opera program for Thais (0.155 kg, around 50 pages)	Inflow	Resource use	Divide by the total sold tickets.	775	kg	0.0601	kg
General programs (60000 copies, 0.234 kg)	Inflow	Resource use	Allocate these to the time share of the production for	14040	kg	0.0599	kg
Letters for invitations (500 copies, 0.017 kg)	Inflow	Resource use	Divide by the total sold tickets.	8.5	kg	0.0007	kg
Flyers (5000 copies 0.002 kg)	Inflow	Resource use	Divide by the total sold tickets.	10	kg	0.0008	kg
Posters (0.038 kg, 800 copies)	Inflow	Resource use	Divide by the total sold tickets.	38.4	kg	0.0030	kg
Drinking tickets (100 copies 0.0005 kg)	Inflow	Resource use	Divide by the total sold tickets.	0.005	kg	0.0000004	kg
Tickets (0.001 kg 60% of visitors buy ordinary tickets)	Inflow	Resource use	Assume everyone buy a ticket in some way	12.893	kg	0.0010	kg
Total paper for marketing						0.1254	kg
Restaurant (1 year inclusive transport to the costumer according to LCA:s)			Total for food: 3960209 SEK, Total wine 1190874 SEK, Total Beer 102206 SEK. They serve 228544 luch/dinners during 2009. 150 opera dinners each play. Calculate with 150 times 355 to also cover the lunches that is served during the day. This will lead to 54750 dinners. Every fourth person is eating Beef, Fish etc.				
Beef	Inflow	Resource use	Beef bought for maximum 700000 SEK, 258.6 SEK/kg.	2566	kg	0.0109	kg
Milk	Inflow	Resource use	Calculate with 0.1 liter/dinner. Price 7 SEK. Source: Je	5475	liter	0.0234	liter
Bread	Inflow	Resource use	Calculate with 0.045kg/dinner. Bread 1.5 SEK/person.	2464	kg	0.0105	kg
Potatoes	Inflow	Resource use	0.13 kg potatos/person. Calculate with every fourth d	1779	kg	0.0076	kg
Salad	Inflow	Resource use	Calculate with 0.050 kg/dinner. Source: Jennie Kauffm	2738	kg	0.0117	kg
Beer	Inflow	Resource use	Restaurant buy for 13 SEK/0.5 liter beer. Sell for at lea	4000	liter	0.0171	liter
Wine	Inflow	Resource use	Restaurant buy for 100 SEK. Sell for at least 3 times th	9000	liter	0.0384	liter
Fish (Cod)	Inflow	Resource use	0.14 kg/dinner. Every fourth dinner is with fish. Losse	2395	kg	0.0102	kg
Rice	Inflow	Resource use	Calculate with 0.1 kg/dinner. Assume one fourth of al	1369	kg	0.0058	kg
Total food and drink for restaurant						0.1195	kg/liter
Sum up of total inflows						1.8972	kg
OUTFLOW							
Waste management							
Burnable waste	Outflow	Waste	Renova, every week. From building + store. Data from	111540	kg/year	0.4758	kg
Paper and packaging	Outflow	Waste	Recycled by IL, every two week. Data from WSP, 2002	7576	kg/year	0.0323	kg

APPENDIX 9 BACKGROUND DATA FOR THE REGIONTEATER VÄST

Theater in Uddevalla	Normalized per activity						Normalized per functional unit					
	Inflow	Amount	Unit	Outflow	Amount	Unit	Inflow	Amount	Unit	Outflow	Amount	Unit
LCA steel X-mas trees	Inflow			Outflow	1	kg	Inflow			Outflow	0.01	kg/ (one sold ticket)
Resource used												
Iron (Fe)	Inflow	0.289930191	kg	Outflow	0.0000865	kg	Inflow	0.002464495	kg	Outflow	7.35275E-07	kg
Crude oil (42.3MJ/kg)	Inflow	0.024458544	kg				Inflow	0.000207905	kg			
Natural gas (44.1MJ/kg) (0.8	Inflow	0.05721576	m^3				Inflow	0.000571363	m^3			
Hard coal (26.3 MJ/kg)	Inflow	0.235476221	kg				Inflow	0.002001619	kg			
Water (fresh)	Inflow	8.831673318	kg				Inflow	0.075071904	kg			
General materials	Inflow	0.200341245	kg	Outflow	0.518635517	kg	Inflow	0.001702961	kg	Outflow	0.004408559	kg
Global Warming												
CO2				Outflow	0.897669319	kg				Outflow	0.007630462	kg
CH4				Outflow	0.000704623	kg				Outflow	5.98951E-06	kg
N2O				Outflow	4.73E-05	kg				Outflow	4.02064E-07	kg
Acidification												
SO2 (Sulfur dioxide)				Outflow	0.001067487	kg				Outflow	9.07395E-06	kg
HCl (Hydrogen chloride)				Outflow	0.0000341	kg				Outflow	2.8985E-07	kg
NOx				Outflow	0.00135966	kg				Outflow	1.15575E-05	kg
NH3 (Ammonia)				Outflow	0.0000288	kg				Outflow	2.44809E-07	kg
Eutrophication												
PO4 (-3) (Phosphate)				Outflow	1.54289E-05	kg				Outflow	1.3115E-07	kg
NOx				Outflow	0.00135966	kg				Outflow	1.15575E-05	kg
NH3 (Ammonia)				Outflow	0.0000288	kg				Outflow	2.44809E-07	kg
COD (Chemical Oxygen Demand)				Outflow	0.000209306	kg				Outflow	1.77915E-06	kg
Office Paper Husum paper mill (Office)				Outflow	1	kg				Outflow	0.05	kg/ (one sold ticket)
Resource used												
Fossil energy	Inflow	0.651968504	MJ				Inflow	0.033927776	MJ			
Electricity	Inflow	3.582992126	MJ				Inflow	0.186455255	MJ			
General energy	Inflow	21.1480315	MJ				Inflow	1.100521987	MJ			
General materials				Outflow	0.068566929	kg				Outflow	0.003568153	kg
Global Warming												
CO2				Outflow	0.183089764	kg				Outflow	0.009527805	kg
Acidification												
SO2 (Sulfur dioxide)				Outflow	0.000897638	kg				Outflow	4.67122E-05	kg
NOx				Outflow	0.002233071	kg				Outflow	0.000116207	kg
Eutrophication												
P				Outflow	3.30709E-05	kg				Outflow	1.72097E-06	kg
NOx				Outflow	0.002233071	kg				Outflow	0.000116207	kg
N				Outflow	0.000299213	kg				Outflow	1.55707E-05	kg
COD (Chemical Oxygen Demand)				Outflow	0.015587402	kg				Outflow	0.000863191	kg
LCA Aluminum extruded profiles (forge)				Outflow	1	kg				Outflow	0.06	kg/ (one sold ticket)
Resource used												
Aluminum ore (Bauxite)	Inflow	0.612801389	kg	Outflow	1.18395E-05	kg	Inflow	3.91E-02	kg	Outflow	7.54737E-07	kg
Iron (Fe)	Inflow	0.003105135	kg	Outflow	0.000422706	kg	Inflow	1.98E-04	kg	Outflow	2.69464E-05	kg
Uranium (504000MJ/kg)	Inflow	1.97238E-05	kg				Inflow	1.26E-06	kg			
Crude oil (42.3MJ/kg)	Inflow	0.129378488	kg				Inflow	8.25E-03	kg			
Natural gas (44.1MJ/kg) (0.8	Inflow	0.374381415	m^3				Inflow	2.39E-02	m^3			
Hard coal (26.3 MJ/kg)	Inflow	0.210953754	kg				Inflow	1.34E-02	kg			
Brown coal (Lignite) (11.9MJ	Inflow	0.193983799	kg				Inflow	1.24E-02	kg			
Water (fresh)	Inflow	5.072749249	kg				Inflow	3.23E-01	kg			
General energy	Inflow	6.830406879	MJ	Outflow	16.08884624	MJ	Inflow	4.35E-01	MJ	Outflow	1.025624385	MJ
General materials	Inflow	4.087082994	kg	Outflow	4.390868392	kg	Inflow	2.61E-01	kg	Outflow	0.279907063	kg
General radioactive materials				Outflow	0.003570046	kg				Outflow	0.000227582	kg
Global Warming												
CO2	Inflow	0.065217521	kg	Outflow	2.212053493	kg	Inflow	4.16E-03	kg	Outflow	0.141012971	kg
CH4				Outflow	0.004190282	kg				Outflow	0.00026712	kg
N2O				Outflow	4.21E-02	kg				Outflow	0.002685914	kg
SF6 (Sulfur hexa fluoride)				Outflow	1.89209E-09	kg				Outflow	1.20615E-10	kg
CFC-11				Outflow	1.30194E-07	kg				Outflow	8.29955E-09	kg
CFC-12				Outflow	2.79918E-08	kg				Outflow	1.78441E-09	kg
CFC-13				Outflow	1.75762E-08	kg				Outflow	1.12044E-09	kg
CFC-114				Outflow	1.33331E-07	kg				Outflow	8.49955E-09	kg
HCFC-22				Outflow	3.05957E-08	kg				Outflow	1.9504E-09	kg
Acidification												
SO2 (Sulfur dioxide)				Outflow	0.007418884	kg				Outflow	0.000472936	kg
HCl (Hydrogen chloride)				Outflow	9.77926E-05	kg				Outflow	6.23404E-06	kg
HF (Hydrogen fluoride)				Outflow	8.24275E-05	kg				Outflow	5.25455E-06	kg
NOx				Outflow	0.003816727	kg				Outflow	0.000243307	kg
NH3 (Ammonia)				Outflow	4.59617E-05	kg				Outflow	2.92995E-06	kg
Ammonia to ECO 99H												
NH3 air (Ammonia)				Outflow	1.03589E-05	kg				Outflow	6.60351E-07	kg
Eutrophication												
PO4 (-3) (Phosphate)				Outflow	1.6831E-05	kg				Outflow	1.07293E-06	kg
NOx				Outflow	0.003816727	kg				Outflow	0.000243307	kg
NH3 (Ammonia)				Outflow	4.59617E-05	kg				Outflow	2.92995E-06	kg
NH4+ (Ammonium)				Outflow	-4.04953E-07	kg				Outflow	-2.58148E-08	kg
NO3- (Nitrate)				Outflow	3.63493E-05	kg				Outflow	2.31718E-06	kg
COD (Chemical Oxygen Demand)				Outflow	0.00041098	kg				Outflow	2.6199E-05	kg
Wood - Moelven Furu (Carpenter)				Outflow	1	kg				Outflow	0.02	kg/ (one sold ticket)

Theater in Uddevalla	Normalized per activity						Normalized per functional unit					
	Inflow	Amount	Unit	Outflow	Amount	Unit	Inflow	Amount	Unit	Outflow	Amount	Unit
Resource used												
Iron (Fe)	Infow	0.000625	kg				Inflow	1.10481E-05	kg			
Crude oil (42.3MJ/kg)	Infow	0.012559102	kg				Inflow	0.000222006	kg			
Electricity	Infow	0.802083333	MJ				Inflow	0.014178379	MJ			
General energy	Infow	2.395833333	MJ				Inflow	0.042351002	MJ			
Global Warming												
CO2				Outflow	0.039229167	kg				Outflow	0.000693452	kg
Acidification												
NOx				Outflow	0.000958333	kg				Outflow	1.69404E-05	kg
Eutrophication												
NOx				Outflow	0.000958333	kg				Outflow	1.69404E-05	kg
Wood - Moelven Gran (Carpenter)				Outflow	1	kg				Outflow	0.11	kg/ (one sold ticket)
Resource used												
Iron (Fe)	Infow	0.000789474	kg				Inflow	8.84117E-05	kg			
Crude oil (42.3MJ/kg)	Infow	0.015864128	kg				Inflow	0.001776594	kg			
Electricity	Infow	1.013157895	MJ				Inflow	0.113461627	MJ			
Generel energy	Infow	3.026315789	MJ				Inflow	0.338911354	MJ			
General materials				Outflow	0.007723684	kg				Outflow	0.000864961	kg
Global Warming												
CO2				Outflow	0.049552632	kg				Outflow	0.005549305	kg
Acidification												
NOx				Outflow	0.001210526	kg				Outflow	0.000135565	kg
Eutrophication												
NOx				Outflow	0.001210526	kg				Outflow	0.000135565	kg
LCA Cotton bleaced 100% fabric production (Costume				Outflow	1	kg				Outflow	0.01	kg/ (one sold ticket)
Resource used												
Uranium (504000MJ/kg)	Infow	5.54E-05	kg				Inflow	3.23391E-07	kg			
Crude oil (42.3MJ/kg)	Infow	0.67	kg				Inflow	0.0039183	kg			
Natural gas (44.1MJ/kg) (0.83	Infow	0.746987952	kg				Inflow	0.004368542	m^3			
Hard coal (26.3 MJ/kg)	Infow	0.92	kg				Inflow	0.005380352	kg			
Fossil energy	Infow	59.8	MJ				Inflow	0.34972289	MJ			
Electricity	Infow	34.6	MJ				Inflow	0.202348027	MJ			
Water (fresh)	Infow	26100	kg				Inflow	152.6382514	kg			
Global Warming												
CO2				Outflow	6.548	kg				Outflow	0.038294072	kg
CH4				Outflow	0.013	kg				Outflow	7.60267E-05	kg
Acidification												
SO2 (Sulfur dioxide)				Outflow	6.30E-03	kg				Outflow	3.68437E-05	kg
NOx				Outflow	0.0302	kg				Outflow	0.000176616	kg
Eutrophication												
P				Outflow	5.20E-05	kg				Outflow	3.04107E-07	kg
NOx				Outflow	0.0302	kg				Outflow	0.000176616	kg
N				Outflow	4.00E-06	kg				Outflow	2.33928E-08	kg
COD (Chemical Oxygen Demand)				Outflow	0.0133	kg				Outflow	7.77812E-05	kg
LCA polyester for X-mas (Props)				Outflow	1	kg				Outflow	0.07	kg/ (one sold ticket)
Resource used												
Crude oil (42.3MJ/kg)	Infow	0.41	kg				Inflow	0.030693989	kg			
Natural gas (44.1MJ/kg) (0.83	Infow	0.43373494	m^3				Inflow	0.032470867	m^3			
Hard coal (26.3 MJ/kg)	Infow	0.14	kg				Inflow	0.010480874	kg			
Fossil energy	Infow	82.2	MJ				Inflow	6.153770492	MJ			
Electricity	Infow	15.2	MJ				Inflow	1.137923497	MJ			
Water (fresh)	Infow	17.2	kg				Inflow	1.287650273	kg			
Global Warming												
CO2				Outflow	2.31	kg				Outflow	0.172934426	kg
CH4				Outflow	0.0001	kg				Outflow	7.48634E-06	kg
Acidification												
SO2 (Sulfur dioxide)				Outflow	0.0002	kg				Outflow	1.49727E-05	kg
NOx				Outflow	0.0194	kg				Outflow	0.00145235	kg
Eutrophication												
NOx				Outflow	0.0194	kg				Outflow	0.00145235	kg
COD (Chemical Oxygen Demand)				Outflow	0.0032	kg				Outflow	0.000239563	kg
LCA Plywood (Carpenter)		585	kg	Outflow	1	kg					0.02	kg/ (one sold ticket)
Resource used												
Uranium (504000MJ/kg)	Infow	3.33401E-08	kg				Inflow	8.05264E-10	kg			
Crude oil (42.3MJ/kg)	Infow	0.010870663	kg	Outflow	2.15385E-05	kg	Inflow	0.000262559	kg	Outflow	5.20219E-07	kg
Natural gas (44.1MJ/kg) (0.83	Infow	0.040910196	m^3				Inflow	0.000988104	m^3			
Hard coal (26.3 MJ/kg)	Infow	0.008449514	kg				Inflow	0.000204081	kg			
Electricity	Infow	0.532581197	MJ				Inflow	0.012863437	MJ			
General energy	Infow	2.64957265	MJ				Inflow	0.063995143	MJ			
General materials				Outflow	0.01517094	kg				Outflow	0.000390577	kg
Global Warming												
CO2				Outflow	0.068205128	kg				Outflow	0.001647359	kg
CH4				Outflow	0.000186325	kg				Outflow	4.5003E-06	kg
Acidification												
NOx				Outflow	0.000569231	kg				Outflow	1.37486E-05	kg

Theater in Uddevalla	Normalized per activity						Normalized per functional unit					
	Inflow	Amount	Unit	Outflow	Amount	Unit	Inflow	Amount	Unit	Outflow	Amount	Unit
Eutrophication												
NO_x				Outflow	0.000569231	kg				Outflow	1.37486E-05	kg
COD (Chemical Oxygen Demand)				Outflow	1.45325E-05	kg				Outflow	3.53418E-07	kg
Metsä toilet/kitchen paper (Building maintanance)				Outflow	1	kg				Outflow	0.01	kg/ (one sold ticket)
Resource used												
Fossil energy	Inflow	3	MJ				Inflow	3.48E-02	MJ			
Electricity	Inflow	5.4	MJ				Inflow	6.27E-02	MJ			
General energy	Inflow	4.741935484	MJ				Inflow	5.51E-02	MJ			
General materials				Outflow	0.012854839	kg				Outflow	1.49E-04	kg
Global Warming												
CO_2				Outflow	0.204322581	kg				Outflow	2.37E-03	kg
Acidification												
SO_2 (Sulfur dioxide)				Outflow	1.40323E-05	kg				Outflow	1.63E-07	kg
NO_x				Outflow	0.000354839	kg				Outflow	4.12E-06	kg
Eutrophication												
P				Outflow	4.67742E-06	kg				Outflow	5.43E-08	kg
NO_x				Outflow	0.000354839	kg				Outflow	4.12E-06	kg
N				Outflow	0.000193548	kg				Outflow	2.25E-06	kg
COD (Chemical Oxygen Demand)				Outflow	0.003112903	kg				Outflow	3.62E-05	kg

Theater in Uddevalla	Normalized per activity						Normalized per functional unit					
	Inflow	Amount	Unit	Outflow	Amount	Unit	Inflow	Amount	Unit	Outflow	Amount	Unit
Toilet paper from new fibres, Husum paper mill				Outflow	1	kg					3.62E-02	kg/ (one sold ticket)
Resource used												
Fossil energy	Inflow	0.651968504	MJ				Inflow	0.023592789	MJ			
Electricity	Inflow	3.582992126	MJ				Inflow	0.12965776	MJ			
General energy	Inflow	21.1480315	MJ				Inflow	0.765283957	MJ			
General materials				Outflow	0.068566929	kg				Outflow	0.002481232	kg
Global Warming												
CO_2				Outflow	0.183089764	kg				Outflow	0.006625471	kg
Acidification												
SO_2 (Sulfur dioxide)				Outflow	0.000897638	kg				Outflow	3.24828E-05	kg
NO_x				Outflow	0.002233071	kg				Outflow	8.08082E-05	kg
Eutrophication												
P				Outflow	3.30709E-05	kg				Outflow	1.19674E-06	kg
NO_x				Outflow	0.002233071	kg				Outflow	8.08082E-05	kg
N				Outflow	0.000299213	kg				Outflow	1.08276E-05	kg
COD (Chemical Oxygen Demand)				Outflow	0.015587402	kg				Outflow	0.000600248	kg
fibres, Katrinefors paper mill				Outflow	1	kg				Outflow	3.62E-02	kg/ (one sold ticket)
Resource used												
Fossil energy	Inflow	3	MJ				Inflow	1.09E-01	MJ			
Electricity	Inflow	5.4	MJ				Inflow	1.95E-01	MJ			
General energy	Inflow	4.741935484	MJ				Inflow	1.72E-01	MJ			
General materials				Outflow	0.012854839	kg				Outflow	4.65E-04	kg
Global Warming												
CO_2				Outflow	0.204322581	kg				Outflow	7.39E-03	kg
Acidification												
SO_2 (Sulfur dioxide)				Outflow	1.40323E-05	kg				Outflow	5.08E-07	kg
NO_x				Outflow	0.000354839	kg				Outflow	1.28E-05	kg
Eutrophication												
P				Outflow	4.67742E-06	kg				Outflow	1.69E-07	kg
NO_x				Outflow	0.000354839	kg				Outflow	1.28E-05	kg
N				Outflow	0.000193548	kg				Outflow	7.00E-06	kg
COD (Chemical Oxygen Demand)				Outflow	0.003112903	kg				Outflow	1.13E-04	kg
Sweden (Organic municipal solid waste)	Inflow	1	kg				Inflow	0.01563362	kg/ (one sold ticket)			
Resource used												
Electricity				Outflow	2.25	MJ				Outflow	0.035175644	MJ
General energy				Outflow	4.95	MJ				Outflow	0.077386417	MJ
Global Warming												
CO_2				Outflow	9.13E-01	kg				Outflow	0.014273495	kg
Acidification												
SO_2 (Sulfur dioxide)				Outflow	2.40E-04	kg				Outflow	3.75207E-06	kg
HCl (Hydrogen chloride)				Outflow	0.000247	kg				Outflow	3.8615E-06	kg
NO_x				Outflow	5.49E-03	kg				Outflow	8.58286E-05	kg
NH_3 (Ammonia)	Inflow	0.00215	kg				Inflow	3.36123E-05	kg			
Eutrophication												
NO_x				Outflow	5.49E-03	kg				Outflow	8.58286E-05	kg
Deponi (No landfill gas extraction)	Inflow	1	kg				Inflow		kg/ (one sold ticket)			
Resource used												
Iron (Fe)				Outflow	1.00E-04	kg				Outflow		kg
Global Warming												
CH_4				Outflow	0.158	kg				Outflow		kg

