

**IMPROVING ENVIRONMENTAL PERFORMANCE
AND RELATED COSTS IN A PUBLIC ORGANIZATION
THROUGH INITIAL ENVIRONMENTAL REVIEW:
CASE STUDY – HELSINKI POLICE DEPARTMENT**

**Jyväskylä University School
of Business and Economics**

Master's thesis

2017

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ABSTRACT

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Title of thesis Improving environmental performance and related costs in a public organization through initial environmental review: case study – Helsinki Police Department	
Discipline Corporate Environmental Management	Type of work Master's thesis
Time (month/year) 6/2017	Number of pages 85 + 39
Abstract <p>The purpose of this study is to explore what the Helsinki Police Department could do to improve its overall environmental performance and related costs from the perspective of sustainable development. A research project on this topic was carried out and became the groundwork of this thesis. The two reviewed theoretical concepts were: (1) initial environmental review and (2) sustainable environmental direction and practices.</p> <p>This research was designed based on a single case study, qualitative and inductive standpoints. The scope of the review was narrowed down to the Helsinki Police Department's main police station in Helsinki – Pasila Police Station. Within this station, the research focused on eight selected operational areas: (1) organization overview; (2) property management; (3) procurement, material use and office practices; (4) hazardous material; (5) environmental training; (6) environmental incident; (7) fleet management and (8) most visible subcontractors. Eleven people were interviewed for primary data. Secondary data was collected from multi-sources and then analyzed collectively to form a big picture of the organization, which allowed the researcher to decide which areas should be primarily paid attention to in conjunction with overall improvement.</p> <p>Base on research findings, three sequential analyses were conducted: (1) identifying environmental aspects; (2) identifying significant environmental aspects; and (3) identifying gap. The final analysis revealed that improving overall environmental performance and related costs should start from the three cluster areas: (1) fleet management; (2) energy management and (3) stakeholder engagement. Recommendations were tailored-made for the detected issues.</p>	
Keywords environmental performance, initial environmental review, sustainable environmental practices, environmental aspect, significant environmental aspects	
Location Jyväskylä University Library	

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1 INTRODUCTION

Climate change is one of the biggest threats of our time. Significant scientific evidence has proven that climate change effects are widespread around the globe, regional and local in scale. Based on scientific consensus, human activities not only significantly contribute to the climate changing, but also accelerate the effects that come with it e.g. changes in precipitation, decrease in ice and snow which directly affects the amount of water resources around the world, extreme weather in form of heatwaves, drought, flood, etc. (Intergovernmental Panel on Climate Change, 2014). The significant element behind anthropogenic climate change is the excessive concentration of carbon in the atmosphere, produced by the " emission of Greenhouse gases (GHGs) as a result of economic activities, including energy, industry, transport, and land use, many of which rely upon fossil fuels. The most important GHG, carbon dioxide, CO₂" (Banuri and Opschoor, 2007: 2).

Since the concentration of GHGs is a direct consequence of economic activities and development, there is a need to link the effort to stabilize the concentration of the GHGs in the atmosphere and to promote sustainable development. This is to ensure that economic development is not halted or reversed because of the global effort to combat climate change (ibid). Since climate change and sustainable development are large topics by themselves, often, they are discoursed separately. In this study, it is viewed that the global concern over climate change has tremendously influenced the global effort to promote sustainable development, especially on environmental management to sustainably green societies.

Sustainable development, another major social movement since 1990, has been perceived as the true path towards sustainable wellbeing of humankind (UN, 2016a). Determined to foster sustainability, heads of states have cooperated and enacted various environmental strategies, policies and action plans to tackle this issue. The fruit of the latest cooperation is 'the 2030 Agenda for Sustainable Development (ibid.), which has binding effects on all state members including Finland. The detail of 2030 Agenda is discussed further in chapter 2.

In the past two decades, the Finnish government has been actively promoting sustainable development practices. This includes requesting large Finnish public organizations to green themselves (Findicator, 2016; Interviewee 1). Many have adopted different environmental management systems (EMS) and practices based on environmental standards e.g. ISO 14001 EMS, European Eco-Management and Audit Scheme (EMAS), Green office EMS or even the national guideline called 'Sustainable development indicators' (Kuiri, 2014; Parliament of Finland, 2006; World Wildlife Fund, 2014; Kela, 2012; Lindroos, 2016). The Helsinki Police Department has also been asked to green itself. At the same time, the organization has been interested in improving its own environmental performance. This interest was the starting point of this thesis research.

1.1 Background and objectives of the research

In January 2016, the researcher was contacted by the Helsinki Police Department (HPD) to inquire whether the researcher could assist the organization to improve its own environmental performance. The HPD had pointed out three objectives it hoped to achieve: (1) to improve overall environmental performance from the perspective of sustainable development; (2) to find where costs could be saved from being a more environmental friendly operation; and (3) to promote a positive image to the public.

This project appeared to be challenging, but compelling at the same time. The HPD further suggested that this project could be conducted as a Master Thesis research project. This is the reason why this thesis topic exists. In addition, the HPD required that this study be carried out from the standpoint of sustainable consumption as the HPD is the consumer of countless products and services. This fact was also taken into account when designing the research.

At the moment, the HPD does not have an environmental management program (EMP), but it has great interest to launch one. In perusing any EMP, there is a need to conduct a primary background study. The most appropriate method for this is thought to be 'an initial environmental review (IER), the most commonly employed technique before launching any EMP (Edwards, 2004).

1.2 Research task and questions

It was challenging to find previous research on conducting an initial environmental review (IER) in a public organization in English. The researcher found more guidelines on how to conduct an IER than the actual review report examples. Even so, the researcher managed to find two IER example reports from the Internet. The first one is called 'Parliament environmental review report (2006)' (in Finnish Eduskunnan ympäristökartoitusraportti), and the other named 'Initiative Environmental review (2007)' from the University of Jyväskylä. Although both studies were carried out ten years ago, they are still relevant. Both were used as examples on how the researcher designed the research method and compiled questions. However, they are not used as comparative studies. This is due to the nature of the IER that only investigates a single specific case at a time; therefore; it does not allow comparison unless it is conducted in the same type of organization repeatedly.

Understanding what the HPD wanted, the three research objectives were used to formulate the research task, which was:

What the Helsinki Police Department could do to improve overall environmental performance and related costs from the perspective of sustainable development

The researcher posed two research questions to explore answers for the research task, as follows:

Question 1: What are the Helsinki Police Department's current environmental practices, environmental aspects, potential environmental impacts and significant environmental aspects?

Question 2: What are the sustainable environmental direction and practices that the Helsinki Police Department should aim for?

The answers to the two research questions were based on the two reviewed theoretical concepts: initial environmental review (IER) and sustainable environmental direction and practices in chapter 2 (Theoretical framework).

1.3 Scope and justification

This thesis research concentrated on environmental improvement. Since the topic is directly related to the economic side; for that reason, a part of the discussion at times involved the connection between the environmental and economic sides.

