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RESOURCE EFFICIENCY OF MASS EVENTS

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The purpose of this thesis was to provide guidelines for organizing a mass event that follows the principles of sustainable development and resource efficiency. The basis was in the research done in summer 2014 about the resource efficiency of the biggest summer events in Pori. The research was done for the Environmental Office of the City of Pori.

The theory part of the thesis concentrated on describing the concepts of resource efficiency and sustainable development, and their connection to event organizing. Both qualitative and quantitative research methods were used in the summer of 2014. The data gathering was done with personal interviews or via phone or e-mail. Three events, Viksu 2014, F.I.C.C. Rally and Porispere, were chosen to be described in this thesis. They were also benchmarked with similar events, and compared to Finnish averages of water and electricity consumption and waste generation.

The biggest environmental impact that events have is the emissions from the traffic of people getting to and from the event. Therefore usage of public transport and car-pooling should be encouraged. Electricity consumption of the events was high, and it, as well as water consumption, should be better monitored. Waste recycling was quite well organised, but some more specifying sorting information would still be needed. The necessity of printed products could be considered, because there were quite many of them.

MASSATAPAHTUMIEN RESURSSITEHOKKUUS

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Tämän työn tarkoituksena oli antaa suuntaviivoja kestävästä kehityksestä ja resurssitehokkuuden periaatteiden mukaisten massatapahtumien järjestämiseen. Pohjana oli kesällä 2014 tehty tutkimus Porin suurimpien kesätapahtumien resurssitehokkuudesta. Tutkimus tehtiin Porin kaupungin ympäristövirastolle.

Työn teoriaosa keskittyi kuvaamaan resurssitehokkuuden ja kestävästä kehityksestä käsitteitä ja niiden yhteyttä tapahtumien järjestämiseen. Kesällä 2014 käytettiin sekä laadullisia että määrällisiä tutkimusmenetelmiä. Materiaalin kerääminen toteutettiin henkilökohtaisilla haastatteluilla tai puhelimen tai sähköpostin välityksellä. Kolme tapahtumaa, Viksu 2014, F.I.C.C. Rally ja Porispere, valittiin tässä työssä kuvailtaviksi. Niitä myös vertailtiin samantapaisten tapahtumien, ja veden ja sähkönkulutuksen sekä jätteiden tuoton suomalaisten keskiarvojen kanssa.

Tapahtumien suurin ympäristövaikutus aiheutuu päästöistä, jotka syntyvät ihmisten saapuessa tapahtumaan ja poistuessa sieltä. Siksi julkisten liikennevälineiden ja kimpakyytien käyttämiseen pitäisi kannustaa. Sähkönkulutus tapahtumissa oli korkea ja sitä, kuten myös veden kulutusta, pitäisi tarkkailla paremmin. Jätteiden kierrätys oli melko hyvin järjestetty, mutta joitain tarkentavia lajittelu ohjeita tarvittaisiin vielä. Painotuotteiden tarpeellisuutta voitaisiin pohtia, koska niitä oli melko paljon.

CONTENTS

1	INTRODUCTION	6
2	THEORETICAL BASIS	7
2.1	Related Literature	7
2.2	Sustainable Event.....	8
2.3	Research Done in Summer 2014	9
3	PURPOSE AND OBJECTIVES OF THE THESIS	9
4	IMPLEMENTATION OF THE THESIS PROCESS	10
4.1	Research Methods.....	10
4.2	The Chosen Summer Events.....	11
4.2.1	Viksu 2014	11
4.2.2	F.I.C.C. Rally	18
4.2.3	Porispere.....	22
4.2.4	Climate Calculator.....	25
4.2.5	Venue	26
4.3	The Benchmarking Events.....	28
4.3.1	Palotarus 2010.....	28
4.3.2	Ilosaarirock.....	29
5	RESULTS.....	32
5.1	Viksu 2014 Compared to Palotarus 2010	32
5.2	Porispere Compared to Ilosaarirock	34
5.3	F.I.C.C. Rally Compared to Finnish Averages	35
5.4	Improvements to Sustainability and Resource Efficiency	35
6	CONCLUSIONS AND DISCUSSION.....	37
	REFERENCES.....	38

LIST OF TABLES

Table 1	Viksu: Material printed on paper	12
Table 2	Viksu: Canteen products from K-Supermarket City.....	13
Table 3	Viksu: Canteen products from Suomen Nestlé Oy	14
Table 4	Viksu: Canteen products from Oy Sinebrychoff Ab.....	14
Table 5	Viksu: Trips of the participants.....	16
Table 6	Viksu: Trips of the invited guests	17

Table 7 Viksu: Transport	18
Table 8 F.I.C.C. Rally: Material printed on paper	19
Table 9 F.I.C.C. Rally: Printed signs and stickers	19
Table 10 F.I.C.C. Rally: Trips of the participants.....	21
Table 11 Porispere: Material printed on paper.....	22
Table 12 Porispere: Printed signs.....	23
Table 13 Porispere: Trips of the participants	24

LIST OF PICTURES

Picture 1 Kirjurinluoto area from above (Halttunen 2003).....	27
Picture 2 Map of city center of Pori (Website of Vihreä Teatteri 2014).....	27
Picture 3 Laulurinne area from above (Website of Ilosaarirock 2009).....	30
Picture 4 Map of city center of Joensuu (Website of Ilosaarirock 2014).....	30

LIST OF CHARTS

Chart 1 Viksu: Printed products with Viksu -logo.....	13
Chart 2 F.I.C.C. Rally: Material printed on fabric	20
Chart 3 F.I.C.C. Rally: Waste amounts after sorting	22
Chart 4 Porispere: Waste amounts after sorting.....	25
Chart 5 Palotarvus: Waste generated during event (Ristanen & Leván 2010, 46)	29

1 INTRODUCTION

Resources are needed to nearly everything that humans do. Resources can mean many different things in different contexts, like natural resources or human resources, but in this thesis resources mean natural resources. Using the limited resources, that the Earth has to offer, in a sustainable way is called resource efficiency. Behaving in a resource efficient way is important, because we, and also the future generations, depend heavily on natural resources. (Website of European Commission 2015)

Resource efficiency includes also the minimization of environmental impacts. Resources should be recycled rather than used ones and thrown away. The same resources last longer and are used more efficiently, and less waste is generated. (Website of European Commission 2015)

The purpose of this thesis is to create a guide for a sustainable mass event. This is based on the research done in summer 2014 for Porin kaupungin ympäristövirasto (the Environmental Office of the City of Pori). What is meant with mass event is an event of 1000 or more participants. Sustainability means that the needs of people today are met in a way that will not jeopardize the ways of future generations to satisfy their needs. (Jones 2010, 4; Website of European Commission 2015)

The sustainability definition can also be applied to event organizing. Environment is a system where different areas, like people, businesses, and industries, affect one another and have cumulative effects. The size of the events industry globally is big and millions of people take part in the events annually. Ensuring sustainable event management is the responsibility of everyone involved. (Jones 2010, 4)

2 THEORETICAL BASIS

2.1 Related Literature

There are many different guides for sustainable and resource efficient event organizing. There are comprehensive guides, but also some that are more content limited. Some guides are created to some specific events purposes, even though they can be applied to other types of events too, and some are more general.

Meegan Jones has written a practical guidebook called ‘Sustainable Event Management’. It deals with all event management aspects quite comprehensively from a sustainable point of view. (Jones 2010) The Icarus Foundation, a not-for-profit environmental, policy, research, and education organization, has created a guide called ‘Green Festivals and Events Guide, a How To...’, which gives practical examples of planning a green, sustainable event (Graci & Dodds 2008).