Theater in Uddevalla	Normalized per activity						Normalized per functional unit					
	Inflow	Amount	Unit	Outflow	Amount	Unit	Inflow	Amount	Unit	Outflow	Amount	Unit
LCA electricity Sweden 230V	Inflow			Outflow	1	MJ	Inflow			Outflow	25.20	MJ/ (one sold ticket)
Resource used												
Aluminum ore (Bauxite)	Inflow	1.5887E-06	kg	Outflow	2.13E-06	kg	Inflow	5.01246E-05	kg	Outflow	5.36E-05	kg
Iron (Fe)	Inflow	1.87245E-05	kg	Outflow	2.99E-06	kg	Inflow	0.000471946	kg	Outflow	7.53E-05	kg
Uranium (504000MJ/kg)	Inflow	3.62E-06	kg				Inflow	9.12412E-05	kg			
Crude oil (42.3MJ/kg)	Inflow	0.001319776	kg				Inflow	0.033264612	kg			
Natural gas (44.1MJ/kg) (0.83 kg/N	Inflow	0.000811205	m^3				Inflow	0.02044622	m^3			
Hard coal (26.3 MJ/kg)	Inflow	0.003122605	kg				Inflow	0.078704469	kg			
Brown coal (Lignite) (11.9MJ/kg)	Inflow	0.000495647	kg				Inflow	0.012492645	kg			
Electricity	Inflow	0.737806402	MJ				Inflow	18.59622317	MJ			
Water (fresh)	Inflow	0.272742914	kg				Inflow	6.874415945	kg			
General energy	Inflow	1.06602E-05	MJ				Inflow	0.000268688	MJ			
General materials				Outflow	3.69E-02	kg				Outflow	9.31E-01	kg
General radioactive materials				Outflow	6.58E-04	kg				Outflow	1.66E-02	kg
Global Warming												
CO_2	Inflow	0.008775455	kg	Outflow	2.99E-02	kg	Inflow	0.221183113	kg	Outflow	7.53E-01	kg
CH_4				Outflow	2.31E-05	kg				Outflow	5.83E-04	kg
N_2O				Outflow	4.65E-07	kg				Outflow	1.17E-05	kg
SF_6 (Sulfur hexa fluoride)				Outflow	2.00E-11	kg				Outflow	5.03E-10	kg
CFC-11				Outflow	2.40E-08	kg				Outflow	6.04E-07	kg
CFC-12				Outflow	5.15E-09	kg				Outflow	1.30E-07	kg
CFC-13				Outflow	3.23E-09	kg				Outflow	8.15E-08	kg
CFC-114				Outflow	2.45E-08	kg				Outflow	6.18E-07	kg
HCFC-22				Outflow	5.63E-09	kg				Outflow	1.42E-07	kg
Acidification												
SO_2 (Sulfur dioxide)				Outflow	3.02E-05	kg				Outflow	7.61E-04	kg
HCl (Hydrogen chloride)				Outflow	5.90E-07	kg				Outflow	1.49E-05	kg
HF (Hydrogen fluoride)				Outflow	2.72E-08	kg				Outflow	6.85E-07	kg
NO_x				Outflow	3.81E-05	kg				Outflow	9.61E-04	kg
NH_3 (Ammonia)				Outflow	1.25E-06	kg				Outflow	3.15E-05	kg
Ammonia to ECO 95H												
NH_3 air (Ammonia)				Outflow	1.77E-07	kg				Outflow	4.46E-06	kg
Eutrophication												
PO_4 (-3) (Phosphate)				Outflow	6.32E-08	kg				Outflow	1.59E-06	kg
NO_x				Outflow	3.81E-05	kg				Outflow	9.61E-04	kg
NH_3 (Ammonia)				Outflow	1.25E-06	kg				Outflow	3.15E-05	kg
NH_4^+ (Ammonium)				Outflow	8.26E-13	kg				Outflow	2.08E-11	kg
NO_3^- (Nitrate)				Outflow	7.29E-07	kg				Outflow	1.84E-05	kg
COD (Chemical Oxygen Demand)				Outflow	5.62E-06	kg				Outflow	1.42E-04	kg
LCA VVS drinking water				Outflow	1	m^3				Outflow	0.03	m^3/ (one sold ticket)
Resource used												
Aluminum ore (Bauxite)	Inflow	0.013999377	kg	Outflow	5.48E-07	kg	Inflow	0.00048741	kg	Outflow	1.91E-08	kg
Iron (Fe)	Inflow	0.00351646	kg	Outflow	3.64E-05	kg	Inflow	0.000122431	kg	Outflow	1.27E-06	kg
Crude oil (42.3MJ/kg)	Inflow	0.012573264	kg				Inflow	0.000437758	kg			
Natural gas (44.1MJ/kg) (0.83 kg/N	Inflow	0.038229655	m^3				Inflow	0.001331025	m^3			
Hard coal (26.3 MJ/kg)	Inflow	0.027839012	kg				Inflow	0.000969258	kg			
Brown coal (Lignite) (11.9MJ/kg)	Inflow	0.01768538	kg				Inflow	0.000615744	kg			
Water (fresh)	Inflow	1002.276446	kg				Inflow	34.89580757	kg			
General energy	Inflow	0.072707071	MJ	Outflow	1.79E+00	MJ	Inflow	0.002531409	MJ	Outflow	6.24E-02	MJ
General materials		0.501899406	kg	Outflow	4.10E-01	kg		0.017474406	kg	Outflow	1.43E-02	kg
General radioactive materials				Outflow	1.36E-04	kg				Outflow	4.72E-06	kg
Global Warming												
CO_2	Inflow	0.000698028	kg	Outflow	6.01E-01	kg	Inflow	2.43029E-05	kg	Outflow	2.09E-02	kg
Acidification												
SO_2 (Sulfur dioxide)				Outflow	8.21E-04	kg				Outflow	2.86E-05	kg
HCl (Hydrogen chloride)				Outflow	7.62E-06	kg				Outflow	2.65E-07	kg
HF (Hydrogen fluoride)				Outflow	3.97E-07	kg				Outflow	1.38E-08	kg
NO_x				Outflow	1.21E-03	kg				Outflow	4.22E-05	kg
NH_3 (Ammonia)				Outflow	4.64E-05	kg				Outflow	1.62E-06	kg
Ammonia to ECO 95H												
NH_3 air (Ammonia)				Outflow	7.21E-07	kg				Outflow	2.51E-08	kg
Eutrophication												
PO_4 (-3) (Phosphate)				Outflow	1.76E-06	kg				Outflow	6.14E-08	kg
P	Inflow	1.91206E-07	kg				Inflow	6.65715E-09	kg			
NO_x				Outflow	1.21E-03	kg				Outflow	4.22E-05	kg
NH_3 (Ammonia)				Outflow	4.64E-05	kg				Outflow	1.62E-06	kg
NH_4^+ (Ammonium)				Outflow	1.57E-12	kg				Outflow	5.47E-14	kg
NO_3^- (Nitrate)				Outflow	3.44E-04	kg				Outflow	1.20E-05	kg
COD (Chemical Oxygen Demand)				Outflow	1.04E-02	kg				Outflow	3.61E-04	kg
Waste Water Uddevalla (Skansverket)				Outflow	1	m^3				Outflow	0.03	m^3/ (one sold ticket)
Resource used												
Electricity	Inflow	1.078000254	MJ				Inflow	0.037532249	MJ			
General energy				Outflow	3.03E-01	MJ				Outflow	1.05E-02	MJ
Eutrophication												
P				Outflow	1.90E-04	kg				Outflow	6.62E-06	kg
N				Outflow	1.04E-02	kg				Outflow	3.62E-04	kg
COD (Chemical Oxygen Demand)				Outflow	2.60E-02	kg				Outflow	9.05E-04	kg

Theater in Uddevalla	Normalized per activity						Normalized per functional unit					
	Inflow	Amount	Unit	Outflow	Amount	Unit	Inflow	Amount	Unit	Outflow	Amount	Unit
District heating Uddevalla				Outflow	1	MJ heat				Outflow	22.47	MJ heat/ (one sold ticket)
Resource used												
Crude oil (42.3MJ/kg)	Inflow	0.000257707	kg				Inflow	0.005791157	kg			
General energy	Inflow	1.382044929	MJ	Outflow	1.00E+00	MJ	Inflow	31.05717861	MJ	Outflow	2.25E+01	MJ
Global Warming												
CO2				Outflow	2.56E-02	kg				Outflow	5.74E-01	kg
Acidification												
SO2 (Sulfur dioxide)				Outflow	3.61E-06	kg				Outflow	8.11E-05	kg
NOx				Outflow	5.28E-05	kg				Outflow	1.19E-03	kg
Eutrophication												
NOx				Outflow	5.28E-05	kg				Outflow	1.19E-03	kg

Total transport theatre	Inflow	Amount	Unit	Outflow	Amount	Unit
TOTAL	**INFLOWS SUMMARZIED**			**OUTFLOWS SUMMARIZED**		
Resource used						
Crude oil (42.3MJ/kg)	Inflow	2.00E+00	kg			
CO2				Outflow	6.23E+00	kg
Acidification						
SO2 (Sulfur dioxide)				Outflow	6.64E-04	kg
NOx				Outflow	1.47E-02	kg
Eutrophication						
NOx				Outflow	1.47E-02	kg

APPENDIX 10 BACKGROUND DATA FOR THE GÖTEBORG OPERA

Opera	Normalized per activity						Normalized to functional unit					
	Inflow	Amount	Unit	Outflow	Amount	Unit	Inflow	Amount	Unit	Outflow	Amount	Unit
LCA steel (Scenery)	Inflow		kg	Outflow	1	kg	Inflow			Outflow	0.0011	kg/ (one sold ticket)
Resources used												
Iron (Fe)	Inflow	0.289930191	kg	Outflow	0.0000865	kg	Inflow	0.000319441	kg	Outflow	9.53045E-08	kg
Crude oil (42.3MJ/kg)	Inflow	0.024458544	kg				Inflow	2.69481E-05	kg			
Natural gas (44.1MJ/kg) (0.8	Inflow	0.06721676	m^3				Inflow	7.40585E-05	m^3			
Hard coal (26.3 MJ/kg)	Inflow	0.235476221	kg				Inflow	0.000259445	kg			
Water (fresh)	Inflow	8.831673318	kg				Inflow	0.009730618	kg			
General materials	Inflow	0.200341245	kg	Outflow	0.5186355	kg	Inflow	0.000220733	kg	Outflow	0.000571426	kg
Global Warming												
CO_2				Outflow	0.8976693	kg				Outflow	0.00098904	kg
CH_4				Outflow	0.0007046	kg				Outflow	7.76344E-07	kg
N_2O				Outflow	4.73E-05	kg				Outflow	5.21145E-08	kg
Acidification												
SO_2 (Sulfur dioxide)				Outflow	0.0010675	kg				Outflow	1.17614E-06	kg
HCl (Hydrogen chloride)				Outflow	0.0000341	kg				Outflow	3.75709E-08	kg
NO_x				Outflow	0.0013597	kg				Outflow	1.49805E-06	kg
NH_3 (Ammonia)				Outflow	0.0000288	kg				Outflow	3.17315E-08	kg
Eutrophication												
PO_4 (-3) (Phosphate)				Outflow	1.543E-05	kg				Outflow	1.69994E-08	kg
NO_x				Outflow	0.0013597	kg				Outflow	1.49805E-06	kg
NH_3 (Ammonia)				Outflow	0.0000288	kg				Outflow	3.17315E-08	kg
COD (Chemical Oxygen Demand)				Outflow	0.0002093	kg				Outflow	2.30611E-07	kg
LCA leather (Costume)		1.4	kg/m^2	Outflow	1	kg				Outflow	0.00006	m2/ (one sold ticket)
Resources used												
Crude oil (42.3MJ/kg)	Inflow	0.033571429	kg				Inflow	2.08308E-06	kg			
Hard coal (26.3 MJ/kg)	Inflow	1.365714286	kg				Inflow	8.47414E-05	kg			
Electricity	Inflow	16.09457143	MJ				Inflow	0.000998655	MJ			
Water (fresh)	Inflow	119.2857143	kg				Inflow	0.00740158	kg			
General materials				Outflow	8.7314286	kg				Outflow	0.000541778	kg
Global Warming												
CO_2				Outflow	3.0821429	kg				Outflow	0.000191244	kg
CH_4				Outflow	0.0028571	kg				Outflow	1.77283E-07	kg
Acidification												
SO_2 (Sulfur dioxide)				Outflow	0.0757143	kg				Outflow	4.69801E-06	kg
NO_x				Outflow	0.3285714	kg				Outflow	2.03876E-05	kg
Eutrophication												
COD (Chemical Oxygen Demand)				Outflow	0.7007143	kg				Outflow	4.34787E-05	kg
Paper - Husum paper mill (Office)				Outflow	1	kg				Outflow	0.021623749	kg/ (one sold ticket)
Resources used												
Fossil energy	Inflow	0.651968504	MJ				Inflow	0.014098003	MJ			
Electricity	Inflow	3.582992126	MJ				Inflow	0.077477724	MJ			
General energy	Inflow	21.1480315	MJ				Inflow	0.457299732	MJ			
General materials				Outflow	0.0685669	kg				Outflow	0.001482674	kg
Global Warming												
CO_2				Outflow	0.1830898	kg				Outflow	0.003959087	kg
Acidification												
SO_2 (Sulfur dioxide)				Outflow	0.0008976	kg				Outflow	1.94103E-05	kg
NO_x				Outflow	0.0022331	kg				Outflow	4.82874E-05	kg
Eutrophication												
P				Outflow	3.307E-05	kg				Outflow	7.15116E-07	kg
NO_x				Outflow	0.0022331	kg				Outflow	4.82874E-05	kg
N				Outflow	0.0002992	kg				Outflow	6.4701E-06	kg
COD (Chemical Oxygen Demand)				Outflow	0.0165874	kg				Outflow	0.000358682	kg
LCA Aluminum extruded profiles (Forge)				Outflow	1	kg				Outflow	3.76E-02	kg/ (one sold ticket)
Resources used												
Aluminum ore (Bauxite)	Inflow	0.612801389	kg	Outflow	1.184E-05	kg	Inflow	2.30E-02	kg	Outflow	4.45163E-07	kg
Iron (Fe)	Inflow	0.003105135	kg	Outflow	0.0004227	kg	Inflow	1.17E-04	kg	Outflow	1.58937E-05	kg
Uranium (504000MJ/kg)	Inflow	1.97238E-05	kg				Inflow	7.42E-07	kg			
Crude oil (42.3MJ/kg)	Inflow	0.129378488	kg				Inflow	4.86E-03	kg			
Natural gas (44.1MJ/kg) (0.8	Inflow	0.374381415	m^3				Inflow	1.41E-02	m^3			
Hard coal (26.3 MJ/kg)	Inflow	0.210953754	kg				Inflow	7.93E-03	kg			
Brown coal (Lignite) (11.9MJ	Inflow	0.193983799	kg				Inflow	7.29E-03	kg			
Water (fresh)	Inflow	5.072749249	kg				Inflow	1.91E-01	kg			
General energy	Inflow	6.830406879	MJ	Outflow	16.088846	MJ	Inflow	2.57E-01	MJ	Outflow	0.60493962	MJ

Opera	Normalized per activity						Normalized to functional unit					
	Inflow	Amount	Unit	Outflow	Amount	Unit	Inflow	Amount	Unit	Outflow	Amount	Unit
General materials	Inflow	4.087082994	kg	Outflow	4.3908684	kg	Inflow	1.54E-01	kg	Outflow	0.165096379	kg
General radioactive materials				Outflow	0.00357	kg				Outflow	0.000134233	kg
Global Warming												
CO2	Inflow	0.065217821	kg	Outflow	2.2120535	kg	Inflow	2.45E-03	kg	Outflow	0.083173074	kg
CH4				Outflow	0.0041903	kg				Outflow	0.000157554	kg
N2O				Outflow	4.21E-02	kg				Outflow	0.001584221	kg
SF6 (Sulfur hexa fluoride)				Outflow	1.892E-09	kg				Outflow	7.11425E-11	kg
CFC-11				Outflow	1.302E-07	kg				Outflow	4.89529E-09	kg
CFC-12				Outflow	2.799E-08	kg				Outflow	1.05249E-09	kg
CFC-13				Outflow	1.758E-08	kg				Outflow	6.60865E-10	kg
CFC-114				Outflow	1.333E-07	kg				Outflow	5.01325E-09	kg
HCFC-22				Outflow	3.06E-08	kg				Outflow	1.15039E-09	kg
Acidification												
SO2 (Sulfur dioxide)				Outflow	0.0074189	kg				Outflow	0.00027895	kg
HCl (Hydrogen chloride)				Outflow	9.779E-05	kg				Outflow	3.677E-06	kg
HF (Hydrogen fluoride)				Outflow	8.243E-05	kg				Outflow	3.09927E-06	kg
NOx				Outflow	0.0038167	kg				Outflow	0.000143509	kg
NH3 (Ammonia)				Outflow	4.596E-05	kg				Outflow	1.72816E-06	kg
Ammonia to ECO 99H												
NH3 air (Ammonia)				Outflow	1.036E-05	kg				Outflow	3.89492E-07	kg
Eutrophication												
PO4 (-3) (Phosphate)				Outflow	1.683E-05	kg				Outflow	6.32843E-07	kg
P	Inflow	1.04978E-06	kg				Inflow	3.95E-08	kg			
NOx				Outflow	0.0038167	kg				Outflow	0.000143509	kg
NH3 (Ammonia)				Outflow	4.596E-05	kg				Outflow	1.72816E-06	kg
NH4+ (Ammonium)				Outflow	-4.05E-07	kg				Outflow	-1.52262E-08	kg
NO3- (Nitrate)				Outflow	3.635E-05	kg				Outflow	1.36673E-06	kg
COD (Chemical Oxygen Demand)				Outflow	0.000411	kg				Outflow	1.54528E-05	kg
LCA polystyrene fabric (Scenery)				Outflow	1	kg				Outflow	1.28E-03	kg/ (one sold ticket)
Resources used												
Crude oil (42.3MJ/kg)	Inflow	0.41	kg				Inflow	5.24E-04	kg			
Natural gas (44.1MJ/kg) (0.8	Inflow	0.43373494	m^3				Inflow	5.55E-04	m^3			
Hard coal (26.3 MJ/kg)	Inflow	0.14	kg				Inflow	1.79E-04	kg			
Fossil energy	Inflow	82.2	MJ				Inflow	1.05E-01	MJ			
Electricity	Inflow	15.2	MJ				Inflow	1.94E-02	MJ			
Water (fresh)	Inflow	17.2	kg				Inflow	2.20E-02	kg			
Global Warming												
CO2				Outflow	2.31	kg				Outflow	2.95E-03	kg
CH4				Outflow	0.0001	kg				Outflow	1.28E-07	kg
Acidification												
SO2 (Sulfur dioxide)				Outflow	0.0002	kg				Outflow	2.56E-07	kg
NOx				Outflow	0.0194	kg				Outflow	2.48E-05	kg
Eutrophication												
NOx				Outflow	0.0194	kg				Outflow	2.48E-05	kg
COD (Chemical Oxygen Demand)				Outflow	0.0032	kg				Outflow	4.09E-06	kg
Wood - Moelven Furu (Carpenter)				Outflow	1	kg				Outflow	1.23E-01	kg/ (one sold ticket)
Resources used												
Iron (Fe)	Inflow	0.000625	kg				Inflow	7.67224E-05	kg			
Crude oil (42.3MJ/kg)	Inflow	0.012559102	kg				Inflow	0.001541704	kg			
Electricity	Inflow	0.802083333	MJ				Inflow	0.098460473	MJ			
General energy	Inflow	2.395833333	MJ				Inflow	0.294102711	MJ			
General materials				Outflow	0.0061146	kg				Outflow	0.000750601	kg
Global Warming												
CO2				Outflow	0.0392292	kg				Outflow	0.004815612	kg
Acidification												
NOx				Outflow	0.0009583	kg				Outflow	0.000117641	kg
Eutrophication												
NOx				Outflow	0.0009583	kg				Outflow	0.000117641	kg
Wood - Moelven Gran				Outflow	1	kg				Outflow		kg/ (one sold ticket)
Resources used												
Iron (Fe)	Inflow	0.000789474	kg				Inflow		kg			
Crude oil (42.3MJ/kg)	Inflow	0.015864128	kg				Inflow		kg			
Electricity	Inflow	1.013157895	MJ				Inflow		MJ			
General energy	Inflow	3.026315789	MJ				Inflow		MJ			
General materials				Outflow	0.0077237	kg				Outflow		kg

Opera	Normalized per activity						Normalized to functional unit					
	Inflow	Amount	Unit	Outflow	Amount	Unit	Inflow	Amount	Unit	Outflow	Amount	Unit
Global Warming												
CO_2				Outflow	0.0495526	kg				Outflow		kg
Acidification												
NOx				Outflow	0.0012105	kg				Outflow		kg
Eutrophication												
NOx				Outflow	0.0012105	kg				Outflow		kg
LCA Cotton fibre production				Outflow	1	kg				Outflow	0.00E+00	kg/ (one sold ticket)
Resources used												
Uranium (504000MJ/kg)	Inflow	1.40E-05	kg				Inflow		kg			
Crude oil (42.3MJ/kg)	Inflow	0.53	kg				Inflow		kg			
Natural gas (44.1MJ/kg) (0.8	Inflow	0.421686747	m^3				Inflow		m^3			
Hard coal (26.3 MJ/kg)	Inflow	0.52	kg				Inflow		kg			
Fossil energy	Inflow	47.7	MJ				Inflow		MJ			
Electricity	Inflow	12.1	MJ				Inflow		MJ			
Water (fresh)	Inflow	22200	kg				Inflow		kg			
Global Warming												
CO_2				Outflow	4.265	kg				Outflow		kg
CH_4				Outflow	7.60E-03	kg				Outflow		kg
Acidification												
SO_2 (Sulfur dioxide)				Outflow	4.00E-03	kg				Outflow		kg
NOx				Outflow	0.0227	kg				Outflow		kg
Eutrophication												
NOx				Outflow	0.0227	kg				Outflow		kg
LCA cotton fabric (Costume)				Outflow	1	kg				Outflow	1.77E-02	kg/ (one sold ticket)
Resources used												
Uranium (504000MJ/kg)	Inflow	5.54E-05	kg				Inflow	9.79952E-07	kg			
Crude oil (42.3MJ/kg)	Inflow	0.67	kg				Inflow	0.011851408	kg			
Natural gas (44.1MJ/kg) (0.8	Inflow	0.746987952	kg				Inflow	0.013213222	m^3			
Hard coal (26.3 MJ/kg)	Inflow	0.92	kg				Inflow	0.016273575	kg			
Fossil energy	Inflow	59.8	MJ				Inflow	1.057782363	MJ			
Electricity	Inflow	34.6	MJ				Inflow	0.612027922	MJ			
Water (fresh)	Inflow	26100	kg				Inflow	461.6742418	kg			
Global Warming												
CO_2				Outflow	6.548	kg				Outflow	0.1158254	kg
CH_4				Outflow	0.013	kg				Outflow	0.000229953	kg
Acidification												
SO_2 (Sulfur dioxide)				Outflow	6.30E-03	kg				Outflow	0.000111439	kg
NOx				Outflow	0.0302	kg				Outflow	0.000534198	kg
Eutrophication												
P				Outflow	5.20E-05	kg				Outflow	9.19811E-07	kg
NOx				Outflow	0.0302	kg				Outflow	0.000534198	kg
N				Outflow	4.00E-06	kg				Outflow	7.07547E-08	kg
COD (Chemical Oxygen Demand)				Outflow	0.0133	kg				Outflow	0.000235259	kg
LCA polyester fabric (Costume)				Outflow	1	kg				Outflow	1.51E-03	kg/ (one sold ticket)
Resources used												
Crude oil (42.3MJ/kg)	Inflow	0.41	kg				Inflow	0.000620714	kg			
Natural gas (44.1MJ/kg) (0.8	Inflow	0.43373494	m^3				Inflow	0.000656648	m^3			
Hard coal (26.3 MJ/kg)	Inflow	0.14	kg				Inflow	0.000211951	kg			
Fossil energy	Inflow	82.2	MJ				Inflow	0.124445687	MJ			
Electricity	Inflow	15.2	MJ				Inflow	0.023011854	MJ			
Water (fresh)	Inflow	17.2	kg				Inflow	0.02603973	kg			
Global Warming												
CO_2				Outflow	2.31	kg				Outflow	0.003497196	kg
CH_4				Outflow	0.0001	kg				Outflow	1.51394E-07	kg
Acidification												
SO_2 (Sulfur dioxide)				Outflow	0.0002	kg				Outflow	3.02788E-07	kg
NOx				Outflow	0.0194	kg				Outflow	2.93704E-05	kg
Eutrophication												
NOx				Outflow	0.0194	kg				Outflow	2.93704E-05	kg
COD (Chemical Oxygen Demand)				Outflow	0.0032	kg				Outflow	4.8446E-06	kg
LCA Aluminum extruded profiles (Costume)				Outflow	1	kg				Outflow	1.55E-05	kg/ (one sold ticket)