Currently, the Helsinki Police Department (HPD) consists of four police stations in these locations: (1) Pasila; (2) Malmi; (3) Töölö and (4) Itäkeskus. The Pasila station was chosen as the starting point of the project because it is the central unit of all operations. The suitable scope of the project, agreed between the HPD and researcher, was overviewed from an administrative level. This means, in practice, that key data was collected through interviews with managerial and administrative staff and from analysis of police internal documents. These were meant to display the overall picture of the Helsinki Police from selected functions within the headquarters and to reveal issues that could be improved.

In figure 1 below, highlighted with blue color were the reviewed themes, of which there were eight topics of consideration: (1) organization overview; (2) property management; (3) procurement, material use and office practices; (4) hazardous material; (5) environmental training; (6) environmental incident; (7) fleet management and (8) most visible subcontractors. (Reference: 'The Appendix 1. 154 initial environmental review questions'). The information obtained under the first topic 'organization overview' was treated as background information. Whereas the data acquired under the rest of the topics were reported as research findings. The parts highlighted with yellow color were units and operations that were out of the project scope. The 'other units' specifically refer to six policing units: (1) mounted police; (2) marine police; (3) police dog; (4) internet police (5) national special intervention unit and (6) police band. The project scope-thesis of this study is illustrated below.

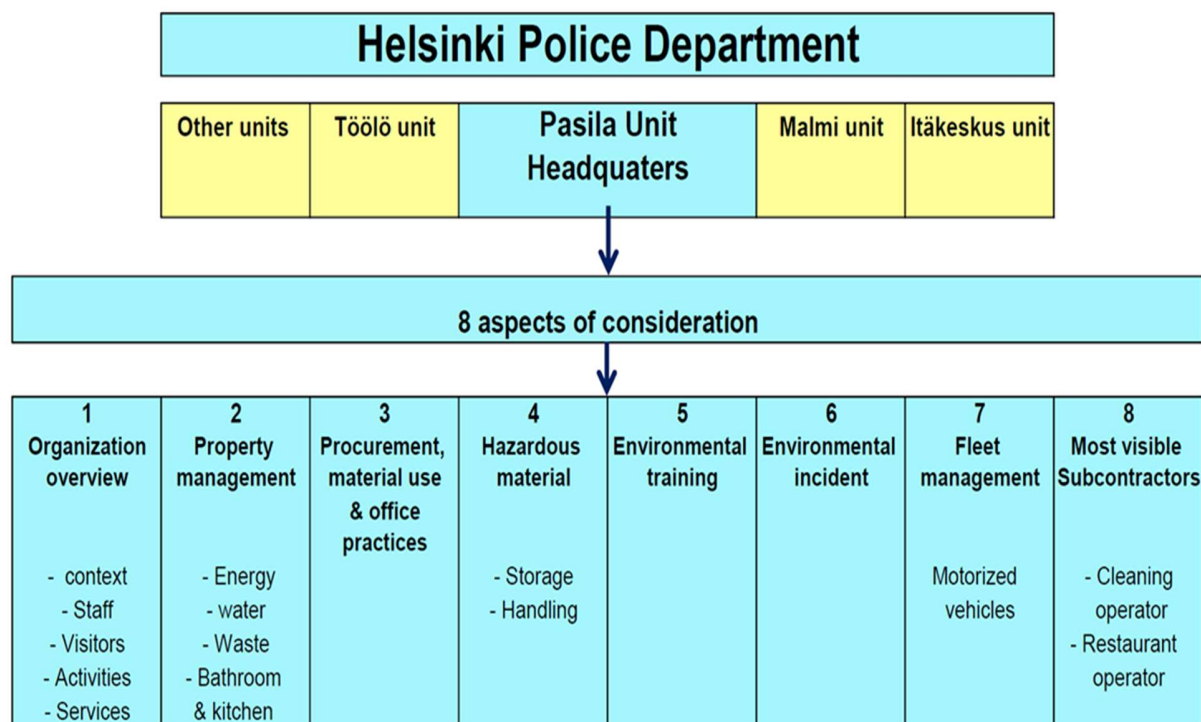


Figure 1. The thesis scope

1.4 Definition of key concepts

Throughout this report, there are seven key concepts that are often referred to. The following keywords' definitions are directly quoted to prevent misinterpretation, as follows: (1) **environment** is " surroundings in which an organization operates, including air, water land, natural resources, flora, fauna, humans and their interrelationships " (ISO 14001:2015: 2); (2) **environmental management system** is part of the larger management system, meant to " manage environmental aspects, fulfil compliance obligations, and address risks and opportunities " (ISO 14001:2015: 2); (3) **environmental review** refers to " an initial comprehensive analysis of environmental aspects, environmental impacts and environmental performance related to an organization' s activities, products and services " (EMAS, 2013a); (4) **environmental aspect** is " element of an organization' s activities or products or services that interacts or can interact with the environment " (ISO 14001:2015: 2); (5) **significant environmental aspect** is " an environmental aspect that has or can have a significant environmental impact " (EMAS, 2013a); (6) **environmental impact** is " change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization' s environmental aspects " (ISO 14001:2015: 3); and (7) **environmental performance** is " performance related to the management of environmental aspects " (ISO 14001:2015: 6).

1.5 Outline of the research processes in this study

All research processes in this study are outlined in figure 2 below.