United Nations Environment Programme has also done a quite comprehensive guide called ‘Sustainable Events Guide’ for meetings and other indoor events (Website of Ecoprocura 2012). An example of a more event type specific guide is a guide called ‘Sustainability Handbook for Event Organisers’ by The Fédération Equestre Internationale for the organizers of riding events (Website of FEI 2014).

International Organization for Standardization published a new standard in 2012 for organizers of all types of events. The ISO 20121:2012 standard aims to help organizers to integrate sustainability to their events. It is claimed to help in identifying and removing or reducing the negative impacts that events have on social, economic, and environmental dimensions. (Frost 2012)

Some theses have been written about similar topics, and here are three examples just to name some of them. Jari Lampinen wrote a master’s degree thesis for Mikkeli University of Applied Sciences about event organizing by taking into account sustainable development. A ‘Guide for Organizing an Ecological and Safe Event’ was created from the basis of that thesis. (Lampinen 2011) Mikko Rantanen has written

his thesis called 'The Carbon Footprint of Ilosaarirock Festival' about calculating the carbon dioxide emissions of Ilosaarirock of 2010 (Rantanen 2011). Taru Särkiniemi wrote her thesis for Porispere festival and it was called 'Environmental Plan for Porispere -Festival'. It had two parts; the theory part explained sustainability and created the basis and the actual environmental plan part was created on this theoretical basis. (Särkiniemi 2015)

2.2 Sustainable Event

Sustainability is taken into consideration around the world in many kinds of contexts. Also event organizers are paying more attention to their event's impacts to the environment. (Graci & Dodds 2008.) A sustainable event could be an example of equilibrium between minimized impact on environment, sustainable usage of resources, and human activity, instead of being resource intense and garbage producing (Jones 2010, 3).

There is not only one definition of a sustainable event. An event can be sustainable if all of its aspects are considered. All laws and regulations must be taken into account and followed. The organizer must also consider the environmental impacts of the event and try to reduce them. The ways of reduction could be using public transport, minimizing energy and water consumption, minimizing waste and recycling it, and using materials that can be reused or recycled. (Lampinen 2011, 12)

The organizer of any event should be committed to environmental impact reducing methods. Also all volunteers and visitors as well as the exhibitors or stall holders should be involved and informed. An example of material reusing or recycling is making the signage used on the site such that they can be used again in coming years or for another event. (Website of Local Authority Prevention Network 2012)

What should also be considered, are the effects on the area where the event is held. There should be no littering of the area and soil trampling should be minimized. If the environmental aspects are part of the planning of the event it could be that more participants are attracted to the event and the participants may also learn about recycling. (Lampinen 2011, 12)

2.3 Research Done in Summer 2014

In the summer of 2014 Hanna Ruotsalainen, an Environmental Engineering student from Satakunta University of Applied Sciences, and Annelea Vuontela, a Sustainable Development student from Turku University of Applied Sciences, researched the resource efficiency of some of the biggest summer events in Pori. This was done for Porin kaupungin ympäristövirasto (the Environmental Office of the City of Pori). The events included Viksu 2014 international fire-fighter youngsters' camp, Pori Jazz festival, Suomi Areena discussion forum, F.I.C.C. Rally international camping event, a horse racing event called Kuninkuusravit, and Porispere music festival.

From these six events listed above, three were chosen to be discussed in this thesis. Those three are Viksu 2014, F.I.C.C. Rally, and Porispere. They were chosen because they all are different from each other. The first two are somewhat similar so that the participants come to the venue for the duration of the event and leave afterwards, whereas the participants of Porispere do not stay at the venue overnight. However, the participants and also the programmes of all of the events are different from each other. Porispere is a music festival so it is much different than the other two. The events and research results are described in the chapters 4 and 5.

3 PURPOSE AND OBJECTIVES OF THE THESIS

The purpose of this thesis was to provide guidelines for organizing a mass event that follows the principles of sustainable development and resource efficiency. This is based on the research done during the summer 2014 and the benchmarking research done by comparing three of the summer events with other events from Finland chosen based on their similarity.

This thesis aims at giving tips for event organizers about sustainable and resource efficient ways of organizing an event. The aim is also to suggest methods of reducing environmental impact.

4 IMPLEMENTATION OF THE THESIS PROCESS

4.1 Research Methods

Both qualitative and quantitative methods were used in the research. The qualitative methods used were case study, constructivism, and benchmarking. The data in a qualitative study can be gathered as text, pictures or by observing. In a case study different kinds of interviews are the most common way of collecting data. In a case study the data is from a real and natural situation and the data gathering is done in a holistic way. The uniqueness of the case to be studied is appreciated and the researcher tries to understand the case in its own context instead of trying to find conformities. (Aaltio-Marjosola 1999.) Constructivism is one method of case study, where new and innovative constructions are developed to solve problems (Lukka 2001).

Benchmarking has many different kinds of definitions but the basic idea is always the same; to compare practices to develop or improve them and to find out which are the best ones. Benchmarking helps to keep up competitive advantage and continuous development. (Karjalainen 2002)

The quantitative method that was used was survey study. The data for a survey study was gathered with interviews and observations. The target group is a sample from a certain population. (Hirsjärvi, Remes & Sajavaara 2005, 182.) Quantitative research is after a general description of a phenomenon and the standardized data gathering supports the idea of the study being easily replicable by another researcher. The ability of a study to be replicated gives it verifiability, which brings reliability and objectivity to the study. (Grix 2010, 118)

The data gathering of the research, which was done during the summer 2014, was realized with different kinds of interviews, some observations, and data searching through the Internet. The interviews were done face to face, through phone calls, or with e-mails. The events were visited as much as it was possible, and it was also tried to find information from the websites of the events.

The benchmarking research for the three events, chosen from the studied summer events, was done for this thesis. The Viksu 2014 -camp was decided to be compared with a similar camp held in 2010 in Padasjoki in a course and camp center called Palotarus. Porispere was compared with Ilosaarirock, because it was the first Finnish event to receive an annual A Greener Festival Award -certificate which Porispere is trying to achieve. No similar event was found to be benchmarked with F.I.C.C. Rally, so it is compared to the average values of electricity consumption and waste production in Finland.

4.2 The Chosen Summer Events

4.2.1 Viksu 2014

The VIKSU 2014 –camp was 16th national camp for firefighter youngsters. It was organized by Länsi-Suomen Pelastusalan Liitto (West Finland’s Rescue Services Union) in Kirjurinluoto in Pori between 29th of June and 5th of July 2014. In addition to the campsite in Kirjurinluoto the participants of the camp used the Länsi-Suomen pelastusharjoitusalue (West Finland’s Emergency Services Training Center) for practicing various firefighter skills. (Viksu2014 palokuntanuortenleiri esittäytyy, 2014)

Suomen ympäristöopisto (Finland’s Environmental Institute) Sykli had made an environmental guide for the previous firefighter youngster camp in 2010. The environmental guide for VIKSU -camp was created based on this guide. (Vilkman personal communication 25.6.2014.) Following the guidelines of the environmental guide the organizers and participants of the event strived to be material efficient and to take environmental aspects into count during construction and operation of the camp. (Vilkman, Tapanainen, Pousi & Räsänen 2014, 3-4)

4.2.1.1 Printed Material

The material that were printed on paper included a camp ABC-book, info brochures for the visitors of the visiting day, camp letters, flyers, posters, and a camp newspaper for every day of the camp. (These materials are listed in table 1.) The camp newspapers were printed by Ai-Ri Offset Ky in Pori, and the other products were printed by Joutsen Median Painotalo Oy in Oulu (which is approximately 510 kilometers from Pori to northeast). (Willberg e-mail 4.7.2014) In addition to the communications printed on paper the event had good www-pages, bulletin board and a camp radio.