Opera	Normalized per activity						Normalized to functional unit					
	Inflow	Amount	Unit	Outflow	Amount	Unit	Inflow	Amount	Unit	Outflow	Amount	Unit
Resources used												
Aluminum ore (Bauxite)	Inflow	0.612801389	kg	Outflow	1.184E-05	kg	Inflow	9.50595E-06	kg	Outflow	1.83657E-10	kg
Iron (Fe)	Inflow	0.003105135	kg	Outflow	0.0004227	kg	Inflow	4.81678E-08	kg	Outflow	6.55713E-09	kg
Uranium (504000MJ/kg)	Inflow	1.97238E-05	kg				Inflow	3.05962E-10	kg			
Crude oil (42.3MJ/kg)	Inflow	0.129378488	kg				Inflow	2.00696E-06	kg			
Natural gas (44.1MJ/kg) (0.8	Inflow	0.374381415	m^3				Inflow	5.80751E-06	m^3			
Hard coal (26.3 MJ/kg)	Inflow	0.210953754	kg				Inflow	3.27238E-06	kg			
Brown coal (Lignite) (11.9MJ	Inflow	0.193983799	kg				Inflow	3.00913E-06	kg			
Water (fresh)	Inflow	5.072749249	kg				Inflow	7.869E-05	kg			
General energy	Inflow	6.830406879	MJ	Outflow	16.088846	MJ	Inflow	0.000105955	MJ	Outflow	0.000249575	MJ
General materials	Inflow	4.087082994	kg	Outflow	4.3908684	kg	Inflow	6.34E-05	kg	Outflow	6.81124E-05	kg
General radioactive materials				Outflow	0.00357	kg				Outflow	5.53796E-08	kg
Global Warming												
CO2	Inflow	0.065217821	kg	Outflow	2.2120535	kg	Inflow	1.01168E-06	kg	Outflow	3.4314E-05	kg
CH4				Outflow	0.0041903	kg				Outflow	6.50009E-08	kg
N2O				Outflow	4.213E-05	kg				Outflow	6.53589E-10	kg
SF6 (Sulfur hexa fluoride)				Outflow	1.892E-10	kg				Outflow	2.93506E-15	kg
CFC-11				Outflow	1.302E-07	kg				Outflow	2.01961E-12	kg
CFC-12				Outflow	2.799E-08	kg				Outflow	4.34217E-13	kg
CFC-13				Outflow	1.758E-08	kg				Outflow	2.72647E-13	kg
CFC-114				Outflow	1.333E-07	kg				Outflow	2.06828E-12	kg
HCFC-22				Outflow	3.06E-08	kg				Outflow	4.74609E-13	kg
Acidification												
SO2 (Sulfur dioxide)				Outflow	0.0074189	kg				Outflow	1.15084E-07	kg
HCl (Hydrogen chloride)				Outflow	9.779E-05	kg				Outflow	1.51699E-09	kg
HF (Hydrogen fluoride)				Outflow	8.243E-05	kg				Outflow	1.27864E-09	kg
NOx				Outflow	0.0038167	kg				Outflow	5.92062E-08	kg
NH3 (Ammonia)				Outflow	4.596E-05	kg				Outflow	7.12972E-10	kg
Ammonia to ECO 99H												
NH3 air (Ammonia)				Outflow	1.036E-05	kg				Outflow	1.6069E-10	kg
Eutrophication												
PO4 (-3) (Phosphate)				Outflow	1.683E-05	kg				Outflow	2.61087E-10	kg
P	Inflow	1.04978E-06	kg				Inflow	1.62844E-11	kg			
NOx				Outflow	0.0038167	kg				Outflow	5.92062E-08	kg
NH3 (Ammonia)				Outflow	4.596E-05	kg				Outflow	7.12972E-10	kg
NH4+ (Ammonium)				Outflow	-4.05E-07	kg				Outflow	-6.28175E-12	kg
NO3- (Nitrate)				Outflow	3.635E-05	kg				Outflow	5.63861E-10	kg
COD (Chemical Oxygen Demand)				Outflow	0.000411	kg				Outflow	6.37524E-09	kg
LCA steel (Forge)	Inflow			Outflow	1	kg				Outflow	2.68E-01	kg/ (one sold ticket)
Resources used												
Iron (Fe)	Inflow	0.289930191	kg	Outflow	0.0000865	kg		0.077581568	kg	Outflow	2.31463E-05	kg
Crude oil (42.3MJ/kg)	Inflow	0.024458544	kg				Inflow	0.00654479	kg			
Natural gas (44.1MJ/kg) (0.8	Inflow	0.06721676	m^3				Inflow	0.017986335	m^3			
Hard coal (26.3 MJ/kg)	Inflow	0.235476221	kg				Inflow	0.06301039	kg			
Water (fresh)	Inflow	8.831673318	kg				Inflow	2.363241522	kg			
General materials	Inflow	0.200341245	kg	Outflow	0.5186355	kg	Inflow	0.053608725	kg	Outflow	0.138780155	kg
Global Warming												
CO2				Outflow	0.8976693	kg				Outflow	0.240204696	kg
CH4				Outflow	0.0007046	kg				Outflow	0.000188548	kg
N2O				Outflow	0.0000473	kg				Outflow	1.26569E-05	kg
Acidification												
SO2 (Sulfur dioxide)				Outflow	0.0010675	kg				Outflow	0.000285646	kg
HCl (Hydrogen chloride)				Outflow	0.0000341	kg				Outflow	9.12472E-06	kg
NOx				Outflow	0.0013597	kg				Outflow	0.000363827	kg
NH3 (Ammonia)				Outflow	0.0000288	kg				Outflow	7.70651E-06	kg
Eutrophication												
PO4 (-3) (Phosphate)				Outflow	1.543E-05	kg				Outflow	4.12857E-06	kg
NOx				Outflow	0.0013597	kg				Outflow	0.000363827	kg
NH3 (Ammonia)				Outflow	0.0000288	kg				Outflow	7.70651E-06	kg
COD (Chemical Oxygen Demand)				Outflow	0.0002093	kg				Outflow	5.60076E-05	kg
LCA PC granulate (Dec	Inflow			Outflow	1	kg				Outflow	6.55E-01	kg/ (one sold ticket)
Resources used												
Aluminum ore (Bauxite)	Inflow	2.13E-05	kg				Inflow	1.39E-05	kg			
Iron (Fe)	Inflow	0.000830392	kg	Outflow	6.27E-05	kg	Inflow	5.44E-04	kg	Outflow	4.11086E-05	kg
Uranium (504000MJ/kg)	Inflow	9.14901E-06	kg				Inflow	6.00E-06	kg			
Crude oil (42.3MJ/kg)	Inflow	0.51222162	kg				Inflow	3.36E-01	kg			
Natural gas (44.1MJ/kg) (0.8	Inflow	1.735839018	m^3				Inflow	1.14E+00	m^3			
Hard coal (26.3 MJ/kg)	Inflow	0.457945449	kg				Inflow	3.00E-01	kg			
Brown coal (Lignite) (11.9MJ	Inflow	0.213926607	kg				Inflow	1.40E-01	kg			
Water (fresh)	Inflow	75.68574286	kg				Inflow	4.96E+01	kg			

Opera	Normalized per activity						Normalized to functional unit					
	Inflow	Amount	Unit	Outflow	Amount	Unit	Inflow	Amount	Unit	Outflow	Amount	Unit
General energy	Inflow	0.411429004	MJ				Inflow	2.70E-01	MJ			
General materials	Inflow	8.04E-01	kg	Outflow	0.1411953	kg	Inflow	5.27E-01	kg	Outflow	0.092543629	kg
Global Warming												
CO2				Outflow	6.023443	kg				Outflow	3.947945697	kg
CH4				Outflow	0.0683563	kg				Outflow	0.044802761	kg
N2O				Outflow	5.45E-09	kg				Outflow	3.57204E-09	kg
Acidification												
SO2 (Sulfur dioxide)				Outflow	0.0156463	kg				Outflow	0.010255035	kg
HCl (Hydrogen chloride)				Outflow	0.0001805	kg				Outflow	0.000118287	kg
HF (Hydrogen fluoride)				Outflow	7.34E-06	kg				Outflow	4.80862E-06	kg
NOx				Outflow	0.0120521	kg				Outflow	0.007899335	kg
NH3 (Ammonia)				Outflow	2.35E-06	kg				Outflow	1.5384E-06	kg
Ammonia to ECO 99H												
NH3 air (Ammonia)				Outflow	1.02E-07	kg				Outflow	6.65825E-08	kg
Eutrophication												
PO4 (-3) (Phosphate)				Outflow	0.0013041	kg				Outflow	0.000854738	kg
P	Inflow	0.0001034	kg				Inflow	6.78E-05	kg			
NOx				Outflow	0.0120521	kg				Outflow	0.007899335	kg
NH3 (Ammonia)				Outflow	2.35E-06	kg				Outflow	1.5384E-06	kg
NO3- (Nitrate)				Outflow	2.48E-06	kg				Outflow	1.6225E-06	kg
COD (Chemical Oxygen Demand)				Outflow	0.0011893	kg				Outflow	0.00077952	kg
LCA PP granulate (Dec	Inflow			Outflow	1	kg	Inflow			Outflow	3.03E-02	kg/(one sold ticket)
Resources used												
Aluminum ore (Bauxite)	Inflow	2.15E-06	kg	Outflow	4.06E-07	kg	Inflow	6.52E-08	kg	Outflow	1.23E-08	kg
Iron (Fe)	Inflow	0.000164558	kg	Outflow	1.81E-08	kg	Inflow	4.99E-06	kg	Outflow	5.46858E-10	kg
Uranium (504000MJ/kg)	Inflow	5.44318E-06	kg				Inflow	1.65E-07	kg			
Crude oil (42.3MJ/kg)	Inflow	1.01277838	kg				Inflow	3.07E-02	kg			
Natural gas (44.1MJ/kg) (0.8	Inflow	0.586953048	m^3				Inflow	1.78E-02	m^3			
Hard coal (26.3 MJ/kg)	Inflow	0.086625483	kg				Inflow	2.62E-03	kg			
Brown coal (Lignite) (11.9MJ	Inflow	1.28051E-05	kg				Inflow	3.88E-07	kg			
Water (fresh)	Inflow	34.37723541	kg				Inflow	1.04E+00	kg			
General energy	Inflow	0.413882982	MJ				Inflow	1.25E-02	MJ			
General materials	Inflow	6.01E-04	kg	Outflow	0.0189749	kg	Inflow	1.82E-05	kg	Outflow	0.000574855	kg
General radioactive materials												
Global Warming												
CO2				Outflow	1.6700211	kg				Outflow	0.050594138	kg
CH4				Outflow	0.011832	kg				Outflow	0.000358457	kg
N2O				Outflow	4.82E-13	kg				Outflow	1.46124E-14	kg
Acidification												
SO2 (Sulfur dioxide)				Outflow	0.0037843	kg				Outflow	0.000114648	kg
HCl (Hydrogen chloride)				Outflow	5.13E-05	kg				Outflow	1.55464E-06	kg
HF (Hydrogen fluoride)				Outflow	1.49E-06	kg				Outflow	4.52621E-08	kg
NOx				Outflow	0.0032868	kg				Outflow	9.95756E-05	kg
NH3 (Ammonia)				Outflow	3.39E-06	kg				Outflow	1.02622E-07	kg
Ammonia to ECO 99H												
NH3 air (Ammonia)				Outflow	1.58E-10	kg				Outflow	4.79196E-12	kg
Eutrophication												
PO4 (-3) (Phosphate)				Outflow	0.0005374	kg				Outflow	1.62798E-05	kg
P	Inflow	8.77E-13	kg				Inflow	2.66E-14	kg			
NOx				Outflow	0.0032868	kg				Outflow	9.95756E-05	kg
NH3 (Ammonia)				Outflow	3.39E-06	kg				Outflow	1.02622E-07	kg
NO3- (Nitrate)				Outflow	0.0001198	kg				Outflow	3.62986E-06	kg
COD (Chemical Oxygen Demand)				Outflow	0.0002405	kg				Outflow	7.28501E-06	kg
LCA Plywood (Carpenter)		585	kg	Outflow	1	kg					3.95E-01	kg/ (one sold ticket)
Resources used												
Uranium (504000MJ/kg)	Inflow	3.33401E-08	kg				Inflow	1.31803E-08	kg			
Crude oil (42.3MJ/kg)	Inflow	0.010870663	kg	Outflow	2.154E-05	kg	Inflow	0.004297471	kg	Outflow	8.51474E-06	kg
Natural gas (44.1MJ/kg) (0.8	Inflow	0.040910196	m^3				Inflow	0.016172921	m^3			
Hard coal (26.3 MJ/kg)	Inflow	0.008449514	kg				Inflow	0.003340324	kg			
Electricity	Inflow	0.532581197	MJ				Inflow	0.21054394	MJ			
General energy	Inflow	2.64957265	MJ				Inflow	1.047448668	MJ			
General materials				Outflow	0.0161709	kg				Outflow	0.006392816	kg
Global Warming												
CO2				Outflow	0.0682051	kg				Outflow	0.026963356	kg
CH4				Outflow	0.0001863	kg				Outflow	7.36593E-05	kg
Acidification												
NOx				Outflow	0.0005692	kg				Outflow	0.000225033	kg

Opera	Normalized per activity						Normalized to functional unit					
	Inflow	Amount	Unit	Outflow	Amount	Unit	Inflow	Amount	Unit	Outflow	Amount	Unit
Eutrophication												
NOx				Outflow	0.0005692	kg				Outflow	0.000225033	kg
COD (Chemical Oxygen Demand)				Outflow	1.463E-05	kg				Outflow	5.78462E-06	kg
LCA cotton fabric (Decor)				Outflow	1	kg				Outflow	1.02E-02	kg/ (one sold ticket)
Resources used												
Uranium (504000MJ/kg)	Inflow	5.54E-05	kg				Inflow	5.65114E-07	kg			
Crude oil (42.3MJ/kg)	Inflow	0.67	kg				Inflow	0.00683441	kg			
Natural gas (44.1MJ/kg) (0.8	Inflow	0.746987952	kg				Inflow	0.007619734	m^3			
Hard coal (26.3 MJ/kg)	Inflow	0.92	kg				Inflow	0.009384563	kg			
Fossil energy	Inflow	59.8	MJ				Inflow	0.609996582	MJ			
Electricity	Inflow	34.6	MJ				Inflow	0.352941166	MJ			
Water (fresh)	Inflow	26100	kg				Inflow	266.2359664	kg			
Global Warming												
CO2				Outflow	6.548	kg				Outflow	0.066793606	kg
CH4				Outflow	0.013	kg				Outflow	0.000132608	kg
Acidification												
SO2 (Sulfur dioxide)				Outflow	6.30E-03	kg				Outflow	6.42639E-05	kg
NOx				Outflow	0.0302	kg				Outflow	0.000308058	kg
Eutrophication												
P				Outflow	5.20E-05	kg				Outflow	5.30432E-07	kg
NOx				Outflow	0.0302	kg				Outflow	0.000308058	kg
N				Outflow	4.00E-06	kg				Outflow	4.08024E-08	kg
COD (Chemical Oxygen Demand)				Outflow	0.0133	kg				Outflow	0.000135668	kg
LCA PS granulate (Decor)				Outflow	1	kg				Outflow	1.40E-02	kg/ (one sold ticket)
Resources used												
Aluminum ore (Bauxite)	Inflow	0.000641909	kg	Outflow	1.05E-06	kg	Inflow	8.99E-06	kg	Outflow	1.47E-08	kg
Iron (Fe)	Inflow	0.001575822	kg	Outflow	1.57E-07	kg	Inflow	2.21E-05	kg	Outflow	2.20E-09	kg
Uranium (504000MJ/kg)	Inflow	4.24551E-06	kg				Inflow	5.94E-08	kg			
Crude oil (42.3MJ/kg)	Inflow	1.01779715	kg				Inflow	1.43E-02	kg			
Natural gas (44.1MJ/kg) (0.8	Inflow	0.900848651	m^3				Inflow	1.26E-02	m^3			
Hard coal (26.3 MJ/kg)	Inflow	0.161070815	kg				Inflow	2.26E-03	kg			
Brown coal (Lignite) (11.9MJ	Inflow	4.35835E-05	kg				Inflow	6.10E-07	kg			
Water (fresh)	Inflow	133.0430538	kg				Inflow	1.86E+00	kg			
General energy	Inflow	0.249285274	MJ				Inflow	3.49E-03	MJ			
General materials	Inflow	3.27E-03	kg	Outflow	0.0661916	kg	Inflow	4.58E-05	kg	Outflow	9.27E-04	kg
Global Warming												
CO2				Outflow	2.7130628	kg				Outflow	3.80E-02	kg
CH4				Outflow	0.0303952	kg				Outflow	4.26E-04	kg
N2O				Outflow	1.93E-08	kg				Outflow	2.70E-10	kg
Acidification												
SO2 (Sulfur dioxide)				Outflow	0.0073194	kg				Outflow	1.02E-04	kg
HCl (Hydrogen chloride)				Outflow	5.06E-05	kg				Outflow	7.08E-07	kg
HF (Hydrogen fluoride)				Outflow	1.89E-06	kg				Outflow	2.64E-08	kg
NOx				Outflow	0.0053206	kg				Outflow	7.45E-05	kg
NH3 (Ammonia)				Outflow	1.28E-05	kg				Outflow	1.79E-07	kg
Ammonia to ECO 99H												
NH3 air (Ammonia)				Outflow	8.91E-09	kg				Outflow	1.25E-10	kg
Eutrophication												
PO4 (-3) (Phosphate)				Outflow	1.873E-05	kg				Outflow	2.62E-07	kg
P	Inflow	1.88E-11	kg				Inflow	2.63E-13	kg			
NOx				Outflow	0.0053206	kg				Outflow	7.45E-05	kg
NH3 (Ammonia)				Outflow	1.28E-05	kg				Outflow	1.79E-07	kg
NH4+ (Ammonium)												
NO3- (Nitrate)				Outflow	6.987E-06	kg				Outflow	9.78E-08	kg
COD (Chemical Oxygen Demand)				Outflow	0.0003845	kg				Outflow	5.38E-06	kg
SCA toilet/kitchen paper (Building maintananc				Outflow	1	kg				Outflow	2.32E-02	kg/ (one sold ticket)
Resources used												
Fossil energy	Inflow	1.979381443	MJ				Inflow	4.59E-02	MJ			
Electricity	Inflow	5.121649485	MJ				Inflow	1.19E-01	MJ			
Water (fresh)	Inflow	33.91752577	kg	Outflow	33.917526	kg	Inflow	7.86E-01	kg	Outflow	7.86E-01	kg
General energy	Inflow	4.907216495	MJ				Inflow	1.14E-01	MJ			
General materials				Outflow	0.0003299	kg				Outflow	7.65E-06	kg
Global Warming												
CO2				Outflow	0.1340206	kg				Outflow	3.11E-03	kg
Acidification												

Opera	Normalized per activity						Normalized to functional unit					
	Inflow	Amount	Unit	Outflow	Amount	Unit	Inflow	Amount	Unit	Outflow	Amount	Unit
SO2 (Sulfur dioxide)				Outflow	1.031E-05	kg				Outflow	2.39E-07	kg
NOx				Outflow	0.0006392	kg				Outflow	1.48E-05	kg
Eutrophication												
P				Outflow	1.031E-05	kg				Outflow	2.39E-07	kg
NOx				Outflow	0.0006392	kg				Outflow	1.48E-05	kg
N				Outflow	0.0001526	kg				Outflow	3.54E-06	kg
COD (Chemical Oxygen Demand)				Outflow	0.0040412	kg				Outflow	9.37E-05	kg
LCA water based paint (Painting)				Outflow	1	kg				Outflow	4.51E-02	kg/ (one sold ticket)
Resources used												
Iron (Fe)	Inflow	0.000118	kg				Inflow	5.31837E-06	kg			
Uranium (504000MJ/kg)	Inflow	5.15873E-06	kg				Inflow	2.32509E-07	kg			
Crude oil (42.3MJ/kg)	Inflow	0.30241844	kg				Inflow	0.013630292	kg			
Natural gas (44.1MJ/kg) (0.8	Inflow	0.480479742	m^3				Inflow	0.021655687	m^3			
Hard coal (26.3 MJ/kg)	Inflow	0.142319392	kg				Inflow	0.006414473	kg			
Brown coal (Lignite) (11.9MJ	Inflow	0.082614286	kg				Inflow	0.003723506	kg			
Electricity	Inflow	2.72	MJ				Inflow	0.122593035	MJ			
General energy	Inflow	0.348	MJ				Inflow	0.015684697	MJ			
General materials	Inflow	0.33603	kg	Outflow	0.140948	kg	Inflow	0.015145198	kg	Outflow	0.006352663	kg
Global Warming												
CO2				Outflow	1.63	kg				Outflow	0.073465679	kg
CH4				Outflow	0.00526	kg				Outflow	0.000237073	kg
N2O				Outflow	9.32E-06	kg				Outflow	4.20061E-07	kg
Acidification												
SO2 (Sulfur dioxide)				Outflow	0.00963	kg				Outflow	0.000434033	kg
HCl (Hydrogen chloride)				Outflow	0.000103	kg				Outflow	4.64231E-06	kg
HF (Hydrogen fluoride)				Outflow	4.39E-06	kg				Outflow	1.97862E-07	kg
NOx				Outflow	0.00726	kg				Outflow	0.000327215	kg
NH3 (Ammonia)				Outflow	1.95E-06	kg				Outflow	8.78884E-08	kg
Ammonia to ECO 99H												
NH3 air (Ammonia)				Outflow	1.95E-06	kg				Outflow	8.78884E-08	kg
Eutrophication												
PO4 (-3) (Phosphate)				Outflow	0.000133	kg				Outflow	5.99444E-06	kg
NOx				Outflow	0.00726	kg				Outflow	0.000327215	kg
NH3 (Ammonia)				Outflow	1.95E-06	kg				Outflow	8.78884E-08	kg
NH4+ (Ammonium)				Outflow	0.0000108	kg				Outflow	4.86766E-07	kg
NO3- (Nitrate)				Outflow	4.35E-06	kg				Outflow	1.96059E-07	kg
N	Inflow		kg	Outflow	0.000032	kg	Inflow		kg	Outflow	1.44227E-06	kg
COD (Chemical Oxygen Demand)				Outflow	0.0063	kg				Outflow	0.000283947	kg
Paper - Husum paper mill (Marketing)				Outflow	1	kg				Outflow	1.25E-01	kg/ (one sold ticket)
Resources used												
Fossil energy	Inflow	0.651968504	MJ				Inflow	0.081767763	MJ			
Electricity	Inflow	3.582992126	MJ				Inflow	0.449367184	MJ			
General energy	Inflow	21.1480315	MJ				Inflow	2.65231712	MJ			
General materials				Outflow	0.0685669	kg				Outflow	0.008599441	kg
Global Warming												
CO2				Outflow	0.1830898	kg				Outflow	0.022962521	kg
Acidification												
SO2 (Sulfur dioxide)				Outflow	0.0008976	kg				Outflow	0.000112579	kg
NOx				Outflow	0.0022331	kg				Outflow	0.000280064	kg
Eutrophication												
P				Outflow	3.307E-05	kg				Outflow	4.14764E-06	kg
NOx				Outflow	0.0022331	kg				Outflow	0.000280064	kg
N				Outflow	0.0002992	kg				Outflow	3.75263E-05	kg
COD (Chemical Oxygen Demand)				Outflow	0.0165874	kg				Outflow	0.002080338	kg
LCA water based paint (Costume)				Outflow	1	kg				Outflow	3.10E-04	kg/ (one sold ticket)
Resources used												
Iron (Fe)	Inflow	0.000118	kg				Inflow	3.6609E-08	kg			
Uranium (504000MJ/kg)	Inflow	5.15873E-06	kg				Inflow	1.60047E-09	kg			
Crude oil (42.3MJ/kg)	Inflow	0.30241844	kg				Inflow	9.38241E-05	kg			
Natural gas (44.1MJ/kg) (0.8	Inflow	0.480479742	m^3				Inflow	0.000149067	m^3			
Hard coal (26.3 MJ/kg)	Inflow	0.142319392	kg				Inflow	4.4154E-05	kg			
Brown coal (Lignite) (11.9MJ	Inflow	0.082614286	kg				Inflow	2.56307E-05	kg			
Electricity	Inflow	2.72	MJ				Inflow	0.000843869	MJ			
General energy	Inflow	0.348	MJ				Inflow	0.000107966	MJ			
General materials	Inflow	0.33603	kg	Outflow	0.140948	kg	Inflow	0.000104252	kg	Outflow	4.37285E-05	kg
Global Warming												