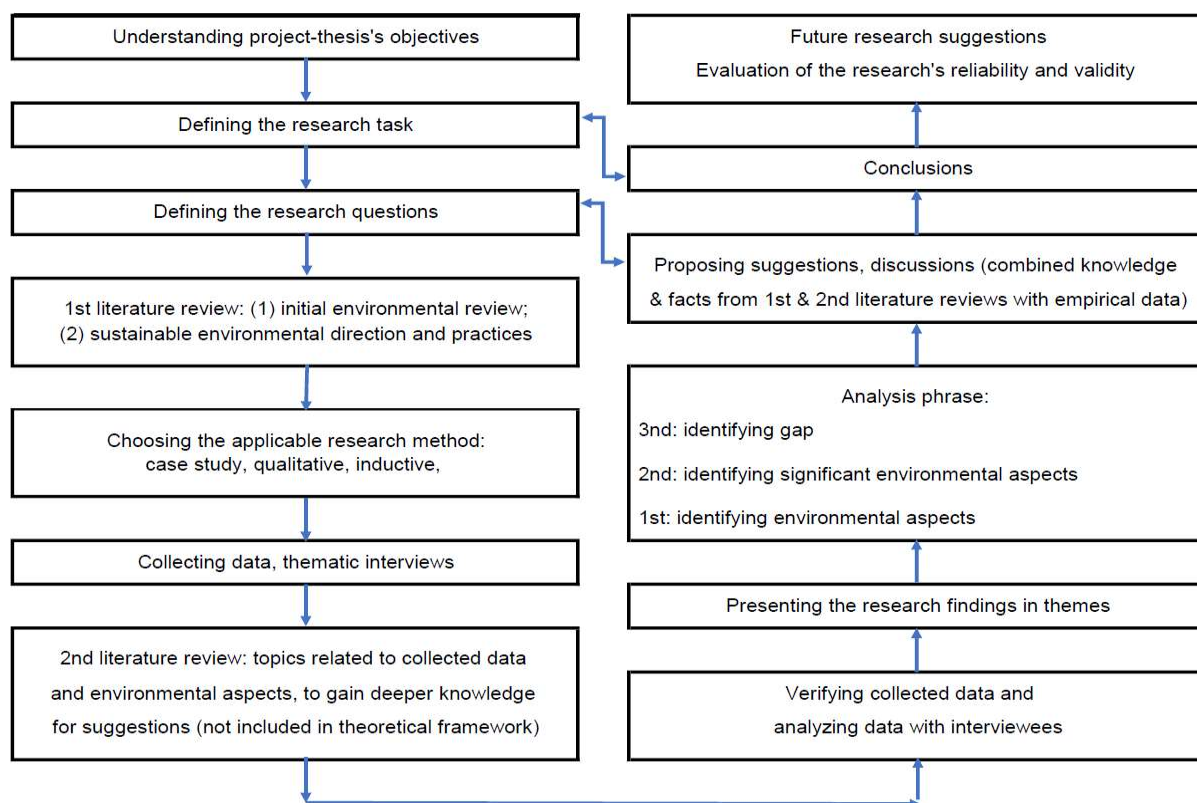


Figure 2. The research processes

This thesis report is formed of six chapters. In the first chapter, the researcher has already mentioned the thesis objectives, the research task, the research questions and two reviewed topics in chapter 2 (the first literature review). Following this, the researcher describes the methodology for data collection and analysis, which is based on case study and thematic interview in chapter 3. There was a need to review more literature (the second literature review) on topics related to the collected data and environmental aspects to gain deeper knowledge for suggestions later. As this research is based on an inductive standpoint, the additional knowledge from the second literature review was not included in the theoretical framework. Nonetheless, it was combined with the first literature review and empirical data for suggestions later. The findings and analyses of this study are extensive. Thus, they are divided into two separate chapters: research findings in chapter 4 and analyses, suggestions and discussions in chapter 5. The last chapter concludes; answers the research task; evaluates the research reliability and validity as well as suggests future research topics.

2 THEORETICAL FRAMEWORK

This chapter reviews two concepts perceived to be relevant for collecting and analyzing research data, specifically initial environmental review (IER) and sustainable environmental direction and practices. The IER is conducted to find an answer for the first research question: 'What are the Helsinki Police Department's current environmental practices, environmental aspects, potential environmental impacts and significant environmental aspects?' The IER is outlined with general definition, its importance and steps in conducting it. For this thesis, the IER aided the researcher in assessing the current overall environmental performances of the Helsinki Police Department (HPD).

The other topic, the sustainable environmental direction and practices are used to answer the second research question: 'What are sustainable environmental direction and practices that the Helsinki Police Department should aim for?' Sustainable development (SD) is the agenda that all countries aspire to achieve. Under the leadership of the United Nations (UN), all states cooperate towards better SD policies and practices. To make sure that the right actions are implemented at national and local levels, sustainable development goals (SDGs) and sustainable development indicators (SDIs) are proposed by the United Nations to ensure uniform measurement across the globe (UN, 2016a; OECD, 2016: 6).

After that, a gap analysis was carried out to evaluate the Helsinki Police Department's overall environmental performances against the desired sustainable environmental direction and practices. Eventually, suggestions on what the organization could do to improve have been proposed in chapter 5: Analyses, suggestions and discussions. The purpose of this review chapter is not to provide all-inclusive knowledge, it is exploratory and explanatory to a large extent.

2.1 Initial environmental review

Initial environmental review (IER) is the first step before planning any environmental management program or environmental management system (EMS). That is why it is important to understand what an EMS is and how many EMS standards are recognized internationally and in Finland. To begin with, general concept of an EMS and its application in a public sector organization are shortly discussed. After that, the IER as main research data collection and analysis method is described.

2.1.1 Introduction to environmental management system

In the past few decades, general concerns on environmental management issues and protection of nature have gained attention from the public worldwide. To improve the situation, different policies, initiatives, legal instruments as well as market based solutions e.g. environmental management system (EMS) have been employed. Those have led to implementation of various environmental management practices not only in private sector organizations, but also in public administration (Norén and von Malmborg, 2004; Emilsson and Hjelm, 2005; Nogueiro and Ramos, 2014). The main goal of sound environmental management, regardless of sector, is to “achieve the balance between the environment, society and economy...the three pillars of sustainability (ISO 14001:2015: VI)”

The concept of the EMS officially emerged a few decades ago. During the 1980s and 1990s, numerous businesses called for new management tools to assist them to stay within environmental compliance and to move onward towards sustainable development. As a result, new standardized environmental management systems (EMS) were developed during that era (Steger, 2000). At the moment, there are two internationally recognized EMSs: ISO 14001 and European Eco-Management and Audit Scheme (EMAS).

Both define themselves slightly different from each another. For instance, ISO 14001 states that “environmental management system is part of the management system used to manage environmental aspects, fulfil compliance obligations, and address risks and opportunities” (ISO 14001:2015: 2). Similarly, EMAS specifies itself as “a voluntary tool available to any organization operating in any economic sector within or outside the European Union that wants to: (1) assume environmental and economic responsibility; (2) improve its environmental performance; and (3) communicate its environmental results to society and stakeholders in general” (EMAS, 2013). By comparing the two definitions, it is noticeable that the EMAS has clearer description of the scheme.

EMAS also claims that it is the most premium EMS brand in the market and superior to ISO 14001 (EMAS, n.d.). One example behind this claim is the fact that the EMAS is the only standard demanding an environmental review as the first official step of its EMS (EMAS, 2013). An organization that wants to go beyond an ISO 14001 standard can step up some procedures to be able to apply to the EMAS certification (EMAS, n.d.).

According to Kuiri (2014), there is one more standard called Green Office EMS, created by World Wide Fund for Nature (WWF). Since the Green Office EMS is designed for modern organizations which operate mainly in office settings, it is thus highly practical tool for such type of organization. That is one reason many organizations turned away from the ISO 14001 EMS and EMAS and register the Green Office EMS instead (ibid.). He maintains that all three EMSs have slightly disparate criteria. In his comparison of each EMS' requirements and scope, Kuiri (2014) finds that the EMAS has the highest level of obligations; the ISO 14001 is in the middle; and the Green Office EMS is the simplest. The Green Office EMS has a strong foothold in Finland, seen from the lengthy list of about 40 Finnish public organizations who have registered for it (WWF, 2014).

In some literature on adoption of an EMS such as ISO 14001 or EMAS in public sector organizations, the relative importance of it is debated and suggested that such EMS is not the most suitable for the public sector. For simple reasons, it is complex and costly when pursuing it on a full scale (Norén and Malmberg, 2004; Emilsson and Hjelm, 2005).