Table 1 Viksu: Material printed on paper

Printed material	Type of paper	Amount (pcs)	Weight (kg)
Flyer, English/German, A5	Multi Art Silk 170 g	200	1.06
Flyer, Finnish/Swedish, A5	Multi Art Silk 170 g	500	2.64
Poster, Swedish, A3	Multi Art Silk 170 g	130	2.76
Poster, Finnish, A3	Multi Art Silk 170 g	800	16.96
Talent show poster, Swedish, A3	Multi Art Silk 170 g	150	3.18
Talent show poster, Finnish, A3	Multi Art Silk 170 g	750	15.90
Camp ABC-book, English, A5	Multi Art Silk 115 g	150	8.58
	Multi Art Silk 150 g		1.40
Camp ABC-book, Finnish/Swedish, A5	Multi Art Silk 115 g	3 000	386.01
	Multi Art Silk 150 g		27.98
Camp letter, A5	G-Print	900	
Camp newspaper, A4, 16 p.	G-Print	13 000	676.00
Visiting day's info brochure. A5	Multi Art Silk 170 g	1 500	7.93
Total			1 150.39

There were also other printed products with the Viksu 2014 -camp logo on them (amounts given in chart 1). These products were from a company called Sanser Ltd Oy, which is part of the Palojoki-yhtiöt in Pori (Website of Sanser Ltd Oy 2014).

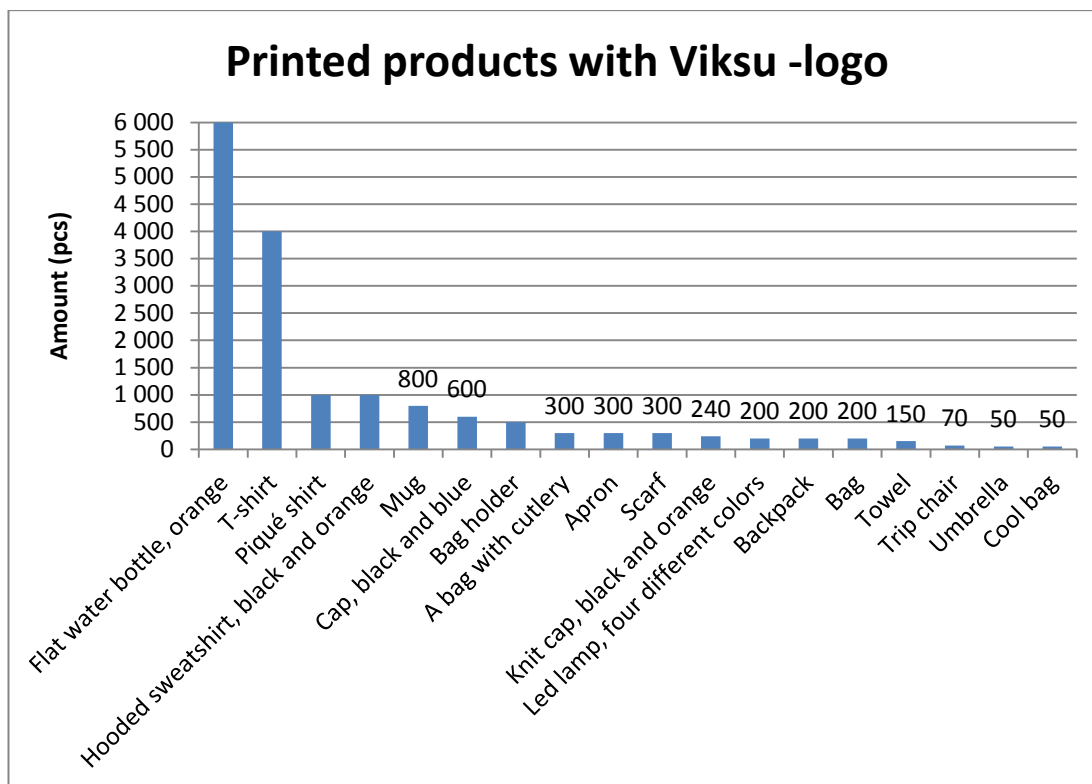


Chart 1 Viksu: Printed products with Viksu -logo

Two canteens operated during the duration of the camp. One of them was at the campsite and the other at the practice area. The products that were sold there came from different companies. Most of the products came through a wholesale business of K-Supermarket City, but there were also ice-cream from Suomen Nestlé Oy and soft drinks from Oy Sinebrychoff Ab. (Soini, personal communication on 8.7.2014; Soini 2014) The sale products are listed in tables 2, 3, and 4.

Table 2 Viksu: Canteen products from K-Supermarket City

K-Supermarket City	Amount			Weight
	piece	package	bottle	kilogram
Candy bag, different kinds	1 744			
Candy pack, different kinds	976			
Lollipop, different kinds	2 270			
Chocolate bar, different kinds	2 468			
Licorice stick, different kinds	1 380			
Jenkki chewing gum	234			

Pringles, 3 flavors	2 562			
Taffel chips, 3 different kinds	1 170			
Salted peanuts in a bag	108			
Fruit, different kinds				15
Hamburger	800			
Sausage				150
Cube sugar, Pulmu				20
Coffee, Paulig Juhlamokka				160
Cocoa powder, 30g/bag	580			
Tea bag, 100/package		4		
Trip –drink, 4 different tastes	380			
Lip palm	20			
Tooth brush	15			
Tooth paste	15			
Nessu handkerchief		14		
Always towel		10		
Dove shower gel			8	
Dove shampoo			8	

Table 3 Viksu: Canteen products from Suomen Nestlé Oy

Suomen Nestlé Oy	Amount (pcs)
Ice-cream cone, different flavors	6 100
Ice-cream stick, different flavors	5 680
Popsicle, different flavors	2 860

Table 4 Viksu: Canteen products from Oy Sinebrychoff Ab

Oy Sinebrychoff Ab	Amount (pcs)
1,5 liter bottle, different kinds	4 968
0,5 liter bottle, different kinds	5 220

4.2.1.2 Camp Structures

The structures were planned so that at least most of them could be used also in the structures of coming camps (Vilkman, Tapanainen, Pousi & Räsänen 2014, 9). Most of the structures, like shipping containers used as offices and some big tents, were rented from different companies. There was not much single use items because of careful planning and renting which promotes resource efficiency. (Santala, personal communication on 25.6.2014) The furniture in the office containers and big tents were borrowed from Winnova or rented from Festrent (Lehtonen 2014).

4.2.1.3 Water Consumption

During the time from 24th of June to 5th of July the water consumption in the Delta Arena area in Kirjurinluoto was all together 595 cubic meters (m³) (Irjala 2014). This included tap water used in showers, for dish washing, for washing hands, and as drinking water. There was no warm water on the area, so the hot water needed was warmed up with district heat provided by the City of Pori. (Vilkman, personal communication on 25.6.2014)

4.2.1.4 Electricity Consumption

Electricity consumption on the camp area was all together 13 538 kilowatt hours (kWh) during the duration of the event. The electricity came from Pori Energia, and there was no contract of using renewable energy. (Kataja, personal communication on 25.8.2014)

4.2.1.5 Traffic and Transport

All together 2 838 participants attended the camp (Website of Viksu 2014). Most of the participants were from Finland but some came also from Sweden, Germany, and Russia. They belonged to 265 different voluntary fire departments, and arrived mostly by cars, fire engines, and buses. The information about the travelled distances of

the participants was collected on the enrollment day on Sunday 29th of June. Not all of the participants were got hold of on the enrollment day, so the information of trip lengths of some participants is unknown. Some information of foreign participants was collected in an interview with Ms Susanna Sankala, the Vice President of International Affairs.

All together 1 047 adults took part in the camp and 990 of them arrived on the same transports with the youngsters. So these adults are included in the calculations of the participants' trips. (Kivijärvi 19.8.2014) The lengths of the trips and the emissions caused by them are in table 5. The lengths of the trips were calculated as to and fro and multiplied with the amount of vehicles. In the case of buses the trip lengths were also multiplied with the amount of passengers to get person kilometers (in the table as p-km).