Opera	Normalized per activity						Normalized to functional unit					
	Inflow	Amount	Unit	Outflow	Amount	Unit	Inflow	Amount	Unit	Outflow	Amount	Unit
CO2				Outflow	1.63	kg				Outflow	0.000505701	kg
CH4				Outflow	0.00526	kg				Outflow	1.63189E-06	kg
N2O				Outflow	9.32E-06	kg				Outflow	2.89149E-09	kg
Acidification												
SO2 (Sulfur dioxide)				Outflow	0.00963	kg				Outflow	2.98767E-06	kg
HCl (Hydrogen chloride)				Outflow	0.000103	kg				Outflow	3.19553E-08	kg
HF (Hydrogen fluoride)				Outflow	4.39E-06	kg				Outflow	1.36198E-09	kg
NOx				Outflow	0.00726	kg				Outflow	2.25239E-06	kg
NH3 (Ammonia)				Outflow	1.95E-06	kg				Outflow	6.04979E-10	kg
Ammonia to ECO 99H												
NH3 air (Ammonia)				Outflow	1.95E-06	kg				Outflow	6.04979E-10	kg
Eutrophication												
PO4 (-3) (Phosphate)				Outflow	0.000133	kg				Outflow	4.12627E-08	kg
NOx				Outflow	0.00726	kg				Outflow	2.25239E-06	kg
NH3 (Ammonia)				Outflow	1.95E-06	kg				Outflow	6.04979E-10	kg
NH4+ (Ammonium)				Outflow	0.0000108	kg				Outflow	3.35066E-09	kg
NO3- (Nitrate)				Outflow	4.35E-06	kg				Outflow	1.34957E-09	kg
N				Outflow	0.000032	kg				Outflow	9.92787E-09	kg
COD (Chemical Oxygen Demand)				Outflow	0.0063	kg				Outflow	1.95455E-06	kg

Sum up of total transportation

All transports	Related to functional unit			Related to functional unit		
	Inflow	Amount (quantitative (E.g. numbers	Unit (E.g. kg, m^3	Outflow	Amount (quantitative	Unit (E.g. kg, m^3, l
n) **TOTAL INFLOWS SUMMARZIED**						
Abiotic Resources depletion						
Crude oil (42.3MJ/kg)	Inflow	2.21E+00	kg			
Global Warming						
CO2				Outflow	5.81E+00	kg
Human Toxicity OBS What kind of emissions??						
NO2 (Air)				Outflow	2.97E-02	kg
SO2 (Air)				Outflow	1.88E-04	kg
Dust (<PM10) (Air)				Outflow	3.74E-05	kg
Acidification						
SO2 (Sulfur dioxide)				Outflow	1.37E-03	kg
NOx				Outflow	2.97E-02	kg
Ammonia to ECO 99H						
NH3 air (Ammonia)						
Eutrophication						
NOx				Outflow	2.93E-02	kg
NH3 (Ammonia)						
NH4+ (Ammonium)						
NO3- (Nitrate)						
HNO3 (Nitric acid)						
N						
COD (Chemical Oxygen Demand)						

Opera	Normalized per activity						Normalized to functional unit					
	Inflow	Amount	Unit	Outflow	Amount	Unit	Inflow	Amount	Unit	Outflow	Amount	Unit
LCA beef (Restaurant)				Outflow	1	kg				Outflow	0.010947983	kg/ (one sold ticket)
Resources used												
Fossil energy	Inflow	40.95	MJ				Inflow	0.4483199	MJ			
Electricity	Inflow	7.4	MJ				Inflow	0.081015074	MJ			
General energy	Inflow	0.1	MJ				Inflow	0.001094798	MJ			
Global Warming												
CO_2				Outflow	3.11E+00	kg				Outflow	3.40E-02	kg
CH_4				Outflow	2.95E-01	kg				Outflow	3.23E-03	kg
N_2O				Outflow	1.48E-02	kg				Outflow	1.62E-04	kg
Acidification												
SO_2 (Sulfur dioxide)				Outflow	7.37E-03	kg				Outflow	8.07E-05	kg
NO_x				Outflow	1.75E-02	kg				Outflow	1.92E-04	kg
NH_3 (Ammonia)				Outflow	1.38E-01	kg				Outflow	1.51E-03	kg
Ammonia to ECO 99H												
NH_3 air (Ammonia)				Outflow	1.38E-01	kg				Outflow	1.51E-03	kg
Eutrophication												
P				Outflow	1.29E-03	kg				Outflow	1.41E-05	kg
NO_x				Outflow	1.67E-02	kg				Outflow	1.82E-04	kg
NH_3 (Ammonia)				Outflow	1.38E-01	kg				Outflow	1.51E-03	kg
N				Outflow	8.50E-02	kg				Outflow	9.31E-04	kg
LCA milk (Restaurant)				Outflow	1	liter				Outflow	0.023355697	liter/(one sold ticket)
Resources used												
Fossil energy	Inflow	3.53	MJ				Inflow	0.08244561	MJ			
Electricity	Inflow	1.01	MJ				Inflow	0.023589254	MJ			
General energy	Inflow	0.7	MJ				Inflow	0.016348988	MJ			
Global Warming												
CO_2				Outflow	3.06E-01	kg				Outflow	7.15E-03	kg
CH_4				Outflow	1.97E-02	kg				Outflow	4.59E-04	kg
N_2O				Outflow	8.39E-04	kg				Outflow	1.96E-05	kg
Acidification												
SO_2 (Sulfur dioxide)				Outflow	6.41E-04	kg				Outflow	1.50E-05	kg
NO_x				Outflow	2.30E-04	kg				Outflow	5.38E-06	kg
NH_3 (Ammonia)				Outflow	6.81E-03	kg				Outflow	1.59E-04	kg
Ammonia to ECO 99H												
NH_3 air (Ammonia)				Outflow	6.88E-03	kg				Outflow	1.61E-04	kg
Eutrophication												
P				Outflow	6.43E-05	kg				Outflow	1.50E-06	kg
NO_x				Outflow	1.66E-03	kg				Outflow	3.88E-05	kg
NH_3 (Ammonia)				Outflow	6.88E-03	kg				Outflow	1.61E-04	kg
N				Outflow	4.70E-03	kg				Outflow	1.10E-04	kg
LCA bread (Restaurant)				Outflow	1	kg				Outflow	0.010510064	kg/ (one sold ticket)
Resources used												
Fossil energy	Inflow	6.85	MJ				Inflow	0.071993936	MJ			
Electricity	Inflow	6.87	MJ				Inflow	0.072204137	MJ			
Global Warming												
CO_2				Outflow	6.44E-01	kg				Outflow	6.77E-03	kg
CH_4				Outflow	2.16E-03	kg				Outflow	2.27E-05	kg
N_2O				Outflow	8.16E-04	kg				Outflow	8.58E-06	kg
Acidification												
SO_2 (Sulfur dioxide)				Outflow	2.53E-03	kg				Outflow	2.66E-05	kg
NO_x				Outflow	4.29E-03	kg				Outflow	4.50E-05	kg
NH_3 (Ammonia)				Outflow	1.65E-03	kg				Outflow	1.74E-05	kg
Ammonia to ECO 99H												
NH_3 air (Ammonia)				Outflow	1.56E-03	kg				Outflow	1.64E-05	kg
Eutrophication												
P				Outflow	4.50E-05	kg				Outflow	4.73E-07	kg
NO_x				Outflow	4.43E-03	kg				Outflow	4.66E-05	kg
NH_3 (Ammonia)				Outflow	1.56E-03	kg				Outflow	1.64E-05	kg
N				Outflow	2.60E-03	kg				Outflow	2.73E-05	kg
COD (Chemical Oxygen Demand)												
LCA potatoes (Restaurant)				Outflow	1	kg				Outflow	0.007590601	kg/ (one sold ticket)
Resources used												
Fossil energy	Inflow	1.36	MJ				Inflow	0.010323218	MJ			
Electricity	Inflow	0.51	MJ				Inflow	0.003871207	MJ			
General energy	Inflow	0.16	MJ				Inflow	0.001214496	MJ			
Global Warming												
CO_2				Outflow	1.25E-01	kg				Outflow	9.51E-04	kg
CH_4				Outflow	5.48E-04	kg				Outflow	4.16E-06	kg
N_2O				Outflow	1.81E-04	kg				Outflow	1.37E-06	kg
Acidification												
SO_2 (Sulfur dioxide)				Outflow	3.53E-04	kg				Outflow	2.68E-06	kg
NO_x				Outflow	1.01E-03	kg				Outflow	7.70E-06	kg
NH_3 (Ammonia)				Outflow	2.21E-04	kg				Outflow	1.68E-06	kg

Opera	Normalized per activity						Normalized to functional unit					
	Inflow	Amount	Unit	Outflow	Amount	Unit	Inflow	Amount	Unit	Outflow	Amount	Unit
Ammonia to ECO 99H												
NH_3 air (Ammonia)				Outflow	2.25E-04	kg				Outflow	1.71E-06	kg
Eutrophication												
P				Outflow	1.71E-05	kg				Outflow	1.30E-07	kg
NO_x				Outflow	1.00E-03	kg				Outflow	7.59E-06	kg
NH_3 (Ammonia)				Outflow	2.25E-04	kg				Outflow	1.71E-06	kg
N				Outflow	3.50E-03	kg				Outflow	2.66E-05	kg
LCA salad (Restaurant)				Outflow	1	kg				Outflow	0.011677848	kg/ (one sold ticket)
Resources used												
Fossil energy	Inflow	3.61	MJ				Inflow	0.042157033	MJ			
Electricity	Inflow	2.2	MJ				Inflow	0.025691267	MJ			
General energy	Inflow	0.63	MJ				Inflow	0.007357045	MJ			
Global Warming												
CO_2				Outflow	3.07E-01	kg				Outflow	3.58E-03	kg
CH_4				Outflow	2.81E-04	kg				Outflow	3.28E-06	kg
N_2O				Outflow	3.23E-04	kg				Outflow	3.77E-06	kg
Acidification												
SO_2 (Sulfur dioxide)				Outflow	7.05E-04	kg				Outflow	8.23E-06	kg
NO_x				Outflow	1.47E-03	kg				Outflow	1.72E-05	kg
NH_3 (Ammonia)				Outflow	1.02E-04	kg				Outflow	1.19E-06	kg
Ammonia to ECO 99H												
NH_3 air (Ammonia)				Outflow	1.13E-04	kg				Outflow	1.31E-06	kg
Eutrophication												
P				Outflow	1.57E-05	kg				Outflow	1.84E-07	kg
NO_x				Outflow	1.42E-03	kg				Outflow	1.65E-05	kg
NH_3 (Ammonia)				Outflow	1.13E-04	kg				Outflow	1.31E-06	kg
N				Outflow	6.00E-03	kg				Outflow	7.01E-05	kg
LCA wine (Restaurant)				Outflow	1	liter				Outflow	0.017063523	liter/ (one sold ticket)
Resources used												
Aluminum ore (Bauxite)	Inflow	0.002333333	kg				Inflow	3.98149E-05	kg			
Crude oil (42.3MJ/kg)	Inflow	0.026248	kg				Inflow	0.000447883	kg			
Natural gas (44.1MJ/kg) (0.	Inflow	0.014493398	m^3				Inflow	0.000247308	m^3			
Electricity	Inflow	0.885	MJ				Inflow	0.015101218	MJ			
Water (fresh)	Inflow	2.5	kg				Inflow	0.042658807	kg			
General materials	Inflow	0.8789	kg	Outflow	0.0842	kg	Inflow	0.01499713	kg	Outflow	0.001436749	kg
Global Warming												
CO_2				Outflow	2.617	kg				Outflow	0.044655239	kg
CH_4				Outflow	0.0034	kg				Outflow	5.8016E-05	kg
Acidification												
SO_2 (Sulfur dioxide)	Inflow	0.000075	kg				Inflow	1.27976E-06	kg			
Eutrophication												
P	Inflow	0.037	kg				Inflow	0.00063135	kg			
N	Inflow	0.015	kg				Inflow	0.000255953	kg			
COD (Chemical Oxygen Demand)												
LCA Heineken beer (Restaurant)				Outflow	1	liter Beer or Soft drinks				Outflow	0.038392926	liter Beer or Soft drinks/
Resources used												
Electricity	Inflow	3.41E-01	MJ				Inflow	1.31E-02	MJ			
Water (fresh)	Inflow	5.04E+00	kg	Outflow	3.63E+00	kg	Inflow	1.93E-01	kg	Outflow	1.39E-01	kg
General energy	Inflow	1.02E+00	MJ				Inflow	3.92E-02	MJ			
General materials				Outflow	8.58E-03	kg				Outflow	3.30E-04	kg
Global Warming												
CO_2				Outflow	6.66E-02	kg				Outflow	2.56E-03	kg
Acidification												
SO_2 (Sulfur dioxide)				Outflow	1.77E-04	kg				Outflow	6.81E-06	kg
NO_x				Outflow	1.16E-04	kg				Outflow	4.46E-06	kg
Eutrophication												
P				Outflow	3.87E-05	kg				Outflow	1.48E-06	kg
NH_3 (Ammonia)				Outflow	5.33E-06	kg				Outflow	2.05E-07	kg
N				Outflow	6.80E-05	kg				Outflow	2.61E-06	kg
COD (Chemical Oxygen Demand)				Outflow	1.70E-03	kg				Outflow	6.53E-05	kg
LCA rice (Restaurant)				Outflow	1	kg				Outflow	0.005838924	kg/ (one sold ticket)
Resources used												
Crude oil (42.3MJ/kg)	Inflow	1.15E-03	kg				Inflow	6.72305E-06	kg			
Electricity	Inflow	2.30E-02	MJ				Inflow	0.000134003	MJ			
General energy	Inflow	1.56184	MJ				Inflow	0.009119465	MJ			
General materials	Inflow	8.22E-03	kg				Inflow	4.80181E-05	kg			
Global Warming												
CO_2				Outflow	1.62E-01	kg				Outflow	9.48E-04	kg
CH_4				Outflow	1.70E-05	kg				Outflow	9.94E-08	kg
N_2O				Outflow	1.02E-06	kg				Outflow	5.96E-09	kg
Acidification												
SO_2 (Sulfur dioxide)				Outflow	2.06E-04	kg				Outflow	1.20E-06	kg

Opera	Normalized per activity						Normalized to functional unit					
	Inflow	Amount	Unit	Outflow	Amount	Unit	Inflow	Amount	Unit	Outflow	Amount	Unit
NOx				Outflow	1.78E-03	kg				Outflow	1.04E-05	kg
Eutrophication												
NOx				Outflow	1.78E-03	kg				Outflow	1.04E-05	kg
LCA cod fish (Restaurant)				Outflow	1	kg				Outflow	0.010218117	kg/ (one sold ticket)
Resources used												
Crude oil (42.3MJ/kg)	Inflow	8.30E-01	kg				Inflow	0.008481037	kg			
Global Warming												
CO2				Outflow	2.48E+00	kg				Outflow	2.54E-02	kg
Acidification												
SO2 (Sulfur dioxide)				Outflow	5.40E-04	kg				Outflow	5.52E-06	kg
NOx				Outflow	5.65E-02	kg				Outflow	5.77E-04	kg
Eutrophication												
NOx				Outflow	5.65E-02	kg				Outflow	5.77E-04	kg

Opera	Normalized per activity						Normalized to functional unit					
	Inflow	Amount	Unit	Outflow	Amount	Unit	Inflow	Amount	Unit	Outflow	Amount	Unit
Toilet paper from new fibres, Husum paper mill				Outflow	1	kg					3.23E-02	kg/ (one sold ticket)
Resources used												
Fossil energy	Inflow	0.651968504	MJ				Inflow	0.021070522	MJ			
Electricity	Inflow	3.582992126	MJ				Inflow	0.115796258	MJ			
General energy	Inflow	21.1480315	MJ				Inflow	0.683468686	MJ			
General materials				Outflow	0.068566929	kg				Outflow	0.002215967	kg
General radioactive materials												
Global Warming												
CO2				Outflow	0.183089764	kg				Outflow	0.005917152	kg
Acidification												
SO2 (Sulfur dioxide)				Outflow	0.000897638	kg				Outflow	2.90101E-05	kg
NOx				Outflow	0.002233071	kg				Outflow	7.21691E-05	kg
Eutrophication												
P				Outflow	3.30709E-05	kg				Outflow	1.06879E-06	kg
NOx				Outflow	0.002233071	kg				Outflow	7.21691E-05	kg
N				Outflow	0.000299213	kg				Outflow	9.67005E-06	kg
COD (Chemical Oxygen Demand)				Outflow	0.016587402	kg				Outflow	0.000536077	kg
Toilet paper from old fibres, Katrinefors paper mill				Outflow	1	kg				Outflow	3.23E-02	kg/ (one sold ticket)
Resources used												
Fossil energy	Inflow	3	MJ				Inflow	9.70E-02	MJ			
Electricity	Inflow	5.4	MJ				Inflow	1.75E-01	MJ			
General energy	Inflow	4.741935484	MJ				Inflow	1.53E-01	MJ			
General materials				Outflow	0.012854839	kg				Outflow	4.15E-04	kg
Global Warming												
CO2				Outflow	0.204322581	kg				Outflow	6.60E-03	kg
Acidification												
SO2 (Sulfur dioxide)				Outflow	1.40323E-05	kg				Outflow	4.53E-07	kg
NOx				Outflow	0.000354839	kg				Outflow	1.15E-05	kg
Eutrophication												
P				Outflow	4.67742E-06	kg				Outflow	1.51E-07	kg
NOx				Outflow	0.000354839	kg				Outflow	1.15E-05	kg
N				Outflow	0.000193548	kg				Outflow	6.26E-06	kg
COD (Chemical Oxygen Demand)				Outflow	0.003112903	kg				Outflow	1.01E-04	kg
LCA Waste incineration Sweden (Organic municipal solid waste)	Inflow	1	kg				Inflow	0.475816334	kg/(one sold ticket)			
Resources used												
Electricity				Outflow	2.25	MJ				Outflow	1.070586753	MJ
General energy				Outflow	4.95	MJ				Outflow	2.355290856	MJ
Global Warming												
CO2				Outflow	9.13E-01	kg				Outflow	0.434420313	kg
Acidification												
SO2 (Sulfur dioxide)				Outflow	2.40E-04	kg				Outflow	0.000114196	kg
HCl (Hydrogen chloride)				Outflow	0.000247	kg				Outflow	0.000117527	kg
NOx				Outflow	5.49E-03	kg				Outflow	0.002612232	kg
NH3 (Ammonia)	Inflow	0.00215	kg				Inflow	0.001023005	kg			
Eutrophication												
NOx				Outflow	5.49E-03	kg				Outflow	0.002612232	kg
Deponi (No landfill gas extraction)	Inflow	1	kg				Inflow		kg/ (one sold ticket)			
Resources used												
Iron (Fe)				Outflow	1.00E-04	kg				Outflow		kg
Global Warming												
CH4				Outflow	0.158	kg				Outflow		kg