Some countries or municipalities are quite advanced in adopting an EMS, especially those ISO 14001 or EMAS (Norén and Malmberg, 2004). A study within a number of Swedish municipalities found that almost half of the Swedish local organizations had launched an EMS program already in the year 2000. The main message of the study is: "The intention (of public organizations) is to restructure and make environmental management in public organizations more effective" (Emilsson and Hjelm, 2002). A similar study also supports that local Swedish governing bodies recognize improved functionality, especially within the selected Swedish municipalities of Kalmar and Eskilstuna (Norén and Malmberg, 2004). Both municipalities in this study employed either one or both standards of ISO 14001 and EMAS by the time the study was conducted. Having conducted in-depth dialogue with several public officers from both authorities, Norén and Malmberg (2004: 190) were able to generalize the advantages and disadvantages from using the EMS, as directly quoted in table 1 below:

Table 1. Advantages and disadvantages of EMS in Swedish local authorities

Advantages	Disadvantages
(1) More distinct structure (2) Better defined liability among officers (3) Clearer information (4) That environmental thoughts have been implemented in the planning of the work (5) That environmental thoughts have been implemented in the daily work (6) Greater awareness of environmental issues (7) Clearer accounting (8) Simpler communication towards participants	(1) A larger amount of administrative work (2) A lot of time is used to develop the EMS (3) A lot of time is used to support and maintain the EMS (4) It is hard to establish the EMS in the organization in the planning of the work (5) There is a risk that the EMS becomes too detailed and hard to keep functional (6) Sometimes the advantages the EMSs has brought to the caring, social service administrations can be reached in simpler ways (7) Sometimes the certification gives more expenses than income, both economic and in other areas

From the findings mentioned in table 1, it is foreseeable that an EMS does not only offer benefits, but also presents various challenges to public sector organizations. Being aware of the drawbacks of an EMS may ease and smoothen the implementation of an EMS. Nogueiro and Ramos (2014) agree with Norén and Malmberg (2004). They also highlight that there are several other tools to assist public sector organizations to advance their environmental performance towards sustainable development. In their review, they summarize a total of seven approaches with pros and cons. The seven methods are as follows: (1) environmental training; (2) environmental management system (EMS); (3) environmental auditing; (4) sustainable public procurement; (5) environmental and sustainability reporting; (6) sustainability indicators and (7) locally agreed upon sustainable development strategies (Nogueiro and Ramos, 2014: 22).

Having mentioned the three EMSs, this denotes that there was a period that the researcher searched for an EMS model believed to be proper for this thesis project. Though the Green Office EMS sounds credible, it was left out as a choice since the beginning of the project. One reason for this was that the website of Green Office WWF does not provide much in the way of guidelines on how to start this EMS. The only way to get such information is to contact the WWF directly. Then there were two viable options left to consider. Based on the EMAS's webpage and Kuiri's (2014) analysis, it was perceived that the EMAS is demanding. Thus, it was also ruled out. The last choice remaining was ISO 14001.

Being aware of the advantages and disadvantages of an EMS, the researcher follows ISO 14001 guidance with great care. As ISO 14001 is the most registered EMS standard in the world (Mazzi, Toniolo, Mason, Aguiari and Scipioni, 2016) and it was recently revised in the year 2015 (ISO 14001:2015); thus, it is thought that its newness could give some practical direction. ISO 14001 is not the only guidance in this project. Since the EMAS is regulated by European Commission, it has published a guideline called 'EMAS User's Guide', which is easily apprehensible. For that reason, this guideline is used as secondary guidance on building an EMS in addition to ISO 14001:2015.

2.1.1.1 ISO 14001 and its application to the project

The core principles of the ISO 14001 EMS are managing environmental aspects and impacts, compliance with environmental legislation, addressing risks and opportunities, planning, implementation, corrective and prevention action, improvement and management review (ISO 14001:2015: 2; Edwards, 2004: 10-11). There are countless reasons why one would incorporate an EMS within an organization. The main benefits that ISO 14001 may aid an organization to gain are, for example: reducing negative environmental impacts, complying with legal requirements, improving environmental performance and lessening operational costs from being a more environmentally friendlier operation (ISO 14001:2015: VI).

In the history of developing a successful environmental management system (EMS), it is observed that sound commitment and engagement from all stakeholders and operations within the organization, directed by top management could enable the accomplishment of a desired EMS (ISO 14001:2015: VI). Understanding the context of one's own organization, strong leadership and willingness to integrate an EMS in strategic decisions and operations are vital successful drivers of any EMS (ibid).

2.1.1.2 Plan-Do-Check-Act model

Logically, an EMS under ISO14001 is managed under the cycle of Plan-Do-Check-Act (PDCA), which is a continuous cycle of improvement (ISO 14001:2015). There are also sub-steps under each phrase, simply illustrated in figure 3:

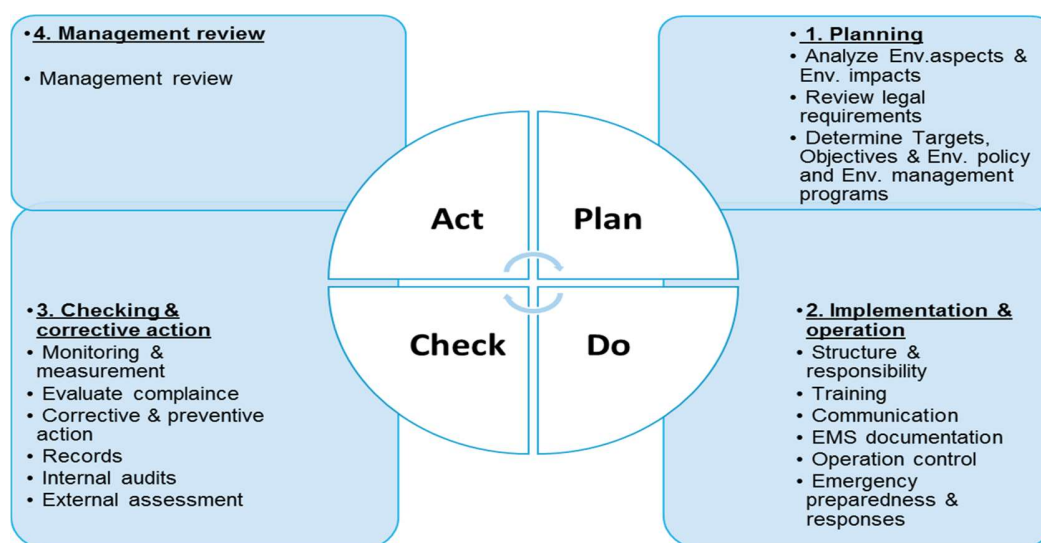


Figure 3. Overview of the ISO 14001 in Plan-Do-Check-Act (PDCA) model (Adapted and abridged from Edwards, 2004: 14-19)

As a whole, it is crucial to understand the concept of PDCA model because each phrase is a stepping stone for the next one. This research involves only the planning phrase. As demonstrated by figure 3, the planning phrase consists of three main tasks: (1) analyzing environmental aspects and impacts; (2) reviewing legal requirements and (3) determining targets, objectives, environmental policy and of environmental management program. Due to restricted time, it is impossible to carry on three tasks. Thus, this thesis only carries out the first task. According to ISO 14001:2015, the tool for the task is 'initial environmental review'. As the scope of this project is only within the planning phrase, the other three steps along with their sub-steps (Do-Check-Act) are left out and will be mentioned only when necessary.