Table 5 Viksu: Trips of the participants

Vehicle	Amount (pcs)	Trip length (p-km = person kilometer)	Emissions, (tCO ₂)
Miehistönkuljetusauto (crew transporting vehicle)	106	54 070 km	14.71
Car	52	22 746 km	4.07
Bus	28	642 996 p-km	32.75
Motor caravan	10	4 640 km	1.26
Fire engine	7	2 250 km	1.35
Truck	1	574 km	0.34
Total			54.48

Four invited guest occasions were organized during the camp two on 1st and two on 3rd of July (Lehtonen 2014). There were all together 45 guests, and most of them came from Pori. Some of them, however, came from Helsinki, Turku, and Tampere (Kivijärvi 30.6.2014). The lengths of the trips and the emissions they caused are in

table 6. The lengths were calculated as to and fro and multiplied with the amount of cars.

Table 6 Viksu: Trips of the invited guests

City	Cars (pcs)	Trip length (km)	Emissions (tCO ₂)
Helsinki	11	5 500	0.98
Turku	4	1 160	0.21
Tampere	4	1 080	0.19
Naantali	2	580	0.10
Pori	26	260	0.05
Total	45	8580	1.53

The relatives and friends of the participants of Viksu 2014 -camp and other interested parties were welcome to visit the camp area on Wednesday the 2nd of July. There were approximately 3100 visitors during the day. (Lehtonen, 2014)

The West Finland's Emergency Services Training Center, which was used as a practice area, is located approximately 5.9 kilometers from Kirjurinluoto and is near to the airport of Pori. The distance was traveled by buses. On the four days of the camp, during which the area was used, 10 bus loads of camp participators were transported to the practicing area and back. The visitors of the visiting day were also transported to the practicing area. There were four trips to and fro between Kirjurinluoto and the practicing area during that day. (Lehtonen, 2014)

The office containers came from Ramirent's Turku and Pori departments. The shower and WC containers were transported from Nurmijärvi (near Helsinki approximately 220 kilometers from Pori). The containers had to be transported by full-length trucks. Some of the participants brought, for instance, tents with them in trailers. (Santala 2014) The lengths of the trips and emissions caused by them are in table 7. The lengths of the trips were calculated as to and fro and multiplied with the amount of trucks.

Table 7 Viksu: Transport

Item	Route	Full-length truck (pcs)	Truck (pcs)	Trip length (km)	Emissions (tCO ₂)
Office containers	Turku-Pori	20		5 800	7.01
	Pori-Kirjurinluoto	5		30	0.04
Shower containers	Nurmijärvi-Pori	3		1 320	1.59
Technology	Honkaluoto-Pori		10	100	0.06
Dining tables	Riihimäki		1	420	0.25
	Turku-Pori-Mynämäki		1	260	0.16
Forklift beds	Pihlava		2	60	0.04
Dish washing lines, shower walls	WinNova		1	7	0
Kiipeily -climbing course	Turku-Pori-Mynämäki		1	260	0.16
Heating container	Turku	1		290	0.35
Koulutusteltat (tents where some education was held)	Turku		1	290	0.17
Big tents	Turku		2	580	0.35
Total		29	19	9 417	10.18

4.2.2 F.I.C.C. Rally

F.I.C.C. (Fédération Internationale de Camping, Caravaning et Autocaravaning) is an international camping federation, which has caravan and camping unions, from different countries, as members (Website of F.I.C.C. Rally 2014). First F.I.C.C. Rally was organized in 1933 in Hampton Court in England. Finland has been a member of F.I.C.C. from the year 1953, and three other Rallies had been organized in Finland

before 2014 summer's Rally between 24th of July and 1st of August in Kirjurinluoto in Pori. (Ylikorpi 2014)

No exact amount of participants was given, but they came by 500 motor caravans, and car and caravan combinations (Website of Hymer Club Finland 2014). So, because the participants were mostly older couples, there were approximately 1000 participants.

4.2.2.1 Printed Material

The materials, which were printed on paper for the Rally, included brochures in different languages and an F.I.C.C. invitation. They were printed by a company called Brand ID in Pori. (Tarvainen personal communication on 31.7.2014) These materials are listed in table 8.

Table 8 F.I.C.C. Rally: Material printed on paper

Product	Type of paper	Amount (pcs)	Weight (kg)
Brochure, German/English/French	GalerieArt silk	6 000	168.00
Brochure, Finnish	GalerieArt silk	5 000	140.00
Brochure, Swedish	GalerieArt silk	3 000	84.00
Brochure, Russian	GalerieArt silk	2 000	56.00
F.I.C.C. Invitation	Edixion	150	0.75
Total			448.75

Other printed materials were printed by Fiola Oy in Pori (Tarvainen personal communication on 31.7.2014). These are listed in table 9 and chart 2.

Table 9 F.I.C.C. Rally: Printed signs and stickers

Product	Material	Size (m ²)
Road sign	PVC cell sheet	25.00
Guide sticker	Print sticker	20.00

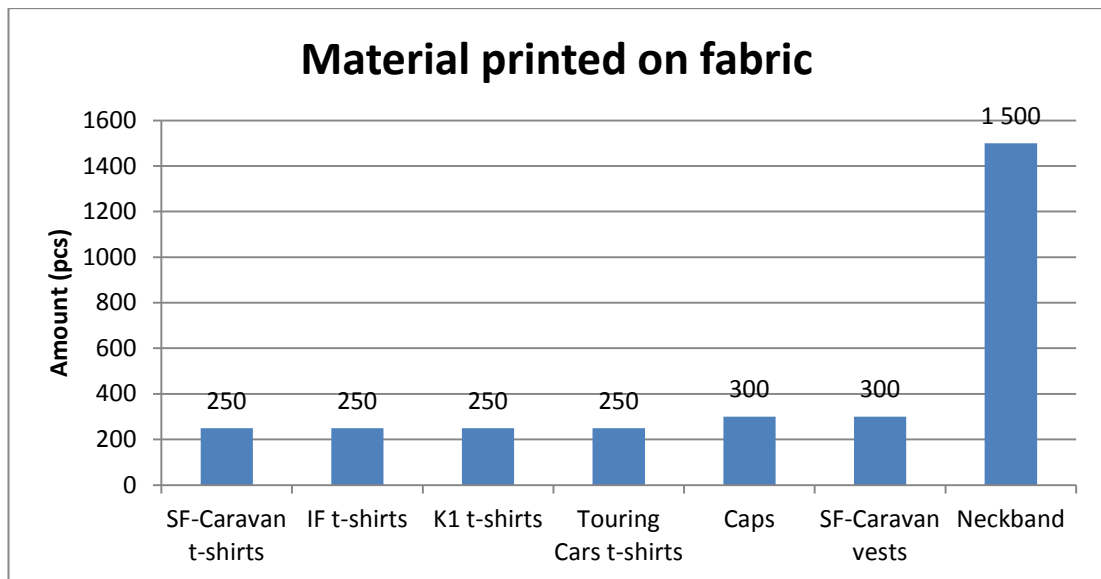


Chart 2 F.I.C.C. Rally: Material printed on fabric

4.2.2.2 Electricity Consumption

The electricity was bought from Pori Energia (an electricity company in Pori) and it was produced by wind energy. The electricity consumption of the event was 10 546 kWh. (Kataja personal communication on 25.8.2014)

4.2.2.3 Trips of the Participants

The participants of F.I.C.C. Rally came from Finland and from different countries of Europe and Asia, and also from USA. They came by combinations of car and caravan, and motor caravans, and some took a flight. The ones coming by cars and motor caravans from outside Finland also took a ferry either from Sweden or from Estonia to Finland. Specific information about the trips of the participants was hard to find out. People were not coming the straightest way from their homes to Pori, but participated some other event or drove round Europe before coming to Pori. It is also likely that they did not go straight back to their homes when leaving Pori, but perhaps continued with their tour of Europe.