Opera	Normalized per activity						Normalized to functional unit					
	Inflow	Amount	Unit	Outflow	Amount	Unit	Inflow	Amount	Unit	Outflow	Amount	Unit
LCA electricity Sweden 230V				Outflow	1	MJ				Outflow	63.23	MJ/ (one sold ticket)
Resources used												
Aluminum ore (Bauxite)	Inflow	1.3887E-06	kg	Outflow	2.13E-06	kg	Inflow	0.000125749	kg	Outflow	1.34E-04	kg
Iron (Fe)	Inflow	1.87245E-05	kg	Outflow	2.99E-06	kg	Inflow	0.001183987	kg	Outflow	1.89E-04	kg
Uranium (504000MJ/kg)	Inflow	3.62E-06	kg				Inflow	0.0002289	kg			
Crude oil (42.3MJ/kg)	Inflow	0.001319776	kg				Inflow	0.083452082	kg			
Natural gas (44.1MJ/kg) (0.83 kg/Nm3)	Inflow	0.000811205	m^3				Inflow	0.051294139	m^3			
Hard coal (26.3 MJ/kg)	Inflow	0.003122605	kg				Inflow	0.197448619	kg			
Brown coal (Lignite) (11.9MJ/kg)	Inflow	0.000495647	kg				Inflow	0.031340729	kg			
Electricity	Inflow	0.737806402	MJ				Inflow	46.65298735	MJ			
Water (fresh)	Inflow	0.272742914	kg				Inflow	17.24608471	kg			
General energy	Inflow	1.06602E-05	MJ				Inflow	0.000674067	MJ			
General materials				Outflow	3.69E-02	kg				Outflow	2.33E+00	kg
General radioactive materials				Outflow	6.58E-04	kg				Outflow	4.16E-02	kg
Global Warming												
CO_2	Inflow	0.008775455	kg	Outflow	2.99E-02	kg	Inflow	0.554880715	kg	Outflow	1.89E+00	kg
CH_4				Outflow	2.31E-05	kg				Outflow	1.46E-03	kg
N_2O				Outflow	4.65E-07	kg				Outflow	2.94E-05	kg
SF_6 (Sulfur hexa fluoride)				Outflow	2.00E-11	kg				Outflow	1.26E-09	kg
CFC-11				Outflow	2.40E-08	kg				Outflow	1.51E-06	kg
CFC-12				Outflow	5.15E-09	kg				Outflow	3.26E-07	kg
CFC-13				Outflow	3.23E-09	kg				Outflow	2.04E-07	kg
CFC-114				Outflow	2.45E-08	kg				Outflow	1.55E-06	kg
HCFC-22				Outflow	5.63E-09	kg				Outflow	3.56E-07	kg
Acidification												
SO_2 (Sulfur dioxide)				Outflow	3.02E-05	kg				Outflow	1.91E-03	kg
HCl (Hydrogen chloride)				Outflow	5.90E-07	kg				Outflow	3.73E-05	kg
HF (Hydrogen fluoride)				Outflow	2.72E-08	kg				Outflow	1.72E-06	kg
NO_x				Outflow	3.81E-05	kg				Outflow	2.41E-03	kg
NH_3 (Ammonia)				Outflow	1.25E-06	kg				Outflow	7.90E-05	kg
Ammonia to ECO 99H												
NH_3 air (Ammonia)				Outflow	1.77E-07	kg				Outflow	1.12E-05	kg
Eutrophication												
PO_4 (-3) (Phosphate)				Outflow	6.32E-08	kg				Outflow	3.99E-06	kg
P	Inflow	1.67726E-11	kg				Inflow	1.06056E-09	kg			
NO_x				Outflow	3.81E-05	kg				Outflow	2.41E-03	kg
NH_3 (Ammonia)				Outflow	1.25E-06	kg				Outflow	7.90E-05	kg
NH_4^+ (Ammonium)				Outflow	8.26E-13	kg				Outflow	5.22E-11	kg
NO_3^- (Nitrate)				Outflow	7.29E-07	kg				Outflow	4.61E-05	kg
COD (Chemical Oxygen Demand)				Outflow	5.62E-06	kg				Outflow	3.55E-04	kg
LCA electricity EU 1-60 kV				Outflow	1	MJ				Outflow	0.00	MJ/ (one sold ticket)
Resources used												
Aluminum ore (Bauxite)	Inflow	1.08966E-06	kg	Outflow	1.56E-06	kg	Inflow		kg	Outflow		kg
Iron (Fe)	Inflow	2.55238E-05	kg	Outflow	6.65E-05	kg	Inflow		kg	Outflow		kg
Uranium (504000MJ/kg)	Inflow	2.61491E-06	kg				Inflow		kg			
Crude oil (42.3MJ/kg)	Inflow	0.004482342	kg				Inflow		kg			
Natural gas (44.1MJ/kg) (0.83 kg/Nm3)	Inflow	0.013152988	m^3				Inflow		m^3			
Hard coal (26.3 MJ/kg)	Inflow	0.021436896	kg				Inflow		kg			
Brown coal (Lignite) (11.9MJ/kg)	Inflow	0.030543256	kg				Inflow		kg			
Electricity	Inflow	0.225953612	MJ				Inflow		MJ			
Water (fresh)	Inflow	-0.827614379	kg				Inflow		kg			
General energy	Inflow	1.5049E-05	MJ				Inflow		MJ			
General materials				Outflow	5.78E-01	kg				Outflow		kg
General radioactive materials				Outflow	4.75E-04	kg				Outflow		kg
Global Warming												
CO_2	Inflow	0.002815013	kg	Outflow	1.47E-01	kg	Inflow		kg	Outflow		kg
CH_4				Outflow	2.84E-04	kg				Outflow		kg
N_2O				Outflow	3.56E-06	kg				Outflow		kg
SF_6 (Sulfur hexa fluoride)				Outflow	5.07E-12	kg				Outflow		kg
CFC-11				Outflow	1.73E-08	kg				Outflow		kg
CFC-12				Outflow	3.71E-09	kg				Outflow		kg
CFC-13				Outflow	2.33E-09	kg				Outflow		kg
CFC-114				Outflow	1.77E-08	kg				Outflow		kg
HCFC 22				Outflow	4.06E-09	kg				Outflow		kg
Acidification												
SO_2 (Sulfur dioxide)				Outflow	8.43E-04	kg				Outflow		kg
HCl (Hydrogen chloride)				Outflow	1.72E-05	kg				Outflow		kg
HF (Hydrogen fluoride)				Outflow	1.38E-06	kg				Outflow		kg
NO_x				Outflow	2.75E-04	kg				Outflow		kg
NH_3 (Ammonia)				Outflow	2.22E-06	kg				Outflow		kg
Ammonia to ECO 99H												
NH_3 air (Ammonia)				Outflow	6.03E-07	kg				Outflow		kg
Eutrophication												
PO_4 (-3) (Phosphate)				Outflow	4.63E-07	kg				Outflow		kg
P	Inflow	9.04526E-12	kg				Inflow		kg			
NO_x				Outflow	2.75E-04	kg				Outflow		kg
NH_3 (Ammonia)				Outflow	2.22E-06	kg				Outflow		kg
NH_4^+ (Ammonium)				Outflow	2.06E-12	kg				Outflow		kg
NO_3^- (Nitrate)				Outflow	2.56E-06	kg				Outflow		kg
COD (Chemical Oxygen Demand)				Outflow	3.95E-05	kg				Outflow		kg
LCA concrete building Bjorklund				Outflow	1	m2 floor area				Outflow	0.00	m2 floor area/ (one sold ticket)

Opera	Normalized per activity						Normalized to functional unit					
	Inflow	Amount	Unit	Outflow	Amount	Unit	Inflow	Amount	Unit	Outflow	Amount	Unit
Resources used												
Iron (Fe)				Outflow	0.000212	kg				Outflow	5.48E-07	kg
Crude oil (42.3MJ/kg)	Inflow	7.00E+00	kg	Outflow	0.0000589	kg	Inflow	0.018099787	kg	Outflow	1.52E-07	kg
Natural gas (44.1MJ/kg) (0.83 kg/Nm3	Inflow	1.956123815	m^3				Inflow	0.005060994	m^3			
Hard coal (26.3 MJ/kg)	Inflow	1.87E+01	kg				Inflow	0.048498765	kg			
Fossil energy	Inflow	96.6	MJ				Inflow	0.249928992	MJ			
Electricity	Inflow	2.52E+02	MJ				Inflow	0.651988676	MJ			
General energy	Inflow		MJ									
General materials				Outflow	820.2154	kg				Outflow	2.12E+00	kg
Global Warming												
CO2				Outflow	1.32E+02	kg				Outflow	3.42E-01	kg
CH4				Outflow	0.0664	kg				Outflow	1.72E-04	kg
N2O				Outflow	1.52E-08	kg				Outflow	3.93E-11	kg
Acidification												
SO2 (Sulfur dioxide)				Outflow	0.16195	kg				Outflow	4.19E-04	kg
HCl (Hydrogen chloride)				Outflow	3.52E-04	kg				Outflow	9.11E-07	kg
HF (Hydrogen fluoride)				Outflow	0.000472	kg				Outflow	1.22E-06	kg
NOx				Outflow	0.6003	kg				Outflow	1.55E-03	kg
NH3 (Ammonia)				Outflow	1.69E-02	kg				Outflow	4.37E-05	kg
Ammonia to ECO 99H												
NH3 air (Ammonia)				Outflow	1.69E-02	kg				Outflow	4.37E-05	kg
Eutrophication												
P				Outflow	0.00000314	kg				Outflow	8.12E-09	kg
NOx				Outflow	0.6003	kg				Outflow	1.55E-03	kg
NH3 (Ammonia)				Outflow	1.69E-02	kg				Outflow	4.37E-05	kg
N				Outflow	0.00035086	kg				Outflow	9.08E-07	kg
COD (Chemical Oxygen Demand)				Outflow	0.0069604	kg				Outflow	1.80E-05	kg
LCA VVS drinking water				Outflow	1	m^3				Outflow	0.06	m^3/ (one sold ticket)
Resources used												
Aluminum ore (Bauxite)	Inflow	0.013999377	kg	Outflow	5.48E-07	kg	Inflow	0.000801259	kg	Outflow	3.14E-08	kg
Iron (Fe)	Inflow	0.00351646	kg	Outflow	3.64E-05	kg	Inflow	0.000201266	kg	Outflow	2.08E-06	kg
Crude oil (42.3MJ/kg)	Inflow	0.012573264	kg				Inflow	0.000719635	kg			
Natural gas (44.1MJ/kg) (0.83 kg/Nm3	Inflow	0.038229655	m^3				Inflow	0.002188087	m^3			
Hard coal (26.3 MJ/kg)	Inflow	0.027839012	kg				Inflow	0.001593375	kg			
Brown coal (Lignite) (11.9MJ/kg)	Inflow	0.01768538	kg				Inflow	0.001012228	kg			
Water (fresh)	Inflow	1002.276446	kg				Inflow	57.36561462	kg			
General energy	Inflow	0.072707071	MJ	Outflow	1.79E+00	MJ	Inflow	0.004161413	MJ	Outflow	1.03E-01	MJ
General materials	Inflow	0.501899406	kg	Outflow	4.10E-01	kg	Inflow	0.028726374	kg	Outflow	2.35E-02	kg
General radioactive materials				Outflow	1.36E-04	kg				Outflow	7.76E-06	kg
Global Warming												
CO2	Inflow	0.000698028	kg	Outflow	6.01E-01	kg	Inflow	3.99519E-05	kg	Outflow	3.43E-02	kg
CH4				Outflow	7.33E-04	kg				Outflow	4.20E-05	kg
N2O				Outflow	2.38E-05	kg				Outflow	1.36E-06	kg
SF6 (Sulfur hexa fluoride)				Outflow	1.41E-12	kg				Outflow	8.06E-14	kg
CFC-11				Outflow	5.78E-09	kg				Outflow	3.31E-10	kg
CFC-12				Outflow	1.24E-09	kg				Outflow	7.11E-11	kg
CFC-13				Outflow	7.80E-10	kg				Outflow	4.46E-11	kg
CFC-114				Outflow	5.92E-09	kg				Outflow	3.39E-10	kg
HCFC-22				Outflow	1.36E-09	kg				Outflow	7.77E-11	kg
Acidification												
SO2 (Sulfur dioxide)				Outflow	8.21E-04	kg				Outflow	4.70E-05	kg
HCl (Hydrogen chloride)				Outflow	7.62E-06	kg				Outflow	4.36E-07	kg
HF (Hydrogen fluoride)				Outflow	3.97E-07	kg				Outflow	2.27E-08	kg
NOx				Outflow	1.21E-03	kg				Outflow	6.93E-05	kg
NH3 (Ammonia)				Outflow	4.64E-05	kg				Outflow	2.66E-06	kg
Ammonia to ECO 99H												
NH3 air (Ammonia)				Outflow	7.21E-07	kg				Outflow	4.13E-08	kg
Eutrophication												
PO4 (-3) (Phosphate)				Outflow	1.76E-06	kg				Outflow	1.01E-07	kg
P	Inflow	1.91206E-07	kg				Inflow	1.09438E-08	kg			
NOx				Outflow	1.21E-03	kg				Outflow	6.93E-05	kg
NH3 (Ammonia)				Outflow	4.64E-05	kg				Outflow	2.66E-06	kg
NH4+ (Ammonium)				Outflow	1.57E-12	kg				Outflow	8.99E-14	kg
NO3- (Nitrate)				Outflow	3.44E-04	kg				Outflow	1.97E-05	kg
COD (Chemical Oxygen Demand)				Outflow	1.04E-02	kg				Outflow	5.94E-04	kg
Waste water Ryaverket				Outflow	1	m^3				Outflow	0.06	m^3/ (one sold ticket)
Resources used												
Crude oil (42.3MJ/kg)	Inflow	3.55594E-05	kg				Inflow	2.03525E-06	kg			
Natural gas (44.1MJ/kg) (0.83 kg/Nm3	Inflow	9.96992E-06	m^3	Outflow	3.85E-02	m^3	Inflow	5.70631E-07	m^3	Outflow	2.20E-03	m^3
Electricity	Inflow	0.901642929	MJ				Inflow	0.051605823	MJ			
General energy	Inflow	0.386107647	MJ				Inflow	0.022098995	MJ			
Eutrophication												
P				Outflow	3.63E-04	kg				Outflow	2.08E-05	kg
NH4+ (Ammonium)				Outflow	1.00E-02	kg				Outflow	5.75E-04	kg
N				Outflow	1.26E-02	kg				Outflow	7.23E-04	kg
COD (Chemical Oxygen Demand)				Outflow	4.29E-02	kg				Outflow	2.45E-03	kg
District heating GBG				Outflow	1	MJ heat				Outflow	27.48	MJ heat/ (one sold ticket)
Global Warming												
CO2				Outflow	4.17E-03	kg				Outflow	1.15E-01	kg

Opera	Normalized per activity						Normalized to functional unit					
	Inflow	Amount	Unit	Outflow	Amount	Unit	Inflow	Amount	Unit	Outflow	Amount	Unit
Acidification												
SO2 (Sulfur dioxide)				Outflow	2.78E-07	kg				Outflow	7.63E-06	kg
NOx				Outflow	7.22E-06	kg				Outflow	1.98E-04	kg
Eutrophication												
NOx				Outflow	7.22E-06	kg				Outflow	1.98E-04	kg

APPENDIX 11 CHARACTERIZATION INDICATORS

Characterisation indicators		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sb_{eqv}/kg] [kg Sbeqv/MJ]	Global warming (time horizon of 100years) [kg $CO2_{eqv}$/kg]	Human toxicity [Human Toxicity Pontentials HTP,kg 1,4-DCB/kg]	Acidification [kg $SO2_{eqv}$/kg]	Eutrophication [kg $PO_4^{3-}{}_{eqv}$/kg]
Resources used (Data from Hitch Hiker´s guide to LCA)	Aluminum ore (Bauxite)	kg	1.00E-08				
	Iron (Fe)	kg	8.43E-08				
	Uranium	kg	2.87E-03				
	Crude oil	kg	2.01E-02				
	Natural gas	m^3	1.87E-02				
	Hard coal	kg	1.34E-02				
	Brown coal (Lignite)	kg	6.71E-03				
	Fossil energy	MJ	4.81E-04				
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO_2	kg		1.00E+00			
	CH4	kg		2.50E+01			
	CCl4	kg		1.40E+03			
	N2O	kg		2.98E+02			
	SF6 (Sulfur hexa fluoride)	kg		2.28E+04			
	CFC-11	kg		4.75E+03			
	CFC-12	kg		1.09E+04			
	CFC-13	kg		1.44E+04			
	CFC-114	kg		1.00E+04			
	HCFC-22	kg		1.81E+03			
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg				1.00E+00	
	HCl	kg				8.80E-01	
	HF	kg				1.60E+00	
	NOx	kg				7.00E-01	
	NH3	kg				1.88E+00	
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	PO4 (-3)	kg					1.00E+00
	H3PO4	kg					9.70E-01
	P	kg					3.06E+00
	NOx	kg					1.30E-01
	NH3	kg					3.50E-01
	NH4+	kg					3.30E-01
	NO3-	kg					1.00E-01
	HNO3	kg					1.00E-01
	N	kg					4.20E-01
	COD	kg					2.20E-02

APPENDIX 12 INVENTORY RESULTS FOR THE REGIONTEATER VÄST

Total environmental impact		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Resources used (Data from Hitch Hiker´s guide to LCA)	Aluminum ore (Bauxite)	kg	3.97E-10			
	Iron (Fe)	kg	2.83E-10			
	Uranium	kg	2.66E-07			
	Crude oil	kg	4.26E-02			
	Natural gas	m^3	1.73E-03			
	Hard coal	kg	2.54E-03			
	Brown coal (Lignite)	kg	1.71E-04			
	Fossil energy	MJ	3.31E-03			
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO2	kg		8.52E+00		
	CH4	kg		3.13E-02		
	N2O	kg		8.04E-01		
	SF6 (Sulfur hexa fluoride)	kg		1.42E-05		
	CFC-11	kg		2.90E-03		
	CFC-12	kg		1.43E-03		
	CFC-13	kg		1.19E-03		
	CFC-114	kg		6.26E-03		
	HCFC-22	kg		2.60E-04		
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg			2.85E-03	
	HCl	kg			2.40E-05	
	HF	kg			1.82E-05	
	NOx	kg			1.52E-02	
	NH3	kg			2.01E-04	
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	PO4 (-3)	kg				2.90E-06
	P	kg				2.98E-05
	NOx	kg				2.82E-03
	NH3	kg				3.75E-05
	NH4+	kg				-5.16E-09
	NO3-	kg				3.26E-06
	N	kg				1.62E-04
	COD	kg				6.99E-05

Total environmental impact	Resources used [kg Sbeqv/(functional unit)]	Global warming (time horizon of 100years) [kg CO2	Acidification [kg SO2eqv/(functional unit)]	Eutrophication [kg PO43-eqv/(functional
Functional Unit				
one sold ticket	5.03E-02	9.37E+00	1.83E-02	3.13E-03
one sold ticket*SEK	5.03E-04	9.37E-02	1.83E-04	3.13E-05
one sold ticket*Real price	2.01E-05	3.75E-03	7.32E-06	1.25E-06
one sold ticket*hour	2.01E-02	3.75E+00	7.31E-03	1.25E-03

Total building services		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Resources used (Data from Hitch Hiker´s guide to LCA)	Aluminum ore (Bauxite)	kg	5.37E-12			
	Iron (Fe)	kg	5.01E-11			
	Uranium	kg	2.61E-07			
	Crude oil	kg	1.38E-03			
	Natural Gas	m^3	5.59E-04			
	Hard Coal	kg	2.11E-03			
	Brown coal (Lignite)	kg	8.78E-05			
	Fossil energy	MJ	1.53E-04			
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO2	kg		1.91E+00		
	CH4	kg		2.21E-02		
	N2O	kg		3.74E-03		
	SF6 (Sulfur hexa fluoride)	kg		1.15E-05		
	CFC-11	kg		2.87E-03		
	CFC-12	kg		1.41E-03		
	CFC-13	kg		1.17E-03		
	CFC-114	kg		6.18E-03		
	HCFC-22	kg		2.57E-04		
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg			1.58E-03	
	HCl	kg			1.80E-05	
	HF	kg			4.26E-06	
	NOx	kg			3.39E-03	
	NH3	kg			1.94E-04	
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	PO4 (-3)	kg				1.65E-06
	P	kg				2.34E-05
	NOx	kg				6.29E-04
	NH3	kg				3.62E-05
	NH4+	kg				6.88E-12
	NO3-	kg				3.03E-06
	N	kg				1.54E-04
	COD	kg				4.23E-05

Total building services	Resources used [kg Sbeqv/(functional unit)]	Global warming (time horizon of 100years) [kg CO2	Acidification [kg SO2eqv/(functional unit)]	Eutrophication [kg PO43-eqv/(functional
Functional Unit				
one sold ticket	4.29E-03	1.95E+00	5.18E-03	8.90E-04
one sold ticket*SEK	4.29E-05	1.95E-02	5.18E-05	8.90E-06
one sold ticket*Real price	1.72E-06	7.79E-04	2.07E-06	3.56E-07
one sold ticket*hour	1.72E-03	7.78E-01	2.07E-03	3.56E-04

District heating impact		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Resources used (Data from Hitch Hiker´s guide to LCA)	Aluminum ore (Bauxite)	kg				
	Crude oil	kg	1.16E-04			
	Fossil energy	MJ				
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO2	kg		5.72E-01		
	CH4	kg				
	N2O	kg				
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg			8.09E-05	
	NOx	kg			8.27E-04	
	NH3	kg				
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	PO4 (-3)	kg				
	P	kg				
	NOx	kg				1.54E-04

District heating impact	Resources used [kg Sbeqv/(functional unit)]	Global warming (time horizon of 100years) [kg CO2	Acidification [kg SO2eqv/(functional unit)]	Eutrophication [kg PO43-eqv/(functional
Functional Unit				
one sold ticket	1.16E-04	5.72E-01	9.08E-04	1.54E-04
one sold ticket*SEK	1.16E-06	5.72E-03	9.08E-06	1.54E-06
one sold ticket*Real price	4.64E-08	2.29E-04	3.64E-07	6.15E-08
one sold ticket*hour	4.64E-05	2.29E-01	3.63E-04	6.15E-05

Electricity impact Sweden		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Resources used (Data from Hitch Hiker´s guide to LCA)	Aluminum ore (Bauxite)	kg	5.01E-13			
	Iron (Fe)	kg	3.97E-11			
	Uranium	kg	2.61E-07			
	Crude oil	kg	6.68E-04			
	Natural Gas	m^3	3.82E-04			
	Hard Coal	kg	1.05E-03			
	Brown coal (Lignite)	kg	8.37E-05			
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO2	kg		7.52E-01		
	CH4	kg		1.46E-02		
	N2O	kg		3.49E-03		
	SF6 (Sulfur hexa fluoride)	kg		1.15E-05		
	CFC-11	kg		2.86E-03		
	CFC-12	kg		1.41E-03		
	CFC-13	kg		1.17E-03		
	CFC-114	kg		6.17E-03		
	HCFC-22	kg		2.56E-04		
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg			7.60E-04	
	HCl	kg			1.31E-05	
	HF	kg			1.09E-06	
	NOx	kg			6.72E-04	
	NH3	kg			5.91E-05	
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	PO4 (-3)	kg				1.59E-06
	NOx	kg				1.25E-04
	NH3	kg				1.10E-05
	NH4+	kg				6.86E-12
	NO3-	kg				1.84E-06
	COD	kg				3.11E-06

Electricity impact Sweden	Resources used [kg Sbeqv/(functional unit)]	Global warming (time horizon of 100years) [kg CO2 eqv/(functional	Acidification [kg SO2eqv/(functional unit)]	Eutrophication [kg PO43-eqv/(functional unit)]
Functional Unit				
one sold ticket	2.19E-03	7.82E-01	1.50E-03	1.42E-04
one sold ticket*SEK	2.19E-05	7.82E-03	1.50E-05	1.42E-06
one sold ticket*Real price	8.76E-07	3.13E-04	6.03E-07	5.70E-08
one sold ticket*hour	8.75E-04	3.13E-01	6.02E-04	5.69E-05

Concrete building impact		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Resources used (Data from Hitch Hiker´s guide to LCA)	Crude oil	kg	5.85E-04			
	Natural Gas	m^3	1.52E-04			
	Hard Coal	kg	1.05E-03			
	Fossil energy	MJ	1.93E-04			
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO2	kg		5.50E-01		
	CH4	kg		6.91E-03		
	N2O	kg		1.89E-08		
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg			6.74E-04	
	HCl	kg			1.29E-06	
	HF	kg			3.14E-06	
	NOx	kg			1.75E-03	
	NH3	kg			1.32E-04	
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	P	kg				4.00E-08
	NOx	kg				3.25E-04
	NH3	kg				2.46E-05
	N	kg				6.14E-07
	COD	kg				6.38E-07

Concrete building impact	Resources used [kg Sbeqv/(functional unit)]	Global warming (time horizon of 100years) [kg CO2	Acidification [kg SO2eqv/(functional unit)]	Eutrophication [kg PO43-eqv/(functional
Functional Unit				
one sold ticket	1.98E-03	5.57E-01	2.56E-03	3.51E-04
one sold ticket*SEK	1.98E-05	5.57E-03	2.56E-05	3.51E-06
one sold ticket*Real price	7.92E-07	2.23E-04	1.03E-06	1.40E-07
one sold ticket*hour	7.91E-04	2.23E-01	1.02E-03	1.40E-04