2.1.1.3 Three key issues required by ISO 14001

According to ISO 14001:2015's requirements, there are three subjects to examine during the planning phrase: (1) context of the organization; (2) actions to address risks and opportunities and (3) environmental performance evaluation. Simply, understanding the context of the organization is believed to aid the researcher and all stakeholders of the project to understand the purpose of the organization; why it functions the way it does; and how to improve from that awareness. The broad overview of the organization and its context are presented in chapter 4 (Research findings). The second topic of examination is the actions to address risks and opportunities. This subject usually also takes account of the environmental aspects, environmental impacts and identified significant environmental aspects. In case there is any risks or opportunities associated with those referred issues, it should be remarked as well (ISO 14001:2015: 9). This issue is

explained further in the next section. The last subject to be investigated is the evaluation of an organization environmental performance against the desired goals.

2.1.2 Conducting initial environmental review

Initial environmental review (IER) is the first step in planning any environmental management program. In practice, conducting an IER starts with direct site inspection within an organization, together with taking notes of all existing activities and operations. Knowing what existing activities and services will help identifying environmental aspects and impacts. However, as stated that investigating legal requirements is out of the thesis scope, thus this issue is not going to be referred to unless it is related to other topics.

If possible, an organization should take the environmental aspects that it can directly control and indirectly influence into account during the IER period (ISO 14001:2015: 24). However, the identification of environmental aspect in this research focused mainly on direct environmental aspects due to limited time in conducting the project. To establish an EMS in public sector organizations, Lundberg, Balfors and Folkeson (2007: 385) acknowledge that identifying environmental aspect is one of the most challenging parts of an EMS. They justify two reasons on that statement. First, they feel that the definition of environmental aspect given by ISO 14001 is not very clear; another is the fact that it can be perceived as many things. It can be either "the result of an activity, product or service i.e. emissions to air and water; or it could be comparable to an activity e.g. "heating" (Lundberg et al, 2007: 387) and it can be thought of as "environmental impact e.g. noise" (ibid.). It seems unclear what really environmental aspect is in their argument. They thus emphasize on proper identification of environmental aspect because this step will "determine the scope and focus of the EMS" (Lundberg et al, 2007: 385).

Conducting an IER, in addition to collecting relevant data, includes three levels of analysis: (1) identifying environmental aspects; (2) identifying significant environmental aspects; and (3) identifying gap. Details of the three analyses are outlined below.

2.1.2.1 First analysis: identifying environmental aspects

During the IER period, it is suggested to consider all organization's activities from eight sources: " (1) design and development of its facilities, processes, products and services; (2) acquisition of raw materials, including extraction; (3) operational or manufacturing processes, including warehousing; (4) operation and maintenance of facilities, organizational assets and infrastructure; (5) environment performance and practices of external providers; (6) product transportation and service delivery, including packaging; (7) storage, use and end of life treatment of products; and (8) waste management,

including reuse, refurbishing, recycling and disposal" (ISO 14001:2015: 24). Furthermore, ISO 14001 advocates main sources of organization's activities and examples of environmental aspects to consider, as listed in table 2.

Table 2. Sources of organization's activities and environmental aspects (ISO 14001:2015: 24)

Places of organization's activities	Examples of environmental aspects
a) design and development of its facilities, processes, products and services; b) acquisition of raw materials, including extraction; c) operational or manufacturing processes, including warehousing; d) operation and maintenance of facilities, organizational assets and infrastructure; e) environmental performance and practices of external providers; f) product transportation and service delivery, including packaging; g) storage, use and end-of-life treatment of products; h) waste management, including reuse, refurbishing, recycling and disposal	a) emissions to air; b) releases to water; c) releases to land; d) use of raw materials and natural resources; e) use of energy; f) energy emitted (e.g. heat, radiation, vibration (noise), light); g) generation of waste and/or by-products; h) use of space

After organization's activities and environmental aspects are determined, the next step is to identify environmental impacts. EMAS guideline provides examples of environmental impacts derived from different activities and environmental aspects, directly quoted and listed in table 3.

Table 3. Examples of environmental impacts (EMAS, 2013)

Activity	Environmental aspects	Environmental impacts
Office services	<ul style="list-style-type: none"> - Use of materials such as paper, toner, etc. - Electric power consumption (leading to indirect CO₂ emissions) 	<ul style="list-style-type: none"> - Mixed municipal waste pollution - Greenhouse effect
Transport	<ul style="list-style-type: none"> - Used oils for machinery - Carbon emissions of trucks & machinery 	<ul style="list-style-type: none"> - Soil, water, air pollution - Greenhouse effect
Chemical industry	<ul style="list-style-type: none"> - Waste water - Emission of volatile organic compounds - Emission of ozone depleting substances 	<ul style="list-style-type: none"> - Water pollution - Photochemical ozone - Ozone layer depletion
Construction	<ul style="list-style-type: none"> - Air emissions, noise, vibration, etc., by construction machines - Land use 	<ul style="list-style-type: none"> - Noise, soil, water, air pollution - Land cover destruction - Biodiversity loss

2.1.2.2 Second analysis: identifying significant environmental aspects

Due to various natures of organizations and operations, ISO 14001 does not lay down any specific set of guidance on determination of significant environmental aspect. ISO 14001 only recommends that an organization determines own criteria to evaluate which environmental aspects are significant (ISO 14001:2015: 2). However, ISO 14001 describes some possible criteria. For example, “criteria can relate to the environmental aspect (e.g. type, size, frequency) or the environmental impact (e.g. scale, severity, duration, exposure). Other criteria may also be used...such as legal requirements or interested party concerns” (ISO 14001:2015: 24). From such description, ISO14001 indicates that significant environmental aspect could be justified from either environmental aspect or environmental impact.

Edwards (2004) suggests that the criteria should instead justify the significance as environmental impact and it should be quantifiable. He only proposes two measures: “frequency of occurrence and severity”. He continues that the numerical evaluation should be very different between the low and high, exactly “significance range from 1 to 30” (Edwards, 2004). However, he does not specify which number is considered high. This implies that it is up to practitioners to decide by themselves. Table 4 below shows Edwards’s proposed set of criteria.