The distances between the participants' home towns and Pori were calculated with the information of the home towns received from Porin Seudun Matkailu Oy (Pori

region's tourism company). The trip lengths and the emissions caused by them are in table 10. The trip lengths were calculated as to and fro. In the case of plane and ferry trips the lengths were multiplied with the amount of passengers to get person kilometers (in the table as p-km). The amount of passengers in the calculation was just estimation, and it should also be noted that the complete number of passengers in planes or ferries remained unknown, so in reality the emissions might be lower.

Table 10 F.I.C.C. Rally: Trips of the participants

Vehicle	Trip length (p-km = Person kilometer)	Emissions (tCO ₂)
Car + caravan / motor caravan	637 997 km	173.54
Plane	93 292 p-km	30.37
Ferry	69 395 p-km	20.12
Total		224.03

4.2.2.4 Waste Generated during the Event

There were different bins for unsorted waste, energy waste, bio waste, metal, glass, and paper in the area. The amounts of waste collected were 3.78 tons of unsorted waste, 0.06 tons of energy waste, 0.10 tons of bio waste, 0.06 tons of glass, and 0.07 tons of paper, and no metal waste. After the waste collecting company sorted the unsorted waste the amounts of other waste groups increased, especially the amount of energy waste. (Nieminen 2014) The total waste amounts after sorting are given in chart 3.

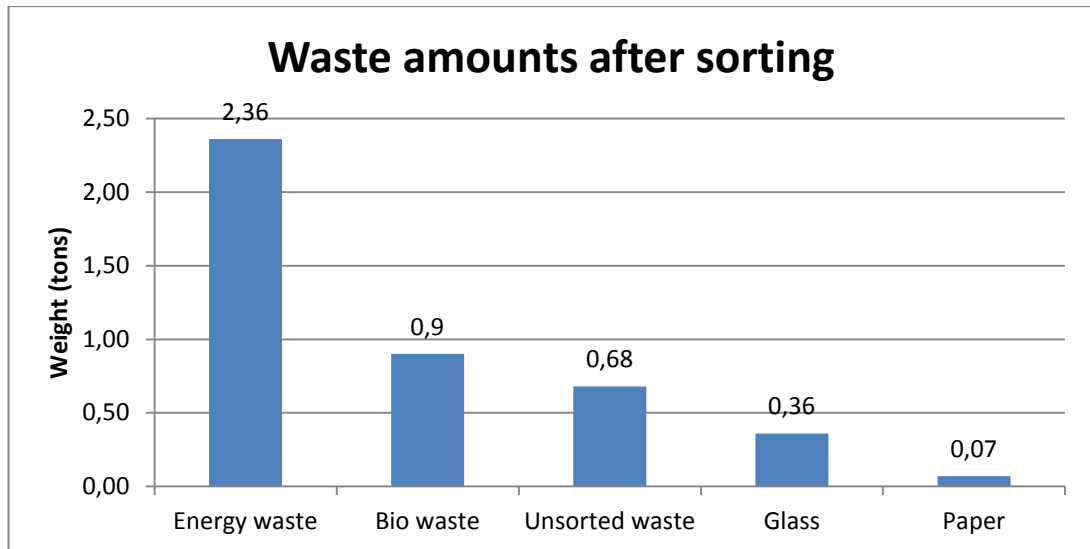


Chart 3 F.I.C.C. Rally: Waste amounts after sorting

4.2.3 Porispere

Porispere is a music festival that has been held in Kirjurinluoto in Pori from the year 2011. In summer 2014 the festival was held between 8th and 10th of August.

4.2.3.1 Printed Material

The materials printed on paper were printed by Plusprint in Ulvila (approximately 9 kilometers from Pori). The CEO of Plusprint announced the amounts, sizes and materials of the different printed materials. (Kuivalainen 2014) The weights of the products have been calculated from the weight of the material, and the products are listed in the table 11.

Table 11 Porispere: Material printed on paper

Product	Material	Amount (pcs)	Weight (kg)
Timetable	Silk 170 g	500	1.77
Timetable, flyer	Silk 170 g	4 000	21.13
Driving permission	Multioffset 300 g	100	
Car sticker		10	

Drink ticket	Multioffset 170 g	4 600	4.69
Poster	Offset-paperi 180 g	220	13.86
Poster	Silk 170 g	100	5.95
Bear's head -logo sticker		2	
Pass (held in a neckband)	Synaps 450 g	1 100	2.97
Motomessut –coupon	Offset 170 g	500	
Porispere –logo sticker		15	
Promokisa, flyer	Multioffset 140 g	300	1.31
Rekry coupon	Offset 170 g	500	2.64
Food ticket	Multioffset 170 g	520	0.53
Total			54.85

Other printed materials were printed by Mainosmasiina in Pori (Wallin personal communication on 6.8.2014). These products are listed in the table 12.

Table 12 Porispere: Printed signs

Product	Material	Amount (pcs)	Size (m ²)
Sign	PVC Frontlit solid vinyl	13	91.06
Sign	Cell sheet 5 mm + sticker	33	17.25
Fabric advertisement	Pelipaitakangas (Fabric used for sport shirts)	4	57.48
Info canvas	Flag 117g lippuneulos (bunting)	1	1.50

4.2.3.2 Festival Decorations

The decorations of the festival area were realized by using second hand items, renting, and borrowing. Some sofas and chairs were bought from local recycling center. The decorations were planned to be used also in coming festivals. (Wallin personal communication on 6.8.2014)

4.2.3.3 Electricity Consumption

The electricity used during Porispere was produced by wind energy and provided by Pori Energia (an electricity company in Pori) (Wallin personal communication on 6.8.2014). The electricity consumption was 13 976 kWh during the building, operation and “demolishing” of the festival between 4th and 12th of August 2014 (Kataja personal communication on 25.8.2014).

4.2.3.4 Traffic and Transport

There were 12 500 visitors at Porispere in 2014 (Kangasmaa 2015). All together 1 251 of them answered the survey done at the Lokkilava -stage area in Kirjurinluoto during the three days of the festival. Most of the festival visitors came from Pori and the surrounding municipalities. Rest of them came for instance from the capital area, Turku, and Tampere.

Most of the visitors came by cars. Some came by buses, trains, bicycles, or on foot. The lengths and emissions of the participants trips are given in the table 13. The lengths were calculated as to and fro. The bus and train trip lengths were also multiplied by the amount of passengers to get them as person kilometers (in the table as p-km). It should be noted that the number of passengers in buses or trains remained unknown, so in reality the emissions might be lower.

Table 13 Porispere: Trips of the participants

Vehicle	Length (p-km = person kilometer)			Emissions, tCO ₂
	Friday	Saturday	Sunday	
Car	9 658 km	12 810 km	8 329 km	5.51
Bus (long-distance)	6 480 p-km	1 501 p-km	1 020 p-km	0.46
Train	1 440 p-km	5 490 p-km		0.14
Taxi	180 km	154 km		0.06
Bus (local)	102 p-km	129 p-km	100 p-km	0.03

Van		280 km		0.08
Motorcycle	20 km			0
Total				6.28

4.2.3.5 Waste Generated during the Event

There were waste bins for unsorted waste and paper. During the festival altogether 3.14 tons of unsorted waste was generated and after sorting, which was done by the waste collecting company, the amount was only 0.3 tons. The amount of paper was 0.26 tons. (Nieminen 2014) The amounts of different kinds of waste after sorting are given in chart 4.