Drinking water impact		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Resources used (Data from Hitch Hiker´s guide to LCA)	Aluminum ore (Bauxite)	kg	4.87E-12			
	Iron (Fe)	kg	1.03E-11			
	Crude oil	kg	8.80E-06			
	Natural Gas	m^3	2.49E-05			
	Hard Coal	kg	1.30E-05			
	Brown coal (Lignite)	kg	4.13E-06			
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO2	kg		2.09E-02		
	CH4	kg		6.38E-04		
	N2O	kg		2.46E-04		
	SF6 (Sulfur hexa fluoride)	kg		1.12E-09		
	CFC-11	kg		9.55E-07		
	CFC-12	kg		4.71E-07		
	CFC-13	kg		3.91E-07		
	CFC-114	kg		2.06E-06		
	HCFC-22	kg		8.55E-08		
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg			2.86E-05	
	HCl	kg			2.33E-07	
	HF	kg			2.21E-08	
	NOx	kg			2.95E-05	
	NH3	kg			3.04E-06	
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	PO4 (-3)	kg				6.14E-08
	NOx	kg				5.48E-06
	NH3	kg				5.65E-07
	NH4+	kg				1.81E-14
	NO3-	kg				1.20E-06
	COD	kg				7.95E-06

Drinking water impact	Resources used [kg Sbeqv/(functional unit)]	Global warming (time horizon of 100years) [kg CO2 eqv/(functional	Acidification [kg SO2eqv/(functional unit)]	Eutrophication [kg PO43-eqv/(functional unit)]
Functional Unit				
one sold ticket	5.08E-05	2.18E-02	6.14E-05	1.53E-05
one sold ticket*SEK	5.08E-07	2.18E-04	6.14E-07	1.53E-07
one sold ticket*Real price	2.03E-08	8.72E-06	2.46E-08	6.11E-09
one sold ticket*hour	2.03E-05	8.71E-03	2.46E-05	6.10E-06

Waste water impact		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	P	kg				2.02E-05
	N	kg				1.52E-04
	COD	kg				1.99E-05

Waste water impact	Resources used [kg Sbeqv/(functional unit)]	Global warming (time horizon of 100years) [kg CO2	Acidification [kg SO2eqv/(functional unit)]	Eutrophication [kg PO43- eqv/(functional
Functional Unit				
one sold ticket	0.00E+00	0.00E+00	0.00E+00	1.92E-04
one sold ticket*SEK	0.00E+00	0.00E+00	0.00E+00	1.92E-06
one sold ticket*Real price	0.00E+00	0.00E+00	0.00E+00	7.70E-08
one sold ticket*hour	0.00E+00	0.00E+00	0.00E+00	7.69E-05

Waste management		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Resources used (Data from Hitch Hiker´s guide to LCA)	Aluminum ore (Bauxite)	kg				
	Brown coal (Lignite)	kg				
	Fossil energy	MJ	-4.09E-05			
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO2	kg		1.35E-02		
	CH4	kg				
	N2O	kg				
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg			3.57E-05	
	HCl	kg			3.40E-06	
	NOx	kg			1.08E-04	
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	P	kg				3.14E-06
	NOx	kg				2.00E-05
	N	kg				1.61E-06
	COD	kg				1.07E-05

Waste management	Resources used [kg Sbeqv/(functional unit)]	Global warming (time horizon of 100years) [kg CO2 eqv/(functional	Acidification [kg SO2eqv/(functional unit)]	Eutrophication [kg PO43- eqv/(functional unit)]
Functional Unit				
one sold ticket	-4.09E-05	1.35E-02	1.47E-04	3.55E-05
one sold ticket*SEK	-4.09E-07	1.35E-04	1.47E-06	3.55E-07
one sold ticket*Real price	-1.64E-08	5.41E-06	5.88E-08	1.42E-08
one sold ticket*hour	-1.63E-05	5.40E-03	5.87E-05	1.42E-05

Total transport impact		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Resources used (Data from Hitch Hiker´s guide to LCA)	Aluminum ore (Bauxite)	kg				
	Uranium	kg				
	Crude oil	kg	4.03E-02			
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO2	kg		6.23E+00		
	CH4	kg				
	N2O	kg				
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg			6.64E-04	
	NOx	kg			1.03E-02	
	NH3	kg				
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	PO4 (-3)	kg				
	P	kg				
	NOx	kg				1.91E-03

Total Transport impact	Resources used [kg Sbeqv/(functional unit)]	Global warming (time horizon of 100years) [kg CO2	Acidification [kg SO2eqv/(functional unit)]	Eutrophication [kg PO43- eqv/(functional
Functional Unit				
one sold ticket	4.03E-02	6.23E+00	1.09E-02	1.91E-03
one sold ticket*SEK	4.03E-04	6.23E-02	1.09E-04	1.91E-05
one sold ticket*Real price	1.61E-05	2.49E-03	4.38E-06	7.64E-07
one sold ticket*hour	1.61E-02	2.49E+00	4.37E-03	7.63E-04

Transportation impact for employees		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Resources used (Data from Hitch Hiker´s guide to LCA)	Aluminum ore (Bauxite)	kg				
	Uranium	kg				
	Crude oil	kg	1.08E-02			
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO2	kg		1.62E+00		
	CH4	kg				
	N2O	kg				
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg				
	NOx	kg			2.83E-03	
	NH3	kg				
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	PO4 (-3)	kg				
	P	kg				
	NOx	kg				5.25E-04

Transportation impact for employees	Resources used [kg Sbeqv/(functional unit)]	Global warming (time horizon of 100years) [kg CO2	Acidification [kg SO2eqv/(functional unit)]	Eutrophication [kg PO43-eqv/(functional
Functional Unit				
one sold ticket	1.08E-02	1.62E+00	2.83E-03	5.25E-04
one sold ticket*SEK	1.08E-04	1.62E-02	2.83E-05	5.25E-06
one sold ticket*Real price	4.31E-06	6.49E-04	1.13E-06	2.10E-07
one sold ticket*hour	4.30E-03	6.48E-01	1.13E-03	2.10E-04

Transportation impact for tour		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Resources used (Data from Hitch Hiker´s guide to LCA)	Aluminum ore (Bauxite)	kg				
	Uranium	kg				
	Crude oil	kg	7.61E-03			
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO2	kg		1.17E+00		
	CH4	kg				
	N2O	kg				
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg			1.97E-04	
	NOx	kg			3.91E-03	
	NH3	kg				
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	PO4 (-3)	kg				
	P	kg				
	NOx	kg				7.26E-04

Transportation impact for tour	Resources used [kg Sbeqv/(functional unit)]	Global warming (time horizon of 100years) [kg CO2	Acidification [kg SO2eqv/(functional unit)]	Eutrophication [kg PO43-eqv/(functional
Functional Unit				
one sold ticket	7.61E-03	1.17E+00	4.10E-03	7.26E-04
one sold ticket*SEK	7.61E-05	1.17E-02	4.10E-05	7.26E-06
one sold ticket*Real price	3.05E-06	4.70E-04	1.64E-06	2.91E-07
one sold ticket*hour	3.04E-03	4.70E-01	1.64E-03	2.90E-04

Transportation impact for visitors		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Resources used (Data from Hitch Hiker´s guide to LCA)	Aluminum ore (Bauxite)	kg				
	Uranium	kg				
	Crude oil	kg	2.16E-02			
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO2	kg		3.39E+00		
	CH4	kg				
	N2O	kg				
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg				
	NOx	kg			2.94E-03	
	NH3	kg				
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	PO4 (-3)	kg				
	P	kg				
	NOx	kg				5.46E-04

Transportation impact for visitors	Resources used [kg Sbeqv/(functional unit)]	Global warming (time horizon of 100years) [kg CO2	Acidification [kg SO2eqv/(functional unit)]	Eutrophication [kg PO43-eqv/(functional
Functional Unit				
one sold ticket	2.16E-02	3.39E+00	2.94E-03	5.46E-04
one sold ticket*SEK	2.16E-04	3.39E-02	2.94E-05	5.46E-06
one sold ticket*Real price	8.65E-06	1.36E-03	1.18E-06	2.19E-07
one sold ticket*hour	8.65E-03	1.36E+00	1.18E-03	2.18E-04

Transportation impact for materials		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Resources used (Data from Hitch Hiker´s guide to LCA)	Aluminum ore (Bauxite)	kg				
	Uranium	kg				
	Crude oil	kg	2.68E-04			
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO2	kg		4.05E-02		
	CH4	kg				
	N2O	kg				
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg			4.67E-04	
	NOx	kg			5.91E-04	
	NH3	kg				
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	PO4 (-3)	kg				
	P	kg				
	NOx	kg				1.10E-04

Transportation impact for materials	Resources used [kg Sbeqv/(functional unit)]	Global warming (time horizon of 100years) [kg CO2	Acidification [kg SO2eqv/(functional unit)]	Eutrophication [kg PO43-eqv/(functional
Functional Unit				
one sold ticket	2.68E-04	4.05E-02	1.06E-03	1.10E-04
one sold ticket*SEK	2.68E-06	4.05E-04	1.06E-05	1.10E-06
one sold ticket*Real price	1.07E-07	1.62E-05	4.24E-07	4.39E-08
one sold ticket*hour	1.07E-04	1.62E-02	4.23E-04	4.39E-05

Transportation impact for Waste management		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Resources used (Data from Hitch Hiker´s guide to LCA)	Aluminum ore (Bauxite)	kg				
	Uranium	kg				
	Crude oil	kg	6.14E-07			
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO2	kg		9.40E-05		
	CH4	kg				
	N2O	kg				
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg			2.35E-08	
	NOx	kg			4.36E-07	
	NH3	kg				
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	PO4 (-3)	kg				
	P	kg				
	NOx	kg				8.09E-08

Transportation impact for Waste management	Resources used [kg Sbeqv/(functional unit)]	Global warming (time horizon of 100years) [kg CO2	Acidification [kg SO2eqv/(functional unit)]	Eutrophication [kg PO43-eqv/(functional
Functional Unit				
one sold ticket	6.14E-07	9.40E-05	4.59E-07	8.09E-08
one sold ticket*SEK	6.14E-09	9.40E-07	4.59E-09	8.09E-10
one sold ticket*Real price	2.46E-10	3.77E-08	1.84E-10	3.24E-11
one sold ticket*hour	2.46E-07	3.76E-05	1.84E-07	3.24E-08

Total materials		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Resources used (Data from Hitch Hiker´s guide to LCA)	Aluminum ore (Bauxite)	kg	3.92E-10			
	Iron (Fe)	kg	2.33E-10			
	Uranium	kg	4.57E-09			
	Crude oil	kg	1.19E-03			
	Natural Gas	m^3	1.18E-03			
	Hard Coal	kg	4.27E-04			
	Brown coal (Lignite)	kg	8.36E-05			
	Fossil energy	MJ	3.16E-03			
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO2	kg		4.24E-01		
	CH4	kg		9.22E-03		
	N2O	kg		8.01E-01		
	SF6 (Sulfur hexa fluoride)	kg		2.75E-06		
	CFC-11	kg		3.96E-05		
	CFC-12	kg		1.95E-05		
	CFC-13	kg		1.62E-05		
	CFC-114	kg		8.53E-05		
	HCFC-22	kg		3.54E-06		
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg			1.07E-03	
	HCl	kg			6.01E-06	
	HF	kg			1.40E-05	
	NOx	kg			2.12E-03	
	NH3	kg			7.02E-06	
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	PO4 (-3)	kg				1.25E-06
	P	kg				6.40E-06
	NOx	kg				3.94E-04
	NH3	kg				1.31E-06
	NH4+	kg				-5.16E-09
	NO3-	kg				2.33E-07
	N	kg				7.57E-06
	COD	kg				2.76E-05

Total materials	Resources used [kg Sbeqv/(functional unit)]	Global warming (time horizon of 100years) [kg CO2	Acidification [kg SO2eqv/(functional unit)]	Eutrophication [kg PO43-eqv/(functional
Functional Unit				
one sold ticket	6.04E-03	1.23E+00	3.22E-03	4.38E-04
one sold ticket*SEK	6.04E-05	1.23E-02	3.22E-05	4.38E-06
one sold ticket*Real price	2.42E-06	4.94E-04	1.29E-06	1.76E-07
one sold ticket*hour	2.42E-03	4.94E-01	1.29E-03	1.75E-04

Office		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Resources used (Data from Hitch Hiker´s guide to LCA)	Aluminum ore (Bauxite)	kg				
	Crude oil	kg	1.64E-05			
	Fossil energy	MJ	1.63E-05			
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO2	kg		1.20E-02		
	CH4	kg				
	N2O	kg				
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg			4.73E-05	
	NOx	kg			9.25E-05	
	NH3	kg				
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	P	kg				5.27E-06
	NOx	kg				1.72E-05
	N	kg				6.54E-06
	COD	kg				1.90E-05

Office	Resources used [kg Sbeqv/(functional unit)]	Global warming (time horizon of 100years) [kg CO2 eqv/(functional unit)]	Acidification [kg SO2eqv/(functional unit)]	Eutrophication [kg PO43-eqv/(functional unit)]
Functional Unit				
one sold ticket	3.28E-05	1.20E-02	1.40E-04	4.80E-05
one sold ticket*SEK	3.28E-07	1.20E-04	1.40E-06	4.80E-07
one sold ticket*Real price	1.31E-08	4.82E-06	5.60E-08	1.92E-08
one sold ticket*hour	1.31E-05	4.81E-03	5.59E-05	1.92E-05

Painting, patination textile and laundry		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Resources used (Data from Hitch Hiker´s guide to LCA)	Aluminum ore (Bauxite)	kg	2.91E-16			
	Iron (Fe)	kg	3.38E-13			
	Uranium	kg	1.78E-11			
	Crude oil	kg	1.43E-05			
	Natural Gas	m^3	9.68E-06			
	Hard Coal	kg	4.21E-06			
	Brown coal (Lignite)	kg	3.27E-07			
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO2	kg		3.62E-03		
	CH4	kg		1.67E-04		
	N2O	kg		3.08E-06		
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg			2.44E-05	
	HCl	kg			2.52E-07	
	HF	kg			5.55E-06	
	NOx	kg			1.08E-05	
	NH3	kg			1.03E-06	
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	PO4 (-3)	kg				4.19E-08
	P	kg				4.09E-08
	NOx	kg				2.00E-06
	NH3	kg				1.91E-07
	NH4+	kg				3.39E-09
	NO3-	kg				3.28E-10
	N	kg				7.99E-08
	COD	kg				2.04E-07

Painting, patination textile and laundry	Resources used [kg Sbeqv/(functional unit)]	Global warming (time horizon of 100years) [kg CO2 eqv/(functional	Acidification [kg SO2eqv/(functional unit)]	Eutrophication [kg PO43-eqv/(functional unit)]
Functional Unit				
one sold ticket	2.85E-05	3.79E-03	4.19E-05	2.56E-06
one sold ticket*SEK	2.85E-07	3.79E-05	4.19E-07	2.56E-08
one sold ticket*Real price	1.14E-08	1.52E-06	1.68E-08	1.03E-09
one sold ticket*hour	1.14E-05	1.51E-03	1.68E-05	1.02E-06

Props		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Resources used (Data from Hitch Hiker´s guide to LCA)	Iron (Fe)	kg	2.08E-10			
	Crude oil	kg	8.11E-04			
	Natural Gas	m^3	6.18E-04			
	Hard Coal	kg	1.67E-04			
	Fossil energy	MJ	2.96E-03			
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO2	kg		2.09E-01		
	CH4	kg		3.37E-04		
	N2O	kg		1.20E-04		
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg			4.68E-04	
	HCl	kg			2.55E-07	
	NOx	kg			1.54E-03	
	NH3	kg			4.60E-07	
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	PO4 (-3)	kg				1.31E-07
	NOx	kg				2.87E-04
	NH3	kg				8.57E-08
	COD	kg				5.31E-06

Props	Resources used [kg Sbeqv/(functional unit)]	Global warming (time horizon of 100years) [kg CO2	Acidification [kg SO2eqv/(functional unit)]	Eutrophication [kg PO43-eqv/(functional
Functional Unit				
one sold ticket	4.56E-03	2.10E-01	2.01E-03	2.92E-04
one sold ticket*SEK	4.56E-05	2.10E-03	2.01E-05	2.92E-06
one sold ticket*Real price	1.82E-06	8.39E-05	8.06E-07	1.17E-07
one sold ticket*hour	1.82E-03	8.38E-02	8.05E-04	1.17E-04

Forge		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Resources used (Data from Hitch Hiker´s guide to LCA)	Aluminum ore (Bauxite)	kg	3.91E-10			
	Iron (Fe)	kg	1.67E-11			
	Uranium	kg	3.61E-09			
	Crude oil	kg	1.92E-04			
	Natural Gas	m^3	4.46E-04			
	Hard Coal	kg	1.80E-04			
	Brown coal (Lignite)	kg	8.30E-05			
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO2	kg		1.45E-01		
	CH4	kg		6.68E-03		
	N2O	kg		8.00E-01		
	SF6 (Sulfur hexa fluoride)	kg		2.75E-06		
	CFC-11	kg		3.94E-05		
	CFC-12	kg		1.95E-05		
	CFC-13	kg		1.61E-05		
	CFC-114	kg		8.50E-05		
	HCFC-22	kg		3.53E-06		
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg			4.74E-04	
	HCl	kg			5.49E-06	
	HF	kg			8.41E-06	
	NOx	kg			1.88E-04	
	NH3	kg			5.51E-06	
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	PO4 (-3)	kg				1.07E-06
	NOx	kg				3.49E-05
	NH3	kg				1.03E-06
	NH4+	kg				-8.52E-09
	NO3-	kg				2.32E-07
	COD	kg				5.76E-07

Forge	Resources used [kg Sbeqv/(functional unit)]	Global warming (time horizon of 100years) [kg CO2 eqv/(functional unit)]	Acidification [kg SO2eqv/(functional unit)]	Eutrophication [kg PO43-eqv/(functional unit)]
Functional Unit				
one sold ticket	9.01E-04	9.52E-01	6.81E-04	3.78E-05
one sold ticket*SEK	9.01E-06	9.52E-03	6.81E-06	3.78E-07
one sold ticket*Real price	3.61E-07	3.81E-04	2.73E-07	1.51E-08
one sold ticket*hour	3.61E-04	3.81E-01	2.72E-04	1.51E-05

Carpenter		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Resources used (Data from Hitch Hiker´s guide to LCA)	Iron (Fe)	kg	8.38E-12			
	Uranium	kg	2.31E-12			
	Crude oil	kg	6.86E-05			
	Natural Gas	m^3	1.85E-05			
	Hard Coal	kg	2.73E-06			
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO2	kg		1.14E-02		
	CH4	kg		1.13E-04		
	N2O	kg				
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg			1.55E-06	
	NOx	kg			1.33E-04	
	NH3	kg				
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	PO4 (-3)	kg				
	NOx	kg				2.46E-05
	COD	kg				7.78E-09

Carpenter	Resources used [kg Sbeqv/(functional unit)]	Global warming (time horizon of 100years) [kg CO2 eqv/(functional	Acidification [kg SO2eqv/(functional unit)]	Eutrophication [kg PO43-eqv/(functional unit)]
Functional Unit				
one sold ticket	8.99E-05	1.15E-02	1.34E-04	2.46E-05
one sold ticket*SEK	8.99E-07	1.15E-04	1.34E-06	2.46E-07
one sold ticket*Real price	3.60E-08	4.62E-06	5.37E-08	9.87E-09
one sold ticket*hour	3.59E-05	4.61E-03	5.37E-05	9.86E-06

Costume		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Resources used (Data from Hitch Hiker´s guide to LCA)	Uranium	kg	9.30E-10			
	Crude oil	kg	8.66E-05			
	Natural Gas	m^3	8.17E-05			
	Hard Coal	kg	7.21E-05			
	Fossil energy	MJ	1.68E-04			
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO2	kg		3.95E-02		
	CH4	kg		1.90E-03		
	N2O	kg				
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg			5.63E-05	
	NOx	kg			1.46E-04	
	NH3	kg				
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	P	kg				9.31E-07
	NOx	kg				2.71E-05
	N	kg				9.82E-09
	COD	kg				1.71E-06

Costume	Resources used [kg Sbeqv/(functional unit)]	Global warming (time horizon of 100years) [kg CO2 eqv/(functional	Acidification [kg SO2eqv/(functional unit)]	Eutrophication [kg PO43-eqv/(functional unit)]
Functional Unit				
one sold ticket	4.09E-04	4.14E-02	2.02E-04	2.98E-05
one sold ticket*SEK	4.09E-06	4.14E-04	2.02E-06	2.98E-07
one sold ticket*Real price	1.64E-07	1.66E-05	8.10E-08	1.19E-08
one sold ticket*hour	1.63E-04	1.65E-02	8.10E-05	1.19E-05

Wig and makeup		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Resources used (Data from Hitch Hiker´s guide to LCA)	Aluminum ore (Bauxite)	kg	1.38E-12			
	Iron (Fe)	kg	5.91E-14			
	Uranium	kg	1.28E-11			
	Crude oil	kg	7.62E-07			
	Natural Gas	m^3	1.63E-06			
	Hard Coal	kg	6.49E-07			
	Brown coal (Lignite)	kg	2.94E-07			
	Fossil energy	MJ	2.16E-07			
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO2	kg		5.32E-04		
	CH4	kg		2.37E-05		
	N2O	kg		2.84E-06		
	SF6 (Sulfur hexa fluoride)	kg		9.74E-10		
	CFC-11	kg		1.40E-07		
	CFC-12	kg		6.89E-08		
	CFC-13	kg		5.72E-08		
	CFC-114	kg		3.01E-07		
	HCFC-22	kg		1.25E-08		
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg			1.68E-06	
	HCl	kg			1.94E-08	
	HF	kg			2.98E-08	
	NOx	kg			7.65E-07	
	NH3	kg			1.95E-08	
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	PO4 (-3)	kg				3.80E-09
	NOx	kg				1.42E-07
	NH3	kg				3.63E-09
	NH4+	kg				-3.02E-11
	NO3-	kg				8.21E-10
	COD	kg				2.43E-09

Wig and makeup	Resources used [kg Sbeqv/(functional unit)]	Global warming (time horizon of 100years) [kg CO2 eqv/(functional	Acidification [kg SO2eqv/(functional unit)]	Eutrophication [kg PO43-eqv/(functional unit)]
Functional Unit				
one sold ticket	3.55E-06	5.59E-04	2.52E-06	1.53E-07
one sold ticket*SEK	3.55E-08	5.59E-06	2.52E-08	1.53E-09
one sold ticket*Real price	1.42E-09	2.24E-07	1.01E-09	6.12E-11
one sold ticket*hour	1.42E-06	2.24E-04	1.01E-06	6.11E-08

Building maintanance		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Resources used (Data from Hitch Hiker´s guide to LCA)	Aluminum ore (Bauxite)	kg				
	Crude oil	kg	4.56E-06			
	Fossil energy	MJ	1.68E-05			
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO_2	kg		3.07E-03		
	CH4	kg				
	N2O	kg				
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg			4.65E-07	
	HCl	kg				
	HF	kg				
	NOx	kg			6.12E-06	
	NH3	kg				
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	P	kg				1.66E-07
	NOx	kg				1.14E-06
	N	kg				9.44E-07
	COD	kg				7.96E-07

Building maintanance	Resources used [kg Sbeqv/(functional unit)]	Global warming (time horizon of 100years) [kg CO2 eqv/(functional	Acidification [kg SO2eqv/(functional unit)]	Eutrophication [kg PO43-eqv/(functional unit)]
Functional Unit				
one sold ticket	2.13E-05	3.07E-03	6.58E-06	3.04E-06
one sold ticket*SEK	2.13E-07	3.07E-05	6.58E-08	3.04E-08
one sold ticket*Real price	8.54E-09	1.23E-06	2.63E-09	1.22E-09
one sold ticket*hour	8.53E-06	1.23E-03	2.63E-06	1.22E-06