Table 4. Criteria assessing significance environmental aspect according to Edwards (2004: 27)

Frequency of occurrence		Severity	
Description	Factor	Description	Factor
Unlikely (less than once a year)	1	Minimal environmental impact	1
Common (monthly/ several times a year)	2	Low environmental impact	2
Frequently (daily/weekly)	3	Moderate environmental impact	3
		High environmental impact	6
		Severe environmental impact	10
Environmental impact = Frequency of occurrence x Severity			

2.1.2.3 Third analysis: identifying gap

Gap analysis, simply means recognizing the gap between an organization’s current performance and the desired future it aims to go. It is an analytical tool that tends to be used in project management or change management (Rouse, 2014; Ahmed, 2014; Mind Tools, n.d.). In the context of ISO14001 EMS, the gap analysis is simply comparing an organization’s current system against the ISO14001’s all requirements and applicable legal compliance (ISO 14001: 2015).

Usually, analyzing the gap is the next step after conducting an initial environmental review and identifying legal requirements. It was mentioned earlier that the HPD wishes to improve its overall environmental performance and related costs from the perspective of sustainable development. Having considered the abovementioned guidance, this literally means that there should be three gap analyses conducted for the HPD, against: (1) the ISO14001's all requirements; (2) applicable legal requirements and (3) the desire sustainable environmental direction and practices. Conducting a complete gap analysis against the ISO14001's requirements and applicable legal requirements are rather technical and time consuming. Thus, they were left out of the thesis scope because they would not answer two research questions in this study.

Broadly speaking, there are four steps to follow when conducting a gap analysis (Rouse, 2014; Ahmed, 2014; Mind Tools, n.d.). First, an organization should "identify the future state" (ibid.) as goal or objective that it wants to achieve. After that, analysing own current performance is crucial as it will help the organization to compare its present state and preferred future. The third step is to describe the gap found from the previous step. If possible, one should determine cause(s) of identified gap. The last step is attempting to close the gap. The proposed solutions should include drivers or barrier towards closing the gap if possible (ibid). Generally speaking, there is no best formula on performing gap analysis (ibid). One recommended technique is one should quantify when assessing data relating to a gap, for it will make some comparison easier. In case it is difficult to do so, it is possible to define a gap in qualitative description (Mind Tools, n.d.) as shown in table 5.

Table 5. Example of general assessing data in gap analysis (Mind Tools, n.d.)

Assessment Type	Current Situation	Future State (desired future)
Quantitative	Total costs are \$100 per unit.	Total costs will be \$80 per unit.
Qualitative	Team members work in isolation.	Team members will work collaboratively.

An IER often makes use of key environmental performance indicators (EPIs) within an EMS. The most common EPIs found in literature are related to materials, energy, waste and services (Lundberg, Balfors and Folkesson, 2009; Ramosa et al., 2007; Perotto et al., 2008). In this research, the scope focused mostly on operational level. Thus, it is thought that to best understand the big picture of the HPD is to view the whole organization from the flow of operations' inputs-outputs, embedded with existing EPIs as suggested by Ramosa et al (2007) and Lundberg et al (2007). Their suggestions are based on the guidance of ISO 14031 (Environmental management – Environmental performance evaluation – Guidelines), which compliments the ISO 14001. The concept of operations' inputs-outputs is illustrated below in figure 4.

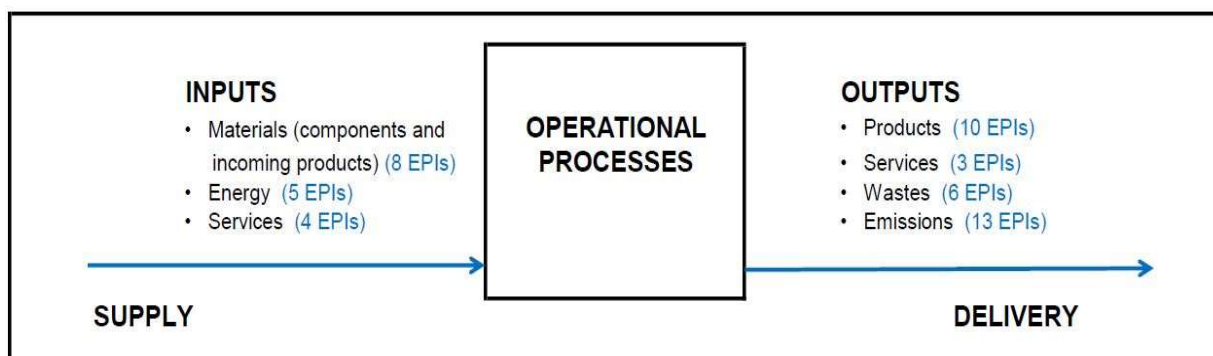


Figure 4. Operations of the organization (general overview) (ISO 14031:2013: 10)

ISO 14031 gives numerous examples of EPIs (as references), which aided the researcher to detect existing environmental practices and EPIs in the HPD's operations. Listed in tables 6 and 7 are the directed quoted EPIs from ISO 14031:2013.

Table 6. Examples of inputs environmental performance indicators (ISO 14031:2013: 30-31)

Type of input	Possible environmental performance indicators
Materials (8 EPIs)	<ul style="list-style-type: none"> – materials used per unit of product; – processed, recycled or reused materials used; – packaging materials discarded or reused per unit of product; – auxiliary materials recycled or reused; – raw materials reused in the production process; – water per unit of product; – water reused; – toxic materials used in the production process.
Energy (5 EPIs)	<ul style="list-style-type: none"> – energy used per year or per unit of product; – energy used per service or customer; – each type of energy used (e.g. renewable); – energy generated with by-products or process streams; – energy units saved due to energy conservation programmes.
Services (4 EPIs)	<ul style="list-style-type: none"> – amount of toxic materials used by contracted service providers; – amount of hazardous cleaning agents used by contracted service providers; – amount of recyclable and reusable materials used by contracted service providers; – type of waste generated by contracted service providers.

Table 7. Examples of outputs environmental performance indicators (ISO 14031:2013: 32-33)

Type of output	Possible environmental performance indicators
Products (10 EPIs)	<ul style="list-style-type: none"> – percentage of products introduced in the market with reduced hazardous properties; – number of products which can be reused or recycled; – percentage of a product's content that can be reused or recycled; – percentage of defective products; – amount of resources consumed during product use; – durability of the product; – percentage of products with instructions regarding environmentally safe use and disposal. – percentage of products with explicit "product stewardship" plans; – percentage of products designed for disassembly, recycling or reuse; – percentage of products with instructions regarding environmentally safe use and disposal.
Services (3 EPIs)	<ul style="list-style-type: none"> – resource consumption per unit of service provided; – amount of carbon dioxide equivalent per unit of service provided; – amount of pollutants per unit of service provided.
Wastes (6 EPIs)	<ul style="list-style-type: none"> – quantity of waste per unit (e.g. product, time, manpower); – quantity of hazardous, recyclable or reusable waste produced per unit; – total waste disposed by category; – quantity of hazardous waste stored on site and/or controlled by regulation; – quantity of waste converted to reusable material per unit; – quantity of hazardous waste eliminated due to pollution prevention programmes.
Emissions (total 13 EPIs) (5 EPIs: emissions to air)	<ul style="list-style-type: none"> – specific emissions per year; – specific emissions per unit of product; – waste energy released to air; – air emissions having ozone-depletion potential; – air emissions having global climate-change potential.
(5 EPIs: emissions to water)	<ul style="list-style-type: none"> – specific material discharged per year; – specific material discharged to water per unit of product; – waste energy released to water; – material sent to landfill per unit of product; – effluent per service unit or customer.
(3 EPIs: emissions from operations)	<ul style="list-style-type: none"> – noise indicator measured at a certain and essential location; – quantity of radiation released per unit; – amount of heat, vibration or light emitted per unit.