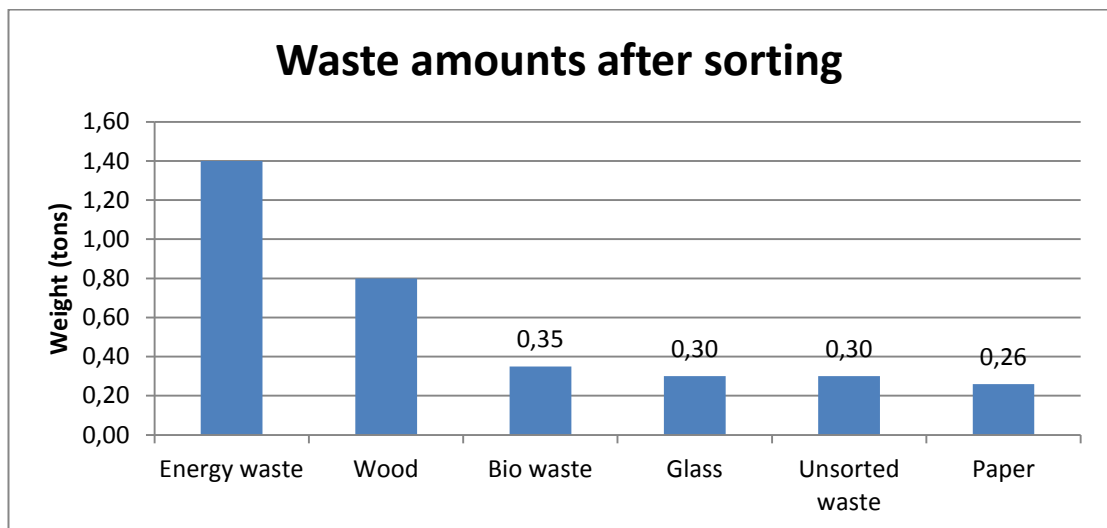


Chart 4 Porispere: Waste amounts after sorting

4.2.4 Climate Calculator

WWF Finland's climate calculator was used to calculate the emissions of the events. The climate calculator was primarily designed to calculate emissions of an office but it can also be used to calculate personal emissions. (Website of climate calculator 2014)

The emission coefficients and default values used in the climate calculator's carbon dioxide emission calculations are based on averages of statistical information and expert evaluations. Best available information from reliable sources is used in the calculator. However, the results received from the calculator do not represent the absolute truth, because of the fact that some of the information the calculator is based on are average values or in other ways limited. The calculator's aim is to give a usable evaluation of greenhouse gas emissions. The coefficients of the calculator are updated averagely once a year. (Website of climate calculator 2014)

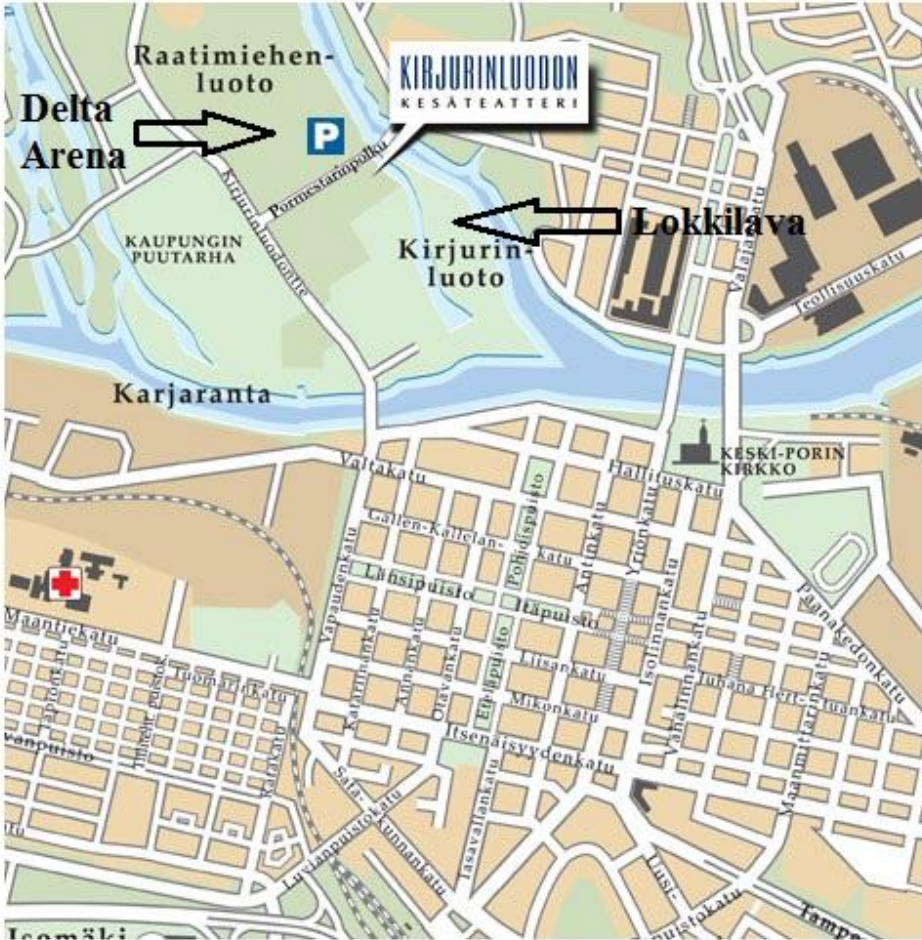
4.2.5 Venue

The place where these three events were organized was Kirjurinluoto near the city center in Pori (picture 2). Viksu 2014 -camp and F.I.C.C. Rally were located at the Delta Arena area, which was constructed especially for different events and concerts. Porispere was held close to the Arena area at Lokkilava (picture 1). The Delta Arena area is ten hectares and it is located only a bit over one kilometer from the city center. Kirjurinluoto is an easily accessible area by car, bike and foot. There is also a possibility of landing with a helicopter and arriving by boat. (Lampinen 2011, 38) The area is accessible for physically disabled people too, and this was also considered when organizing the events, for instance, by providing toilets for disabled participants.

There are municipal electricity grids, and connections to water and sewage networks in the area. There is also an area of 22 hectares for temporary camping use next to the Delta Arena area. On this temporary campsite there are connections to water and sewage networks too. In addition there is draining under the campsite. (Lampinen 2011, 39)



Picture 1 Kirjurinluoto area from above (Halttunen 2003)



Picture 2 Map of city center of Pori (Website of Vihreä Teatteri 2014)

The events had some cooperation so that some of the structures were used at all of the events. The shipping containers, shower containers, and three big tents were brought to Kirjurinluoto before Viksu –camp started and stayed there until the end of Porispere. (Santala personal communication on 25.6.2014)

4.3 The Benchmarking Events

4.3.1 Palotarus 2010

The Palotarus 2010 -camp for firefighter youngsters was held between 5th and 10th of July 2010 in Palotarus course and camp center in Padasjoki. There were approximately 3 550 participants altogether. The camp was organized by The Finnish National Rescue Association (Suomen Pelastusalan Keskusjärjestö) with the help of hundreds of members of volunteer fire departments. (Ristanen & Leván 2010, 2)

The communication methods that were used during the camp were camp radio, camp newspaper, camp ABC-book, bulletin boards, and the homepages of the camp. (Ristanen & Leván 2010, 11)

Resource efficiency was taken into account in planning and organizing the camp. It was preferred to rent equipment, and in procurement need and reusability was always considered. Some camp structures were saved for use at future camps, and eating from disposable dishes was prohibited. It was possible to return some surplus items, like firewood. (Ristanen & Leván 2010; 20, 40, 53)

Electricity consumption was heavy during the camp, but no accurate value was obtained. However, the participants of the camp used solar energy to recharge their mobile phone batteries, and it was possible to by a solar-panel-using charger at the campsite. (Ristanen & Leván 2010, 52)

The water used at the camp came from wells on the area. It was used for dish washing, for washing hands, and in showers. The well water was also tested and found to

be drinkable. (Ristanen 2010) There was no connection to sewage network at the area, so a filtering system was build for the grey waters from showers, and hand and dish washing. After filtering the water was discharged back to the environment. It was not possible to measure water consumption or the amount of waste water at the camp. (Ristanen & Leván 2010; 33, 43)

At the campsite it was possible to sort glass, metal, paper, cardboard, energy waste, bio waste, and hazardous waste, like batteries. No recyclable waste ended up to land-fill site. (Ristanen & Leván 2010, 19) The waste amounts are given in chart 5.