APPENDIX 13 INVENTORY RESULTS FOR THE GÖTEBORG OPERA

Total environmental impact for the opera		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Resources used (Data from Hitch Hiker´s guide to LCA)	Aluminum ore (Bauxite)	kg	2.40E-10			
	Iron (Fe)	kg	6.75E-09			
	Uranium	kg	6.82E-07			
	Crude oil	kg	5.54E-02			
	Natural gas	m^3	2.47E-02			
	Hard coal	kg	8.84E-03			
	Brown coal (Lignite)	kg	1.23E-03			
	Fossil energy	MJ	1.38E-03			
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO2	kg		1.34E+01		
	CH4	kg		1.30E+00		
	N2O	kg		5.44E-01		
	SF6 (Sulfur hexa fluoride)	kg		3.04E-05		
	CFC-11	kg		7.22E-03		
	CFC-12	kg		3.56E-03		
	CFC-13	kg		2.95E-03		
	CFC-114	kg		1.56E-02		
	HCFC-22	kg		6.47E-04		
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg			1.58E-02	
	HCl	kg			2.59E-04	
	HF	kg			1.78E-05	
	NOx	kg			3.36E-02	
	NH3	kg			3.43E-03	
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	PO4 (-3)	kg				8.86E-04
	P	kg				1.41E-04
	NOx	kg				6.19E-03
	NH3	kg				6.38E-04
	NH4+	kg				1.90E-04
	NO3-	kg				7.27E-06
	N	kg				8.16E-04
	COD	kg				1.77E-04

Total environmental impact for the opera	Resources used [kg Sbeqv/(functional unit)]	Global warming (time horizon of 100years) [kg CO2	Acidification [kg SO2eqv/(functional unit)]	Eutrophication [kg PO43-eqv/(functional
Functional Unit				
one sold ticket	9.15E-02	1.53E+01	5.32E-02	9.04E-03
one sold ticket*SEK	2.38E-04	3.99E-02	1.38E-04	2.35E-05
one sold ticket*Real price	5.55E-05	9.28E-03	3.22E-05	5.48E-06
one sold ticket*hour	3.05E-02	5.10E+00	1.77E-02	3.01E-03

Total building services		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Resources used (Data from Hitch Hiker´s guide to LCA)	Aluminum ore (Bauxite)	kg	9.27E-12			
	Iron (Fe)	kg	1.17E-10			
	Uranium	kg	6.57E-07			
	Crude oil	kg	2.06E-03			
	Natural Gas	m^3	1.09E-03			
	Hard Coal	kg	3.32E-03			
	Brown coal (Lignite)	kg	2.17E-04			
	Fossil energy	MJ	8.37E-05			
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO2	kg		2.81E+00		
	CH4	kg		4.19E-02		
	N2O	kg		9.18E-03		
	SF6 (Sulfur hexa fluoride)	kg		2.88E-05		
	CFC-11	kg		7.20E-03		
	CFC-12	kg		3.55E-03		
	CFC-13	kg		2.95E-03		
	CFC-114	kg		1.55E-02		
	HCFC-22	kg		6.44E-04		
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg			2.52E-03	
	HCl	kg			1.37E-04	
	HF	kg			4.74E-06	
	NOx	kg			4.83E-03	
	NH3	kg			2.36E-04	
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	PO4 (-3)	kg				4.09E-06
	P	kg				6.63E-05
	NOx	kg				8.98E-04
	NH3	kg				4.39E-05
	NH4+	kg				1.90E-04
	NO3-	kg				6.58E-06
	N	kg				3.05E-04
	COD	kg				8.48E-05

Total building services	Resources used [kg Sbeqv/(functional unit]	Global warming (time horizon of 100years) [kg CO2	Acidification [kg SO2eqv/(functional unit]	Eutrophication [kg PO43-eqv/(functional
Functional Unit				
one sold ticket	6.77E-03	2.89E+00	7.74E-03	1.60E-03
one sold ticket*SEK	1.76E-05	7.54E-03	2.01E-05	4.16E-06
one sold ticket*Real price	4.10E-06	1.75E-03	4.69E-06	9.69E-07
one sold ticket*hour	2.26E-03	9.65E-01	2.58E-03	5.33E-04

District heating impact		Characterisation indicators - Unit as we calculated in before -->	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO2	kg	1.15E-01		
	CH4	kg			
	CCl4	kg			
	N2O	kg			
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg		7.63E-06	
	HCl	kg			
	HF	kg			
	NOx	kg		1.39E-04	
	NH3	kg			
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	PO4 (-3)	kg			
	H3PO4	kg			
	P	kg			
	NOx	kg			2.58E-05

District heating impact	Global warming (time horizon of 100years) [kg CO2	Acidification [kg SO2eqv/(functional unit]	Eutrophication [kg PO43-eqv/(functional
Functional Unit			
one sold ticket	1.15E-01	1.47E-04	2.58E-05
one sold ticket*SEK	2.98E-04	3.82E-07	6.72E-08
one sold ticket*Real price	6.94E-05	8.88E-08	1.56E-08
one sold ticket*hour	3.82E-02	4.89E-05	8.60E-06

Electricity Sweden impact		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Resources used (Data from Hitch Hiker´s guide to LCA)	Aluminum ore (Bauxite)	kg	1.26E-12			
	Iron (Fe)	kg	9.98E-11			
	Uranium	kg	6.57E-07			
	Crude oil	kg	1.68E-03			
	Natural Gas	m^3	9.59E-04			
	Hard Coal	kg	2.65E-03			
	Brown coal (Lignite)	kg	2.10E-04			
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO2	kg		1.89E+00		
	CH4	kg		3.66E-02		
	N2O	kg		8.77E-03		
	SF6 (Sulfur hexa fluoride)	kg		2.88E-05		
	CFC-11	kg		7.20E-03		
	CFC-12	kg		3.55E-03		
	CFC-13	kg		2.94E-03		
	CFC-114	kg		1.55E-02		
	HCFC-22	kg		6.44E-04		
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg			1.91E-03	
	HCl	kg			3.28E-05	
	HF	kg			2.75E-06	
	NOx	kg			1.69E-03	
	NH3	kg			1.48E-04	
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	PO4 (-3)	kg				3.99E-06
	NOx	kg				3.13E-04
	NH3	kg				2.76E-05
	NH4+	kg				1.72E-11
	NO3-	kg				4.61E-06
	COD	kg				7.81E-06

Electricity Sweden impact	Resources used [kg Sbeqv/(functional unit]	Global warming (time horizon of 100years) [kg CO2 eqv/(functional	Acidification [kg SO2eqv/(functional unit]	Eutrophication [kg PO43-eqv/(functional unit]
Functional Unit				
one sold ticket	5.49E-03	1.96E+00	3.78E-03	3.58E-04
one sold ticket*SEK	1.43E-05	5.11E-03	9.84E-06	9.31E-07
one sold ticket*Real price	3.33E-06	1.19E-03	2.29E-06	2.17E-07
one sold ticket*hour	1.83E-03	6.55E-01	1.26E-03	1.19E-04

Concrete building impact		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Resources used (Data from Hitch Hiker´s guide to LCA)	Crude oil	kg	3.64E-04			
	Natural Gas	m^3	9.46E-05			
	Hard Coal	kg	6.50E-04			
	Fossil energy	MJ	1.20E-04			
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO2	kg		3.42E-01		
	CH4	kg		4.29E-03		
	N2O	kg		1.17E-08		
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg			4.19E-04	
	HCl	kg			8.01E-07	
	HF	kg			1.95E-06	
	NOx	kg			1.09E-03	
	NH3	kg			8.22E-05	
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	P	kg				2.49E-08
	NOx	kg				2.02E-04
	NH3	kg				1.53E-05
	N	kg				3.81E-07
	COD	kg				3.96E-07

Concrete building impact	Resources used [kg Sbeqv/(functional unit)]	Global warming (time horizon of 100years) [kg CO2	Acidification [kg SO2eqv/(functional unit)]	Eutrophication [kg PO43-eqv/(functional
Functional Unit				
one sold ticket	1.23E-03	3.46E-01	1.59E-03	2.18E-04
one sold ticket*SEK	3.20E-06	9.01E-04	4.14E-06	5.68E-07
one sold ticket*Real price	7.45E-07	2.10E-04	9.64E-07	1.32E-07
one sold ticket*hour	4.10E-04	1.15E-01	5.30E-04	7.27E-05

Drinking water impact		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Resources used (Data from Hitch Hiker´s guide to LCA)	Aluminum ore (Bauxite)	kg	8.01E-12			
	Iron (Fe)	kg	1.70E-11			
	Crude oil	kg	1.45E-05			
	Natural Gas	m^3	4.09E-05			
	Hard Coal	kg	2.14E-05			
	Brown coal (Lignite)	kg	6.79E-06			
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO2	kg		3.43E-02		
	CH4	kg		1.05E-03		
	N2O	kg		4.05E-04		
	SF6 (Sulfur hexa fluoride)	kg		1.84E-09		
	CFC-11	kg		1.57E-06		
	CFC-12	kg		7.75E-07		
	CFC-13	kg		6.43E-07		
	CFC-114	kg		3.39E-06		
	HCFC-22	kg		1.41E-07		
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg			4.70E-05	
	HCl	kg			3.84E-07	
	HF	kg			3.64E-08	
	NOx	kg			4.85E-05	
	NH3	kg			4.99E-06	
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	PO4 (-3)	kg				1.01E-07
	NOx	kg				9.01E-06
	NH3	kg				9.29E-07
	NH4+	kg				2.97E-14
	NO3-	kg				1.97E-06
	COD	kg				1.31E-05

Drinking water impact	Resources used [kg Sbeqv/(functional unit)]	Global warming (time horizon of 100years) [kg CO2 eqv/(functional	Acidification [kg SO2eqv/(functional unit)]	Eutrophication [kg PO43-eqv/(functional unit)]
Functional Unit				
one sold ticket	8.35E-05	3.58E-02	1.01E-04	2.51E-05
one sold ticket*SEK	2.18E-07	9.32E-05	2.63E-07	6.53E-08
one sold ticket*Real price	5.06E-08	2.17E-05	6.12E-08	1.52E-08
one sold ticket*hour	2.78E-05	1.19E-02	3.36E-05	8.36E-06

Waste water impact		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Resources used (Data from Hitch Hiker´s guide to LCA)	Uranium	kg		
	Crude oil	kg	4.09E-08	
	Natural Gas	m^3	1.07E-08	
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	P	kg		6.35E-05
	NH4+	kg		1.90E-04
	N	kg		3.04E-04
	COD	kg		5.40E-05

Waste water impact	Resources used [kg Sbeqv/(functional unit)]	Eutrophication [kg PO43-eqv/(functional
Functional Unit		
one sold ticket	5.16E-08	6.11E-04
one sold ticket*SEK	1.34E-10	1.59E-06
one sold ticket*Real price	3.13E-11	3.70E-07
one sold ticket*hour	1.72E-08	2.04E-04

Waste management		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Resources used (Data from Hitch Hiker´s guide to LCA)	Aluminum ore (Bauxite)	kg				
	Iron (Fe)	kg				
	Fossil energy	MJ	-3.65E-05			
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO2	kg		4.34E-01		
	CH4	kg				
	CCl4	kg				
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg			1.43E-04	
	HCl	kg			1.03E-04	
	NOx	kg			1.87E-03	
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	P	kg				2.81E-06
	NOx	kg				3.47E-04
	N	kg				1.43E-06
	COD	kg				9.58E-06

Waste management	Resources used [kg Sbeqv/(functional unit)]	Global warming (time horizon of 100years) [kg CO2	Acidification [kg SO2eqv/(functional unit)]	Eutrophication [kg PO43-eqv/(functional
Functional Unit				
one sold ticket	-3.65E-05	4.34E-01	2.12E-03	3.61E-04
one sold ticket*SEK	-9.51E-08	1.13E-03	5.51E-06	9.41E-07
one sold ticket*Real price	-2.21E-08	2.63E-04	1.28E-06	2.19E-07
one sold ticket*hour	-1.22E-05	1.45E-01	7.06E-04	1.20E-04

Total transport impact		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Resources used (Data from Hitch Hiker´s guide to LCA)	Aluminum ore (Bauxite)	kg				
	Iron (Fe)	kg				
	Crude oil	kg	4.45E-02			
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO2	kg		5.81E+00		
	CH4	kg				
	CCl4	kg				
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg			1.37E-03	
	NOx	kg			2.08E-02	
	NH3	kg				
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	PO4 (-3)	kg				
	H3PO4	kg				
	NOx	kg				3.81E-03

Total Transport impact	Resources used [kg Sbeqv/(functional unit)]	Global warming (time horizon of 100years) [kg CO2	Acidification [kg SO2eqv/(functional unit)]	Eutrophication [kg PO43-eqv/(functional
Functional Unit				
one sold ticket	4.45E-02	5.81E+00	2.22E-02	3.81E-03
one sold ticket*SEK	1.16E-04	1.51E-02	5.78E-05	9.92E-06
one sold ticket*Real price	2.70E-05	3.52E-03	1.35E-05	2.31E-06
one sold ticket*hour	1.48E-02	1.94E+00	7.40E-03	1.27E-03

Transportation impact for employees		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Resources used (Data from Hitch Hiker´s guide to LCA)	Aluminum ore (Bauxite)	kg				
	Iron (Fe)	kg				
	Crude oil	kg	8.34E-03			
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO2	kg		1.26E+00		
	CH4	kg				
	CCl4	kg				
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg			1.20E-03	
	NOx	kg			5.13E-03	
	NH3	kg				
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	PO4 (-3)	kg				
	H3PO4	kg				
	NOx	kg				9.52E-04

Transportation impact for employees	Resources used [kg Sbeqv/(functional unit)]	Global warming (time horizon of 100years) [kg CO2	Acidification [kg SO2eqv/(functional unit)]	Eutrophication [kg PO43-eqv/(functional
Functional Unit				
one sold ticket	8.34E-03	1.26E+00	6.33E-03	9.52E-04
one sold ticket*SEK	2.17E-05	3.28E-03	1.65E-05	2.48E-06
one sold ticket*Real price	5.06E-06	7.65E-04	3.84E-06	5.77E-07
one sold ticket*hour	2.78E-03	4.20E-01	2.11E-03	3.17E-04

Transportation impact by their own transports		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Resources used (Data from Hitch Hiker´s guide to LCA)	Aluminum ore (Bauxite)	kg				
	Iron (Fe)	kg				
	Crude oil	kg	4.01E-04			
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO2	kg		6.27E-02		
	CH4	kg				
	CCl4	kg				
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg			2.51E-06	
	NOx	kg			9.21E-05	
	NH3	kg				
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	PO4 (-3)	kg				
	H3PO4	kg				
	NOx	kg				1.71E-05

Transportation impact by their own transports	Resources used [kg Sbeqv/(functional unit)]	Global warming (time horizon of 100years) [kg CO2	Acidification [kg SO2eqv/(functional unit)]	Eutrophication [kg PO43-eqv/(functional
Functional Unit				
one sold ticket	4.01E-04	6.27E-02	9.46E-05	1.71E-05
one sold ticket*SEK	1.04E-06	1.63E-04	2.46E-07	4.45E-08
one sold ticket*Real price	2.43E-07	3.80E-05	5.73E-08	1.04E-08
one sold ticket*hour	1.34E-04	2.09E-02	3.15E-05	5.70E-06

Transportation impact for visitors		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Resources used (Data from Hitch Hiker´s guide to LCA)	Aluminum ore (Bauxite)	kg				
	Iron (Fe)	kg				
	Crude oil	kg	3.54E-02			
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO2	kg		4.43E+00		
	CH4	kg				
	CCl4	kg				
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg				
	NOx	kg			1.52E-02	
	NH3	kg				
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	PO4 (-3)	kg				
	H3PO4	kg				
	NOx	kg				2.77E-03

Transportation impact for visitors	Resources used [kg Sbeqv/(functional unit)]	Global warming (time horizon of 100years) [kg CO2	Acidification [kg SO2eqv/(functional unit)]	Eutrophication [kg PO43-eqv/(functional
Functional Unit				
one sold ticket	3.54E-02	4.43E+00	1.52E-02	2.77E-03
one sold ticket*SEK	9.22E-05	1.15E-02	3.96E-05	7.22E-06
one sold ticket*Real price	2.15E-05	2.69E-03	9.22E-06	1.68E-06
one sold ticket*hour	1.18E-02	1.48E+00	5.07E-03	9.24E-04

Transportation impact for materials		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Resources used (Data from Hitch Hiker´s guide to LCA)	Aluminum ore (Bauxite)	kg				
	Iron (Fe)	kg				
	Crude oil	kg	3.42E-04			
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO2	kg		5.44E-02		
	CH4	kg				
	CCl4	kg				
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg			1.69E-04	
	NOx	kg			3.79E-04	
	NH3	kg				
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	PO4 (-3)	kg				
	H3PO4	kg				
	NOx	kg				7.03E-05

Transportation impact for materials	Resources used [kg Sbeqv/(functional unit)]	Global warming (time horizon of 100years) [kg CO2	Acidification [kg SO2eqv/(functional unit)]	Eutrophication [kg PO43-eqv/(functional
Functional Unit				
one sold ticket	3.42E-04	5.44E-02	5.47E-04	7.03E-05
one sold ticket*SEK	8.91E-07	1.42E-04	1.43E-06	1.83E-07
one sold ticket*Real price	2.07E-07	3.30E-05	3.32E-07	4.26E-08
one sold ticket*hour	1.14E-04	1.81E-02	1.82E-04	2.34E-05

Transportation impact for Waste management		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Resources used (Data from Hitch Hiker´s guide to LCA)	Aluminum ore (Bauxite)	kg				
	Iron (Fe)	kg				
	Crude oil	kg	2.77E-06			
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO2	kg		4.25E-04		
	CH4	kg				
	CCl4	kg				
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg			1.06E-07	
	NOx	kg			1.97E-06	
	NH3	kg				
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	PO4 (-3)	kg				
	H3PO4	kg				
	NOx	kg				3.65E-07

Transportation impact for Waste management	Resources used [kg Sbeqv/(functional unit)]	Global warming (time horizon of 100years) [kg CO2	Acidification [kg SO2eqv/(functional unit)]	Eutrophication [kg PO43-eqv/(functional
Functional Unit				
one sold ticket	2.77E-06	4.25E-04	2.07E-06	3.65E-07
one sold ticket*SEK	7.23E-09	1.11E-06	5.40E-09	9.51E-10
one sold ticket*Real price	1.68E-09	2.57E-07	1.26E-09	2.21E-10
one sold ticket*hour	9.25E-07	1.42E-04	6.91E-07	1.22E-07

Total materials		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Resources used (Data from Hitch Hiker´s guide to LCA)	Aluminum ore (Bauxite)	kg	2.31E-10			
	Iron (Fe)	kg	6.63E-09			
	Uranium	kg	2.51E-08			
	Crude oil	kg	9.02E-03			
	Natural Gas	m^3	2.36E-02			
	Hard Coal	kg	5.52E-03			
	Brown coal (Lignite)	kg	1.01E-03			
	Fossil energy	MJ	9.81E-04			
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO2	kg		4.74E+00		
	CH4	kg		1.17E+00		
	N2O	kg		4.76E-01		
	SF6 (Sulfur hexa fluoride)	kg		1.62E-06		
	CFC-11	kg		2.33E-05		
	CFC-12	kg		1.15E-05		
	CFC-13	kg		9.52E-06		
	CFC-114	kg		5.02E-05		
	HCFC-22	kg		2.08E-06		
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg			1.20E-02	
	HCl	kg			1.21E-04	
	HF	kg			1.31E-05	
	NOx	kg			7.74E-03	
	NH3	kg			2.14E-05	
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	PO4 (-3)	kg				8.82E-04
	P	kg				2.00E-05
	NOx	kg				1.43E-03
	NH3	kg				3.98E-06
	NH4+	kg				1.57E-07
	NO3-	kg				6.91E-07
	N	kg				2.06E-05
	COD	kg				9.05E-05

Total materials	Resources used [kg Sbeqv/(functional unit)]	Global warming (time horizon of 100years) [kg CO2 eqv/(functional unit)]	Acidification [kg SO2eqv/(functional unit)]	Eutrophication [kg PO43-eqv/(functional unit)]
Functional Unit				
one sold ticket	4.01E-02	6.38E+00	1.99E-02	2.45E-03
one sold ticket*SEK	1.04E-04	1.66E-02	5.17E-05	6.39E-06
one sold ticket*Real price	2.43E-05	3.87E-03	1.20E-05	1.49E-06
one sold ticket*hour	1.34E-02	2.13E+00	6.62E-03	8.18E-04

Office		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Resources used (Data from Hitch Hiker´s guide to LCA)	Uranium	kg				
	Crude oil	kg	6.67E-06			
	Fossil energy	MJ	6.78E-06			
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO2	kg		4.97E-03		
	CH4	kg				
	CCl4	kg				
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg			1.97E-05	
	NOx	kg			3.83E-05	
	NH3	kg				
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	P	kg				2.19E-06
	NOx	kg				7.11E-06
	N	kg				2.72E-06
	COD	kg				7.89E-06

Office	Resources used [kg Sbeqv/(functional unit]	Global warming (time horizon of 100years) [kg CO2 eqv/(functional unit)]	Acidification [kg SO2eqv/(functional unit)]	Eutrophication [kg PO43-eqv/(functional unit)]
Functional Unit				
one sold ticket	1.35E-05	4.97E-03	5.80E-05	1.99E-05
one sold ticket*SEK	3.50E-08	1.30E-05	1.51E-07	5.19E-08
one sold ticket*Real price	8.15E-09	3.01E-06	3.51E-08	1.21E-08
one sold ticket*hour	4.48E-06	1.66E-03	1.93E-05	6.64E-06

Painting		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Resources used (Data from Hitch Hiker´s guide to LCA)	Iron (Fe)	kg	4.48E-13			
	Uranium	kg	6.67E-10			
	Crude oil	kg	2.79E-04			
	Natural Gas	m^3	4.05E-04			
	Hard Coal	kg	8.60E-05			
	Brown coal (Lignite)	kg	2.50E-05			
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO2	kg		7.42E-02		
	CH4	kg		5.93E-03		
	N2O	kg		1.25E-04		
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg			4.34E-04	
	HCl	kg			4.09E-06	
	HF	kg			3.17E-07	
	NOx	kg			2.32E-04	
	NH3	kg			1.65E-07	
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	PO4 (-3)	kg				5.99E-06
	NOx	kg				4.32E-05
	NH3	kg				3.08E-08
	NH4+	kg				1.61E-07
	NO3-	kg				1.96E-08
	N	kg				6.06E-07
	COD	kg				6.25E-06

Painting	Resources used [kg Sbeqv/(functional unit)]	Global warming (time horizon of 100years) [kg CO2	Acidification [kg SO2eqv/(functional unit)]	Eutrophication [kg PO43- eqv/(functional
Functional Unit				
one sold ticket	7.95E-04	8.03E-02	6.71E-04	5.62E-05
one sold ticket*SEK	2.07E-06	2.09E-04	1.75E-06	1.46E-07
one sold ticket*Real price	4.82E-07	4.86E-05	4.07E-07	3.41E-08
one sold ticket*hour	2.65E-04	2.68E-02	2.24E-04	1.87E-05