2.2 Sustainable environmental direction and practices

2.2.1 Introduction to sustainable development

Sustainable development (SD) as a social movement was recognized publicly in 1987 from the Bruntland report, officially known as 'Our Common Future', the report of the World Commission on Environment and Development (SDC, 2011). The report defined

sustainable development as "development which meets the needs of the present without compromising the ability of future generations to meet their own needs". Additionally, the report recommended that "Sustainable development was the solution to the problems of environmental degradation" (ibid).

However, the concept of the SD became truly internationally acknowledged in 1992 in Rio de Janeiro, where the United Nations Conference on Environment and Development, informally known as 'The Rio Earth Summit' was held. The summit pinpointed the first global effort to draft concrete "action plans and strategies for moving towards a more sustainable pattern of development" (SDC, 2011). It was a success of its time simply because over "100 Heads of State, representatives from 178 national governments...and representatives from a range of other organizations representing civil society" attended the summit and showed their strong commitment to the common sustainability (ibid). Since 1992, United Nations (UN) has been the lead coordinator between its members in SD actions. There also have been several more collaborations related to the SD in the international level (UN, 2016a).

Under UN leadership, the latest cooperation is under the name 'the 2030 Agenda for Sustainable Development' (UN, 2016a), endorsed unanimously by all world leaders during 25-27 September 2015 (UN, 2015c). In this agenda, the UN has set out 17 ambitious sustainable development goals (SDGs), accompanied with 169 targets and 230 sustainable development indicators (SDIs) (UN, 2016a; UN, 2016b). The agreement under the 2030 Agenda has become internationally binding since the 1 January 2016 (UN, 2016a). In the next step, all countries must transpose the agenda goals, targets and indicators into their own national law. Afterwards, the transferred goals, targets and indicators on a national level act as the comprehensive framework measuring every country's sustainable development progress for 15 years from 2016 to 2030 (ibid).

Finland, an active country in subjects related to the SD, is aware of this consequence and is preparing for this transposition (PMO, 2016). In general, the country has a long tradition of using indicators to evaluate its performances in different areas (Ministry of Finance, 2006; Findicator, 2016). In the SD extent, Finland had already developed its first set of its SDIs since the year 2000 (Findicator, 2016). At present, the most updated set of the SDIs is based upon the "the national implementation of the UN RIO+20 Conference on Sustainable Development" organized in the year 2012 (ibid.). Finland was also planning to update its SDIs according to the Agenda 2030. During the time of writing this thesis, however, the Finnish SDIs had not been updated.

Similar to the UN, Finland has set out its own 8 SD goals, accompanied with 39 targets and 32 identified SDIs. The list of Finland's 8 SDGs is as following: (1) " equal opportunities for well-being; (2) society of participating citizens; (3) sustainable work; (4) sustainable communities and local communities; (5) carbon-neutral society; (6) resource wise economy; (7) sustainable lifestyles; and (8) respect for nature in decision-making. " (Findicator, 2016)

2.2.2 Suitable sustainable development framework for this thesis

As stated, Finland is translating the UN 2030 Agenda's sustainable goals, targets and indicators into the Finnish national framework. Before it can do that, the Finnish government needs to conduct a gap analysis between the UN's and Finland's sustainable development frameworks (SDF); and that had already been done during spring of 2016. The mission, led by the Finnish Environment Institute and DEMOS Helsinki, was carried out under the name 'the Avain2030 Project' (PMO, 2016). The working group, which was made up of various experts in the SD areas, conducted comprehensive analysis concerning "an overview of the initial situation, challenges and opportunities for Finland in implementing Agenda2030. The project will also identify key development areas for the Agenda2030 indicators" (PMO, 2016: 8). The Avain2030 team mapped both SDFs and discussed some differences between the goals, targets and indicators. The comparison of two frameworks at goal level is illustrated as below in figure 5.

Topic areas of the Finnish sustainable development indicators		UN sustainable development goals
		1. No poverty
1. Equal opportunities for well-being		2. Zero hunger
		3. Good health and well-being
2. Society of participating citizens		4. Quality education
		5. Gender equality
3. Sustainable work		6. Clean water and sanitation
		7. Affordable and clean energy
4. Sustainable communities and local communities		8. Decent work and economic growth
		9. Industry, innovation and infrastructure
5. Carbon-neutral society		10. Reduced inequalities
		11. Sustainable cities and communities
6. Resource wise economy		12. Responsible production and consumption
		13. Climate action
7. Sustainable lifestyles		14. Life below water
		15. Life on land
8. Respect for nature in decision-making		16. Peace, justice and strong institutions
		17. Partnership for the goals

Figure 5. Links between the UN and Finland's sustainable development goals (PMO 2016: 23)

According to the working group, the analysis above is merely suggestive, all the lines point to the closest link of subject areas between the two SDFs. In attempt to find the best clarification, stakeholders from walks of life such as academia; representatives from ministries; research institutes; foundations; unions, etc. were included in several extensive discussions (PMO, 2016: 90). The final analysis results suggested that many of the UN SDGs cannot apply directly in the Finnish context, as quoted below:

" Somewhat surprisingly...only two of Finland's current sustainable development indicators are directly included in the SDG indicators proposed by the UN" . These are broad-band services" and renewable energy's share of total final consumption...In particular, the Finnish sustainable development theme "Society of participating citizens... includes indicators for which there are no equivalents in the international proposal indicators" (PMO, 2016: 23).

The Avain2030 working committees also implied that many of the UN sustainable development goals; targets and indicators appear not very suitable for Finland. They contain rather general wording “and formulations and concepts used in some of them are vague and somewhat open to interpretation “(PMO, 2016: 18). As sustainable development indicators are the core of measuring Agenda2030 advancement; consequently, they proposed the two possible solutions: (1) Finland develops a new set of SDIs, based on the UN’s SDIs or (2) Finland updates the existing SDIs (PMO, 2016: 25).

Based on the meta-analysis of the Avain2030 project, direct adoption of the UN SDGs and SDIs to Finland local public organization is not the best choice. As there are only two sustainable development frameworks (SDFs) (of UN and Finland) to consider, both SDFs were read thoroughly and compared. Within the scope of the thesis, only the SDGs concerning environmental performance were selected. From the UN side, it was found that the goals of number 12 and 13 are related. They match with the goals of number 5, 6 and 7 from the Finnish ones. The UN’s two goals are accompanied with 16 targets and 20 indicators, whereas the Finland’s three goals are accompanied with 13 targets and 12 indicators. The two SDFs are compared below in table 8 (the full details of both SDFs are supplemented as [Appendix 2. United Nations and Finnish sustainable environmental goals and indicators](#)).