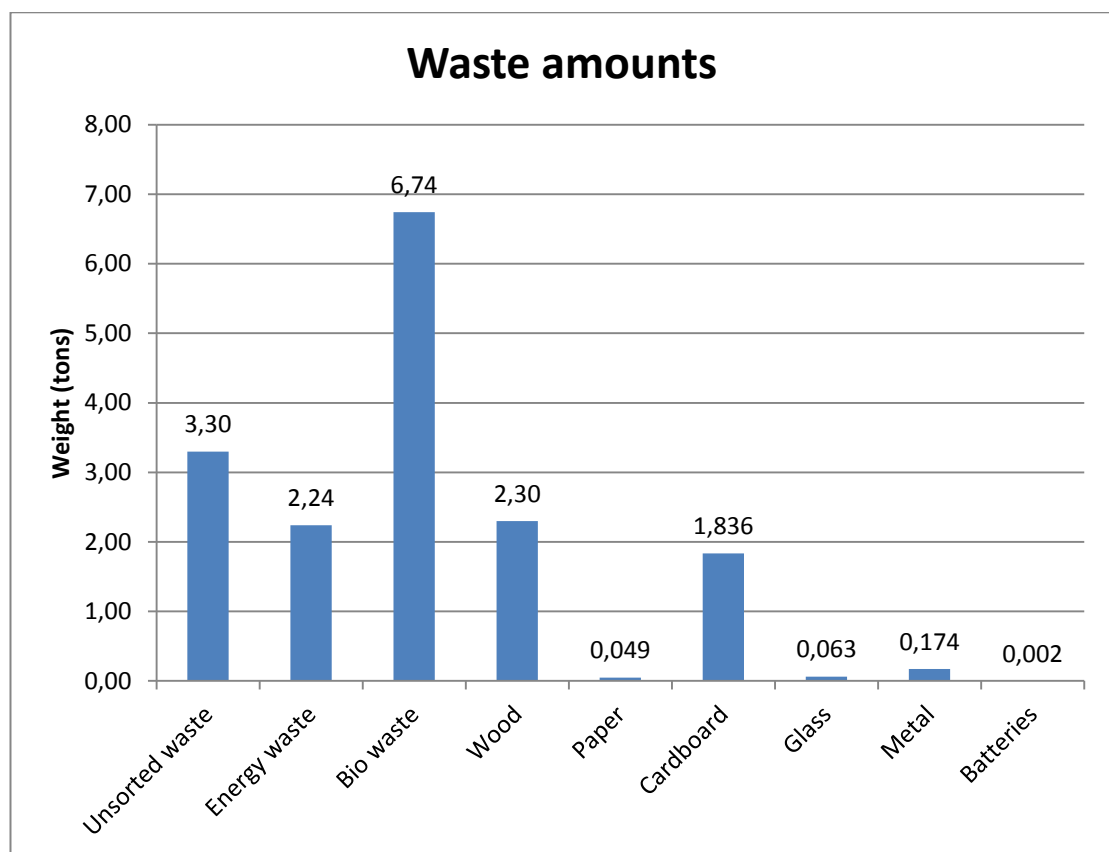


Chart 5 Palotarus: Waste generated during event (Ristanen & Leván 2010, 46)

4.3.2 Ilosaarirock

Ilosaarirock is Finland's second oldest rock festival, which is organized every year in July in Laulurinne in Joensuu (pictures 3 and 4) (Website of Finland Festivals 2013). The carbon footprint of the festival has been calculated from the year 2010 onwards.

In 2013 the festival was held from 12th to 14th of July. (Website of Ilosaarirock 2014) There were 55 000 visitors that year (Website of Ilosaarirock 2013).



Picture 3 Laulurinne area from above (Website of Ilosaarirock 2009)



Picture 4 Map of city center of Joensuu (Website of Ilosaarirock 2014)

The printed materials were printed by Punamusta Oy in Joensuu, and the distance between the printing house and the festival area was about four kilometers. There was a mobile festival program available for mobile devices, which lowered the need for printed material. (Website of Ilosaarirock 2014)

Ethicality and environmental aspects were also considered in other purchases. The Ilosaarirock t-shirts and other products sold at the festival were made from ecologically produced cotton. The neckbands and wristbands were produced from a fabric made of PET-plastic (polyethylene terephthalate). PET-plastic is the material of, for instance, recyclable plastic bottles. The decorations of the festival were mostly made of recycled materials, and the same materials are used in the decorations of next festivals. Recycled and donated items were also used when furnishing changing rooms of the performers. (Website of Ilosaarirock 2014)

The electricity used in Ilosaarirock was almost 80 percent green electricity, which was produced by using renewable energy sources. Electricity consumption was measured quite precisely, and the stall holders were required to calculate the electricity consumptions of their electrical devices. (Website of Ilosaarirock 2014)

It is preferred for the participants to use public transport or to arrange carpools. Special "Rocktrains" were arranged and free "Rockbusses" from the train station to the festival area. The parking areas of the festival had a parking fee, but a driver with at least four passengers was rewarded with a package of fairtrade coffee. A guarded bicycle parking area was arranged for people coming by bikes. (Website of Ilosaarirock 2014)

In 2013 the total emissions were 598 tons of carbon dioxide equivalent. The emissions were divided to three groups, which were program, production, and participants. Program included the emissions caused by both Finnish and foreign artist's trips. Production included the technical realization, electricity production, water consumption, transportation, refuse collection, and printed materials. Participants group entailed the calculation of the emissions of the participants' trips based on customer research and information about the ticket sales. The emissions of the artists' trips were 18 percent of the total emissions, which is 110 tons of carbon dioxide equivalent.

lent. Productions share was the lowest being 89 tons and 15 percent from the total. The biggest part of the emissions came from the trips of the participants. It was 399 tons and 67 percent of the total. (Website of Ilosaarirock 2014)

It was possible to sort energy and bio waste, metal, glass, and cardboard on the festival area. The recycling percent from the total waste amount was 43 percent in 2013. At the food serving stands on the festival area only biodegradable dishes and utensils were used, so they could be sorted as bio waste. On the alcohol serving areas the beer mugs and cans had a deposit, so the area was kept clean and the mugs and cans were returned unbroken to be used again. (Website of Ilosaarirock 2014)

5 RESULTS

5.1 Viksu 2014 Compared to Palotarus 2010

Viksu camp had 2 838 participants and Palotarus camp 3 550 participants, so Viksu camp was a little smaller. However, Suomen ympäristöopisto (Finland's Environmental Institute) Sykli made the environmental guide for the Palotarus camp and this guide was used for Viksu camp also, so the events had similar starting points.

The venues of the camps were considerably different. The Palotarus course and camp center is perhaps better suited for camps and courses with a smaller amount of participants. It is situated at an area of forest and lakes, so it is good area for practicing wilderness skills. There is no connection to municipal sewage system, so special methods were needed to treat the gray waste waters of the Palotarus camp.