Scenery		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Resources used (Data from Hitch Hiker´s guide to LCA)	Iron (Fe)	kg	2.69E-11			
	Crude oil	kg	1.13E-05			
	Natural Gas	m^3	1.18E-05			
	Hard Coal	kg	5.88E-06			
	Fossil energy	MJ	5.06E-05			
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO2	kg		3.97E-03		
	CH4	kg		2.26E-05		
	N2O	kg		1.55E-05		
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg			1.44E-06	
	HCl	kg			3.31E-08	
	NOx	kg			1.85E-05	
	NH3	kg			5.97E-08	
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	PO4 (-3)	kg				1.70E-08
	NOx	kg				3.44E-06
	NH3	kg				1.11E-08
	COD	kg				9.51E-08

Scenery	Resources used [kg Sbeqv/(functional unit)]	Global warming (time horizon of 100years) [kg CO2	Acidification [kg SO2eqv/(functional unit)]	Eutrophication [kg PO43- eqv/(functional
Functional Unit				
one sold ticket	7.95E-05	4.01E-03	2.01E-05	3.57E-06
one sold ticket*SEK	2.07E-07	1.04E-05	5.23E-08	9.29E-09
one sold ticket*Real price	4.82E-08	2.43E-06	1.22E-08	2.16E-09
one sold ticket*hour	2.65E-05	1.34E-03	6.69E-06	1.19E-06

Forge		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Resources used (Data from Hitch Hiker´s guide to LCA)	Aluminum ore (Bauxite)	kg	2.30E-10			
	Iron (Fe)	kg	6.55E-09			
	Uranium	kg	2.13E-09			
	Crude oil	kg	2.82E-04			
	Natural Gas	m^3	6.00E-04			
	Hard Coal	kg	9.51E-04			
	Brown coal (Lignite)	kg	4.89E-05			
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO2	kg		3.31E-01		
	CH4	kg		8.65E-03		
	N2O	kg		4.76E-01		
	SF6 (Sulfur hexa fluoride)	kg		1.62E-06		
	CFC-11	kg		2.33E-05		
	CFC-12	kg		1.15E-05		
	CFC-13	kg		9.52E-06		
	CFC-114	kg		5.01E-05		
	HCFC-22	kg		2.08E-06		
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg			5.67E-04	
	HCl	kg			1.13E-05	
	HF	kg			4.96E-06	
	NOx	kg			3.91E-04	
	NH3	kg			1.77E-05	
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	PO4 (-3)	kg				4.76E-06
	NOx	kg				7.26E-05
	NH3	kg				3.30E-06
	NH4+	kg				-5.02E-09
	NO3-	kg				1.37E-07
	COD	kg				1.57E-06

Forge	Resources used [kg Sbeqv/(functional unit)]	Global warming (time horizon of 100years) [kg CO2 eqv/(functional	Acidification [kg SO2eqv/(functional unit)]	Eutrophication [kg PO43-eqv/(functional unit)]
Functional Unit				
one sold ticket	1.88E-03	8.16E-01	9.91E-04	8.23E-05
one sold ticket*SEK	4.90E-06	2.12E-03	2.58E-06	2.14E-07
one sold ticket*Real price	1.14E-06	4.95E-04	6.01E-07	4.99E-08
one sold ticket*hour	6.27E-04	2.72E-01	3.30E-04	2.74E-05

Carpenter		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Resources used (Data from Hitch Hiker´s guide to LCA)	Iron (Fe)	kg	6.47E-12			
	Uranium	kg	3.78E-11			
	Crude oil	kg	2.70E-04			
	Natural Gas	m^3	3.02E-04			
	Hard Coal	kg	4.48E-05			
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO2	kg		5.50E-02		
	CH4	kg		1.84E-03		
	CCl4	kg				
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg			4.68E-05	
	NOx	kg			3.81E-04	
	NH3	kg				
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	PO4 (-3)	kg				
	NOx	kg				7.07E-05
	COD	kg				1.27E-07

Carpenter	Resources used [kg Sbeqv/(functional unit)]	Global warming (time horizon of 100years) [kg CO2 eqv/(functional	Acidification [kg SO2eqv/(functional unit)]	Eutrophication [kg PO43-eqv/(functional unit)]
Functional Unit				
one sold ticket	6.17E-04	5.68E-02	4.27E-04	7.08E-05
one sold ticket*SEK	1.61E-06	1.48E-04	1.11E-06	1.84E-07
one sold ticket*Real price	3.74E-07	3.44E-05	2.59E-07	4.29E-08
one sold ticket*hour	2.06E-04	1.89E-02	1.42E-04	2.36E-05

Costume		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Resources used (Data from Hitch Hiker´s guide to LCA)	Aluminum ore (Bauxite)	kg	9.51E-14			
	Iron (Fe)	kg	7.15E-15			
	Uranium	kg	2.82E-09			
	Crude oil	kg	2.96E-04			
	Natural Gas	m^3	2.62E-04			
	Hard Coal	kg	2.23E-04			
	Brown coal (Lignite)	kg	1.92E-07			
	Fossil energy	MJ	5.69E-04			
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO2	kg		1.29E-01		
	CH4	kg		5.80E-03		
	CCl4	kg				
	N2O	kg		1.06E-06		
	SF6 (Sulfur hexa fluoride)	kg		6.69E-11		
	CFC-11	kg		9.59E-09		
	CFC-12	kg		4.73E-09		
	CFC-13	kg		3.93E-09		
	CFC-114	kg		2.07E-08		
	HCFC-22	kg		8.59E-10		
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg			2.02E-04	
	HCl	kg			2.95E-08	
	HF	kg			4.22E-09	
	NOx	kg			5.19E-04	
	NH3	kg			2.48E-09	
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	PO4 (-3)	kg				4.15E-08
	P	kg				2.81E-06
	NOx	kg				9.37E-05
	NH3	kg				4.61E-10
	NH4+	kg				1.10E-09
	NO3-	kg				1.91E-10
	N	kg				3.39E-08
	COD	kg				6.28E-06

Costume	Resources used [kg Sbeqv/(functional unit)]	Global warming (time horizon of 100years) [kg CO2	Acidification [kg SO2eqv/(functional unit)]	Eutrophication [kg PO43-eqv/(functional
Functional Unit				
one sold ticket	1.35E-03	1.35E-01	7.21E-04	1.03E-04
one sold ticket*SEK	3.52E-06	3.51E-04	1.88E-06	2.68E-07
one sold ticket*Real price	8.18E-07	8.16E-05	4.37E-07	6.24E-08
one sold ticket*hour	4.50E-04	4.49E-02	2.40E-04	3.43E-05

Wig and makeup		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Resources used (Data from Hitch Hiker´s guide to LCA)	Aluminum ore (Bauxite)	kg				
	Iron (Fe)	kg				
	Crude oil	kg	4.34E-07			
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO2	kg		2.54E-04		
	CH4	kg				
	CCl4	kg				
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg			3.80E-08	
	NOx	kg			8.34E-07	
	NH3	kg				
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	PO4 (-3)	kg				
	H3PO4	kg				
	NOx	kg				1.55E-07

Wig and makeup	Resources used [kg Sbeqv/(functional unit)]	Global warming (time horizon of 100years) [kg CO2 eqv/(functional unit)]	Acidification [kg SO2eqv/(functional unit)]	Eutrophication [kg PO43-eqv/(functional unit)]
Functional Unit				
one sold ticket	4.34E-07	2.54E-04	8.72E-07	1.55E-07
one sold ticket*SEK	1.13E-09	6.63E-07	2.27E-09	4.04E-10
one sold ticket*Real price	2.63E-10	1.54E-07	5.29E-10	9.39E-11
one sold ticket*hour	1.45E-07	8.48E-05	2.91E-07	5.17E-08

Building maintanance		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Resources used (Data from Hitch Hiker´s guide to LCA)	Aluminum ore (Bauxite)	kg				
	Crude oil	kg	4.57E-07			
	Fossil energy	MJ	2.21E-05			
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO2	kg		3.18E-03		
	CH4	kg				
	N2O	kg				
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg			2.56E-07	
	HCl	kg				
	HF	kg				
	NOx	kg			1.07E-05	
	NH3	kg				
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	P	kg				7.32E-07
	NOx	kg				1.98E-06
	N	kg				1.49E-06
	COD	kg				2.06E-06

Building maintanance	Resources used [kg Sbeqv/(functional unit)]	Global warming (time horizon of 100years) [kg CO2 eqv/(functional unit)]	Acidification [kg SO2eqv/(functional unit)]	Eutrophication [kg PO43-eqv/(functional unit)]
Functional Unit				
one sold ticket	2.25E-05	3.18E-03	1.09E-05	6.26E-06
one sold ticket*SEK	5.87E-08	8.27E-06	2.85E-08	1.63E-08
one sold ticket*Real price	1.37E-08	1.93E-06	6.63E-09	3.80E-09
one sold ticket*hour	7.51E-06	1.06E-03	3.65E-06	2.09E-06

Marketing		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Resources used (Data from Hitch Hiker´s guide to LCA)	Aluminum ore (Bauxite)	kg				
	Crude oil	kg	4.02E-05			
	Fossil energy	MJ	3.93E-05			
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO2	kg		2.91E-02		
	CH4	kg				
	CCl4	kg				
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg			1.14E-04	
	NOx	kg			2.23E-04	
	NH3	kg				
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	P	kg				1.27E-05
	NOx	kg				4.15E-05
	N	kg				1.58E-05
	COD	kg				4.58E-05

Marketing	Resources used [kg Sbeqv/(functional unit)]	Global warming (time horizon of 100years) [kg CO2 eqv/(functional unit)]	Acidification [kg SO2eqv/(functional unit)]	Eutrophication [kg PO43-eqv/(functional unit)]
Functional Unit				
one sold ticket	7.95E-05	2.91E-02	3.37E-04	1.16E-04
one sold ticket*SEK	2.07E-07	7.57E-05	8.78E-07	3.01E-07
one sold ticket*Real price	4.82E-08	1.76E-05	2.04E-07	7.01E-08
one sold ticket*hour	2.65E-05	9.69E-03	1.12E-04	3.86E-05

Décor		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Resources used (Data from Hitch Hiker´s guide to LCA)	Aluminum ore (Bauxite)	kg	2.30E-13			
	Iron (Fe)	kg	4.82E-11			
	Uranium	kg	1.95E-08			
	Crude oil	kg	7.83E-03			
	Natural Gas	m^3	2.20E-02			
	Hard Coal	kg	4.21E-03			
	Brown coal (Lignite)	kg	9.41E-04			
	Fossil energy	MJ	2.93E-04			
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO2	kg		4.11E+00		
	CH4	kg		1.14E+00		
	CCl4	kg				
	N2O	kg		1.14E-06		
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg			1.06E-02	
	HCl	kg			1.06E-04	
	HF	kg			7.81E-06	
	NOx	kg			5.92E-03	
	NH3	kg			3.42E-06	
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	PO4 (-3)	kg				8.71E-04
	P	kg				1.62E-06
	NOx	kg				1.10E-03
	NH3	kg				6.37E-07
	NO3-	kg				5.35E-07
	N	kg				1.71E-08
	COD	kg				2.04E-05

Décor	Resources used [kg Sbeqv/(functional unit)]	Global warming (time horizon of 100years) [kg CO2 eqv/(functional	Acidification [kg SO2eqv/(functional unit)]	Eutrophication [kg PO43-eqv/(functional unit)]
Functional Unit				
one sold ticket	3.53E-02	5.25E+00	1.66E-02	1.99E-03
one sold ticket*SEK	9.18E-05	1.37E-02	4.33E-05	5.19E-06
one sold ticket*Real price	2.14E-05	3.18E-03	1.01E-05	1.21E-06
one sold ticket*hour	1.18E-02	1.75E+00	5.54E-03	6.65E-04

Restaurant		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Resources used (Data from Hitch Hiker´s guide to LCA)	Aluminum ore (Bauxite)	kg	3.98E-13			
	Crude oil	kg	1.80E-04			
	Natural Gas	m^3	4.62E-06			
	Fossil energy	MJ	3.15E-04			
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO2	kg		1.26E-01		
	CH4	kg		9.45E-02		
	N2O	kg		5.83E-02		
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg			1.47E-04	
	NOx	kg			6.01E-04	
	NH3	kg			3.18E-03	
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	P	kg				5.46E-05
	NOx	kg				1.14E-04
	NH3	kg				5.90E-04
	N	kg				4.90E-04
	COD	kg				1.44E-06

Restaurant	Resources used [kg Sbeqv/(functional unit)]	Global warming (time horizon of 100years) [kg CO2	Acidification [kg SO2eqv/(functional unit)]	Eutrophication [kg PO43-eqv/(functional
Functional Unit				
one sold ticket	4.99E-04	2.79E-01	3.93E-03	1.25E-03
one sold ticket*SEK	1.30E-06	7.26E-04	1.02E-05	3.26E-06
one sold ticket*Real price	3.03E-07	1.69E-04	2.38E-06	7.58E-07
one sold ticket*hour	1.66E-04	9.30E-02	1.31E-03	4.17E-04

Beef		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Resources used (Data from Hitch Hiker´s guide to LCA)	Aluminum ore (Bauxite)	kg				
	Brown coal (Lignite)	kg				
	Fossil energy	MJ	2.16E-04			
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO2	kg		3.40E-02		
	CH4	kg		8.08E-02		
	N2O	kg		4.84E-02		
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg			8.07E-05	
	NOx	kg			1.34E-04	
	NH3	kg			2.84E-03	
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	P	kg				4.31E-05
	NOx	kg				2.37E-05
	NH3	kg				5.27E-04
	N	kg				3.91E-04

Beef	Resources used [kg Sbeqv/(functional unit)]	Global warming (time horizon of 100years) [kg CO2	Acidification [kg SO2eqv/(functional unit)]	Eutrophication [kg PO43-eqv/(functional
Functional Unit				
one sold ticket	2.16E-04	1.63E-01	3.06E-03	9.85E-04
one sold ticket*SEK	5.62E-07	4.25E-04	7.96E-06	2.56E-06
one sold ticket*Real price	1.31E-07	9.90E-05	1.85E-06	5.97E-07
one sold ticket*hour	7.19E-05	5.44E-02	1.02E-03	3.28E-04

Milk		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Resources used (Data from Hitch Hiker´s guide to LCA)	Aluminum ore (Bauxite)	kg				
	Brown coal (Lignite)	kg				
	Fossil energy	MJ	3.97E-05			
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO2	kg		7.15E-03		
	CH4	kg		1.15E-02		
	N2O	kg		5.84E-03		
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg			1.50E-05	
	NOx	kg			3.77E-06	
	NH3	kg			2.99E-04	
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	P	kg				4.59E-06
	NOx	kg				5.04E-06
	NH3	kg				5.62E-05
	N	kg				4.61E-05

Milk	Resources used [kg Sbeqv/(functional unit)]	Global warming (time horizon of 100years) [kg CO2	Acidification [kg SO2eqv/(functional unit)]	Eutrophication [kg PO43-eqv/(functional
Functional Unit				
one sold ticket	3.97E-05	2.45E-02	3.18E-04	1.12E-04
one sold ticket*SEK	1.03E-07	6.37E-05	8.28E-07	2.92E-07
one sold ticket*Real price	2.40E-08	1.48E-05	1.93E-07	6.78E-08
one sold ticket*hour	1.32E-05	8.16E-03	1.06E-04	3.73E-05

Bread		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Resources used (Data from Hitch Hiker´s guide to LCA)	Aluminum ore (Bauxite)	kg				
	Brown coal (Lignite)	kg				
	Fossil energy	MJ	3.46E-05			
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO2	kg		6.77E-03		
	CH4	kg		5.67E-04		
	N2O	kg		2.56E-03		
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg			2.66E-05	
	NOx	kg			3.15E-05	
	NH3	kg			3.27E-05	
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	P	kg				1.45E-06
	NOx	kg				6.06E-06
	NH3	kg				5.75E-06
	N	kg				1.15E-05

Bread	Resources used [kg Sbeqv/(functional unit)]	Global warming (time horizon of 100years) [kg CO2	Acidification [kg SO2eqv/(functional unit)]	Eutrophication [kg PO43-eqv/(functional
Functional Unit				
one sold ticket	3.46E-05	9.89E-03	9.08E-05	2.47E-05
one sold ticket*SEK	9.02E-08	2.58E-05	2.36E-07	6.44E-08
one sold ticket*Real price	2.10E-08	6.00E-06	5.50E-08	1.50E-08
one sold ticket*hour	1.15E-05	3.30E-03	3.03E-05	8.24E-06

Potatoes		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Resources used (Data from Hitch Hiker´s guide to LCA)	Aluminum ore (Bauxite)	kg				
	Brown coal (Lignite)	kg				
	Fossil energy	MJ	4.97E-06			
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO2	kg		9.51E-04		
	CH4	kg		1.04E-04		
	N2O	kg		4.09E-04		
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg			2.68E-06	
	NOx	kg			5.39E-06	
	NH3	kg			3.16E-06	
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	P	kg				3.98E-07
	NOx	kg				9.87E-07
	NH3	kg				5.98E-07
	N	kg				1.12E-05

Potatoes	Resources used [kg Sbeqv/(functional unit)]	Global warming (time horizon of 100years) [kg CO2	Acidification [kg SO2eqv/(functional unit)]	Eutrophication [kg PO43-eqv/(functional
Functional Unit				
one sold ticket	4.97E-06	1.46E-03	1.12E-05	1.31E-05
one sold ticket*SEK	1.29E-08	3.81E-06	2.92E-08	3.42E-08
one sold ticket*Real price	3.01E-09	8.87E-07	6.80E-09	7.96E-09
one sold ticket*hour	1.66E-06	4.88E-04	3.74E-06	4.38E-06

Salad		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Resources used (Data from Hitch Hiker´s guide to LCA)	Aluminum ore (Bauxite)	kg				
	Brown coal (Lignite)	kg				
	Fossil energy	MJ	2.03E-05			
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO2	kg		3.58E-03		
	CH4	kg		8.20E-05		
	N2O	kg		1.12E-03		
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg			8.23E-06	
	NOx	kg			1.21E-05	
	NH3	kg			2.24E-06	
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	P	kg				5.62E-07
	NOx	kg				2.15E-06
	NH3	kg				4.60E-07
	N	kg				2.94E-05

Salad	Resources used [kg Sbeqv/(functional unit)]	Global warming (time horizon of 100years) [kg CO2	Acidification [kg SO2eqv/(functional unit)]	Eutrophication [kg PO43-eqv/(functional
Functional Unit				
one sold ticket	2.03E-05	4.79E-03	2.25E-05	3.26E-05
one sold ticket*SEK	5.28E-08	1.25E-05	5.87E-08	8.49E-08
one sold ticket*Real price	1.23E-08	2.90E-06	1.37E-08	1.98E-08
one sold ticket*hour	6.76E-06	1.60E-03	7.51E-06	1.09E-05

Wine		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]
Resources used (Data from Hitch Hiker´s guide to LCA)	Aluminum ore (Bauxite)	kg	3.98E-13	
	Crude oil	kg	9.00E-06	
	Natural Gas	m^3	4.62E-06	
	Hard Coal	kg		
	Brown coal (Lignite)	kg		
	Fossil energy	MJ		
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO2	kg		4.47E-02
	CH4	kg		1.45E-03
	CCl4	kg		
	N2O	kg		

Wine	Resources used [kg Sbeqv/(functional unit)]	Global warming (time horizon of 100years) [kg CO2 eqv/(functional unit)]
Functional Unit		
one sold ticket	1.36E-05	4.61E-02
one sold ticket*SEK	3.55E-08	1.20E-04
one sold ticket*Real price	8.26E-09	2.79E-05
one sold ticket*hour	4.54E-06	1.54E-02

Beer		Characterisation indicators - Unit as we calculated in before -->	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO2	kg	2.56E-03		
	CH4	kg			
	N2O	kg			
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg		6.81E-06	
	NOx	kg		3.12E-06	
	NH3	kg			
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	P	kg			4.54E-06
	NH3	kg			7.16E-08
	N	kg			1.10E-06
	COD	kg			1.44E-06

Beer	Global warming (time horizon of 100years) [kg CO2	Acidification [kg SO2eqv/(functional unit)]	Eutrophication [kg PO43-eqv/(functional
Functional Unit			
one sold ticket	2.56E-03	9.93E-06	7.15E-06
one sold ticket*SEK	6.66E-06	2.59E-08	1.86E-08
one sold ticket*Real price	1.55E-06	6.02E-09	4.33E-09
one sold ticket*hour	8.52E-04	3.31E-06	2.38E-06

Rice		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Resources used (Data from Hitch Hiker´s guide to LCA)	Aluminum ore (Bauxite)	kg				
	Crude oil	kg	1.35E-07			
	Natural Gas	m^3				
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO2	kg		9.48E-04		
	CH4	kg		2.49E-06		
	N2O	kg		1.78E-06		
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg			1.20E-06	
	NOx	kg			7.27E-06	
	NH3	kg				
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	PO4 (-3)	kg				
	H3PO4	kg				
	NOx	kg				1.35E-06

Rice	Resources used [kg Sbeqv/(functional unit)]	Global warming (time horizon of 100years) [kg CO2	Acidification [kg SO2eqv/(functional unit)]	Eutrophication [kg PO43-eqv/(functional
Functional Unit				
one sold ticket	1.35E-07	9.52E-04	8.48E-06	1.35E-06
one sold ticket*SEK	3.52E-10	2.48E-06	2.21E-08	3.52E-09
one sold ticket*Real price	8.19E-11	5.77E-07	5.14E-09	8.19E-10
one sold ticket*hour	4.50E-08	3.17E-04	2.83E-06	4.50E-07

Fish		Characterisation indicators - Unit as we calculated in before -->	Resources used [kg Sbeqv/(one sold ticket]	Global warming (time horizon of 100years) [kg CO2 eqv/(one sold ticket)]	Acidification [kg SO2eqv/(one sold ticket]	Eutrophication [kg PO43-eqv/(one sold ticket]
Resources used (Data from Hitch Hiker´s guide to LCA)	Aluminum ore (Bauxite)	kg				
	Crude oil	kg	1.70E-04			
	Fossil energy	MJ				
Emissions - Global Warming 100 years (New data from IPCC 2007)	CO2	kg		2.54E-02		
	CH4	kg				
	N2O	kg				
Emissions - Acidification (Data from Hitch Hiker´s guide to LCA)	SO2	kg			5.52E-06	
	NOx	kg			4.04E-04	
	NH3	kg				
Emissions - Eutrophication (Data from Hitch Hiker´s guide to LCA)	PO4 (-3)	kg				
	H3PO4	kg				
	NOx	kg				7.51E-05

Fish	Resources used [kg Sbeqv/(functional unit)]	Global warming (time horizon of 100years) [kg CO2	Acidification [kg SO2eqv/(functional unit)]	Eutrophication [kg PO43-eqv/(functional
Functional Unit				
one sold ticket	1.70E-04	2.54E-02	4.10E-04	7.51E-05
one sold ticket*SEK	4.44E-07	6.61E-05	1.07E-06	1.95E-07
one sold ticket*Real price	1.03E-07	1.54E-05	2.48E-07	4.55E-08
one sold ticket*hour	5.68E-05	8.46E-03	1.37E-04	2.50E-05