The communication methods were similar at both camps. There were paper mediums but also the camp radios and websites. The bulletin boards of both camps were used for more permanent information, like the waste sorting instructions, and other methods were used to inform participants of, for instance, changes of schedules. This helped to bring down the consumption of paper and need of printed material.

After the Palotarus camp it was possible to return some surplus items and this was a possibility also after the Viksu camp at least for the products that were not sold at the canteens.

In the planning and construction phases of both camps resource efficiency was considered. The needed structures were tried to do so that they could be used again in the future for other camps. The procurement of structures, equipment, and furniture was done by renting or borrowing where possible and no disposable dishes were used.

Water was used for similar purposes at both camps only the source was different. The water consumption of Viksu camp is known and it was 595 m³, but the consumption of Palotarus camp could not be measured. A Finnish citizen uses approximately 60 liters of water for washing themselves in one day (Website of Motiva Oy 2015), which is same as 0.06 m³. A similar figure for a participant of Viksu camp was 0.019 m³.

Electricity was consumed quite heavily at both camps. No exact values were obtained about the electricity consumption of Palotarus camp, but the consumption of Viksu camp was 13 538 kWh. The electricity consumption of a house of four people and 120 m² with electric heating was approximately 19 600 kWh in 2011 (Website of Motiva Oy 2015). There was no mention of the electricity of either camp being produced by renewable sources.

The emissions of Viksu camp combined give the total of 66.19 tons of carbon dioxide. This divided by the total of 111 032 kilometers gives approximately 596.1 g/CO₂/km. In 2013 the carbon dioxide emissions of new cars in Finland were approximately 132.4 g/CO₂/km (Website of Trafi 2015). No emission values or other traffic and transport information was given in the Palotarus report.

It was possible to sort energy waste, bio waste, metal, glass, paper and cardboard, and hazardous waste at both campsites. The waste amounts of Viksu camp remained unknown, but the waste amounts of Palotarus camp were given in chart 5 in chapter 4. In 2011 in Finland 2.7 million tons of municipal waste was generated, which was 0.5 tons per person (Website of Statistics Finland 2013). This value divided by 365

days gives approximately 1.4 kilograms per day. The total waste amount of Palotarus was 16.704 tons. There were 3 550 participants at the camp so there were 4.7 kilograms of waste per participant. When this amount is divided by the length of the camp in days the answer is approximately 0.8 kilograms per day.

5.2 Porispere Compared to Ilosaarirock

There were 12 500 visitors at Porispere in 2014 and 55 000 visitors at Ilosaarirock in 2013, so Porispere is a lot smaller than Ilosaarirock. The venues of both festivals were close to the city centers, which can be seen from the pictures 2 and 4, and they were especially constructed for different events.

It was not mentioned how much printed material there was for Ilosaarirock or what they were. Presumably they were similar materials than for Porispere and maybe the amount was bigger, because of the bigger amount of visitors, even though they had a mobile version of the festival program. The distance between the printing house and the festival area was smaller in Joensuu than in Pori.

At both events the decorations were mostly of recycled materials. They were planned to be used again or further recycled if not usable anymore for the decoration purposes of the future events.

Both events used green electricity produced from renewable energy sources. The electricity consumption was closely monitored but no accurate amounts were mentioned for Ilosaarirock. The consumption of Porispere was 13 976 kWh. The consumption seems quite heavy compared to the 19 600 kWh consumption of a house of four people and 120 m² with electric heating in 2011 (Website of Motiva Oy 2015).

At Ilosaarirock the waste sorting was done on the festival area by the visitors, whereas the waste sorting of Porispere was done by the waste collecting company on their premises. No waste amounts were given on Ilosaarirock's website, so only Porispere's waste amounts are known. On Ilosaarirock's website it was stated that the recycling percent was 43 in 2013. Total amount of unsorted waste collected from Po-

rispere was 3.14 tons, which was only 0.3 tons after sorting. This gives Porispere a high recycling percent, which is 90 percent. Calculated from the total waste amount, amount of visitors, and length of the festival the waste amount per visitor per day was approximately 0.084 kilograms, when the approximate amount of a Finnish citizen was 1.4 kilograms per day in 2011.

The emissions of Ilosaarirock's participants were 67 percent of the total emissions and in tons of carbon dioxide equivalent they were 399. From the visitor's of Porispere only 1 251 answered the survey done during the festival. Based on these answers a guiding emissions value was calculated. It was 6.28 tons of carbon dioxide. It is difficult to compare the emissions values of Porispere and Ilosaarirock because the value for Porispere is only partial. To compare Ilosaarirock's emissions to the emissions of new cars in Finland in 2013 is also difficult because the values are in different units.

5.3 F.I.C.C. Rally Compared to Finnish Averages

The electricity used at F.I.C.C. Rally was produced by renewable energy sources. The electricity consumption was 10 546 kWh. That is over half of the consumption of a 120 m² house with electric heating, which was approximately 19 600 kWh in 2011 (Website of Motiva Oy 2015).

The total waste amount generated during F.I.C.C. Rally was 4.37 tons. An average Finn generated 0.5 tons of municipal waste in 2011 (Website of Statistics Finland 2013). This was approximately the same as 1.4 kilograms per day. When the waste amount of F.I.C.C. Rally is divided by the amount of participants and the length of the event in days, the answer is approximately 0.49 kilograms per participant per day.

5.4 Improvements to Sustainability and Resource Efficiency

There were already many good measures taken at the events held in Pori in summer 2014. Examples of these measures are, for instance, the renting and borrowing of

structures and furniture, and the cooperation of the events concerning some of the structures. Also the usage of electricity produced with renewable energy sources is a good example. However some improvements could be done.

Kirjurinluoto as venue was well suited for the events, because Delta Arena is especially intended for different kinds of events and it is close to the center of Pori. Because it is close also to bus station and railway station, people using public transport do not have long distances from the stations to the area. The biggest environmental effect of any event is the emissions from traffic and transport, so the usage of public transport or carpools should be encouraged where possible. However, it is almost impossible for the caravanning people because of the nature of the pastime.

The necessity of all of the printed products at a time when most of the people have some mobile devices, for instance cell phones or tablets with internet connection, could be considered. An example is of considering the necessity of having an everyday printed version of the camp newspaper at the firefighter youngsters' camp.

Water as well as electricity consumption could be more closely monitored and measured. Unnecessary use of either of them should of course be avoided. The lighting and other electric equipment should be as energy efficient as possible. As it was said at the Ilosaarirock's website the cooperation partners, like stand holders, should be obliged to measure their electricity consumption. They should also monitor their water consumption.

Waste recycling was quite well organized, and there were good recycling instructions. However, there were a lot of recyclable materials in the unsorted waste. One reason for this could be that different municipalities can have slightly different instructions for waste recycling, and this should be taken into account.

Because it is human nature to reach better results with an incentive, those could be offered. There could be some prize for cooperation partners who achieve a low electricity or water consumption. Also the carpoolers could be awarded somehow, like at Ilosaarirock with a package of fairtrade coffee.

6 CONCLUSIONS AND DISCUSSION

The purpose of this thesis was to provide guidelines of how to organize a mass event following the principles of sustainable development and resource efficiency based on case examples from the summer of 2014. The aim was to give examples of environmental impact reducing and resource efficiency improving methods.

The results of this thesis were some considerations of how to improve resource efficiency of mass events and hopefully they are of use when organizing such events. Resource efficiency includes also things that were not discussed in this thesis, like all sources of the used materials and the foodstuffs offered or sold at the events, and their sustainability and resource efficiency. These things could be further researched to get a more comprehensive picture.

Continuous improvement is the key concept for any improvement process, also for enhancing sustainability and resource efficiency. It means that you should never be content with the result you have, but always strive to be better. To succeed it needs monitoring of all areas affecting, in this case, resource efficiency, and learning from the gained results.

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