Table 8. Comparison between the two potential sustainable development frameworks in environmental sustainability

United Nations		Finland	
Goal 12. Ensure sustainable consumption and production patterns	- 11 targets - 13 indicators	Goal 5. Carbon-neutral society	- 4 targets - 2 indicators
Goal 13. Take urgent action to combat climate change and its impacts	- 5 targets - 7 indicators	Goal 6. Resource wise economy	- 4 targets - 3 indicators
		Goal 7. Sustainable lifestyles	- 5 targets - 7 indicators
Total: 2 goals, 16 targets, 20 indicators		Total: 3 goals, 13 targets, 12 indicators	

Having compared the two SDFs, it seems that the Finnish framework is more applicable to the project. For only one reason, the UN agenda is of very high level – national level, not of local level. Also, several UN SDIs appear to be composite and cannot be directly applied to the project. For these reasons, the researcher has decided that the Finland’s SD framework is more applicable. In addition to finding the suitable SDF, the researcher found real-life-examples of sustainable environmental practices from Finnish Ministry of Environment and the City of Jyväskylä. As they are large data, they are supplemented as [Appendix 3. Examples of Finnish sustainable environmental direction and practices](#).

2.2.3 Other essential topics under sustainable development

Under the umbrella of sustainable development (SD), the energy management and stakeholder engagement are significant topics to examine. However, within the scope of this thesis, it is sufficient to understand the general concepts of energy performance and stakeholder engagement.

2.2.3.1 Energy management

Energy management is a critical area of consideration under the sustainable development (Lindroos, 2016; Ministry of the Environment, 2012). Conceptualization of overall energy performance is summed up in figure 6 below:

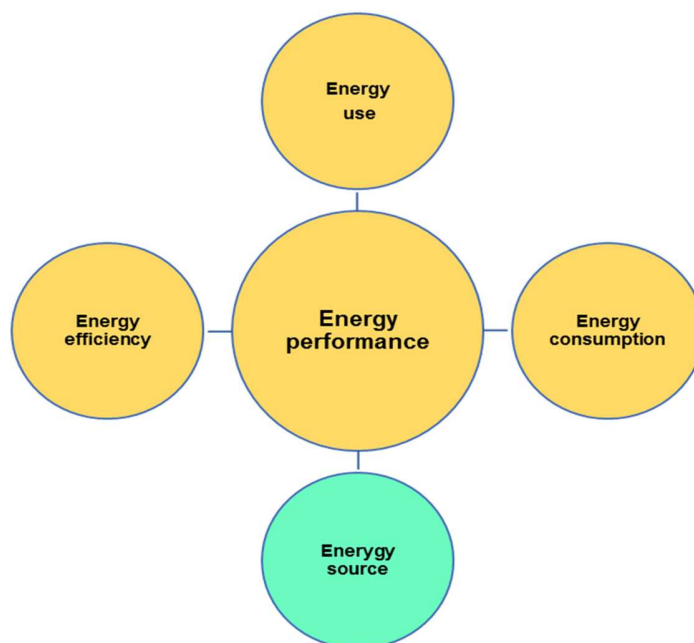


Figure 6. Concept of overall energy performance base on ISO50001:2011: 14

Based on International Standard ISO 50001: 2011, it is recommended that energy management should be executed as a system and that system should be managed through evaluating energy performance. There are several factors forming overall energy performance. The three primary factors, cited by ISO 50001:2011 are: energy efficiency, energy use and consumption. A secondary factor is the source of the energy. Energy intensity is mentioned as well, but evaluating it requires combined multifaceted indicators, which is why it is not included here.

A sound energy management system starts from an energy review. ISO 50001:2011 explains what the energy review is in practice, as directly quoted in table 9 below:

Table 9. Energy review guidance based on ISO 50001:2011: 7

<p>The organization shall develop, record and maintain an energy review. The methodology and criteria used to develop the energy review shall be documented. To develop the energy review, the organization shall:</p> <p>a) analyze energy use and consumption based on measurement and other data, i.e.</p> <ul style="list-style-type: none"> – identify current energy sources; – evaluate past and present energy use and consumption; <p>b) based on the analysis of energy use and consumption, identify the areas of significant energy use, i.e.</p> <ul style="list-style-type: none"> – identify the facilities, equipment, systems, processes and personnel working for, or on behalf of, the organization that significantly affect energy use and consumption – identify other relevant variables affecting significant energy uses; – determine the current energy performance of facilities, equipment, systems and processes related to identified significant energy uses; – estimate future energy use and consumption; <p>c) identify, prioritize and record opportunities for improving energy performance.</p> <p>NOTE opportunities can relate to potential sources of energy, use of renewable energy, or alternative energy sources, such as waste energy.</p>

Energy use mainly comes from three things: activity, process and equipment (ISO 50001:2011). Apart from finding sources that use energy, one should identify the level of energy use, whether it is significant, average or low as it will reveal opportunities for improving energy performance.

ISO 50001:2011 (Energy management systems) advises that improving energy efficiency leads to not only reducing the carbon footprint of the operation, but also better energy performance management as a whole.

2.2.3.1 Stakeholder engagement

Stakeholder management is also a vital topic under SD. No development is sustainable if stakeholders do not commit to it (UN, 2016a; Lindroos, 2016; Melville, 2016). ISO 14001:2015 standard identifies stakeholder as ‘interested party’ and define it as “ person or organization that can affect, be affected by, or perceive itself to be affected by a decision or activities of an organization ” (ISO 14001:2015: 2). To maintain consistency throughout this section, the researcher decided to only use the word ‘stakeholder’ .

According to stakeholder theory and management, there are several categories of stakeholders. Broadly speaking, stakeholders are divided into two groups: primary and secondary. Primary stakeholders tend to have immediate power, legitimacy and urgency

to affect an organization's operations. The secondary stakeholder group possess less power, but still could influence an organization (Freeman, 1984; Mitchell, Agle and Wood, 1997). Examples of the stakeholders listed in ISO 14031:2013 (Environmental performance evaluation) are as follows:

- "management representatives;
- employees;
- investors and potential investors;
- customers and suppliers;
- contractors;
- lending institutions and insurers;
- regulatory and legislative bodies;
- neighboring and regional communities;
- communication media;
- business, administrative, academic and research institutes;
- environmental groups, consumer interested groups and other non-governmental organizations;
- general public;
- shareholders and providers of capital;
- employee representatives" (ISO14031:2013: 22-23)

Improving stakeholder involvement could be done through various methods such as " survey and questionnaires; employee suggestions; meetings and workshops; interviews; etc." (ISO 14031:2013: 24). Based on the stakeholder management theory, employees are primary and significant stakeholders of an organization (Freeman, 1984; Mitchell, Agle and Wood, 1997). Their contributions should be taken more into consideration. A good method for involving more employees in constructive conversation is called stakeholder dialogue. The World Business Council for Sustainable Development (WBCSD) defines this concept very clearly as:

"Dialogue is about communicating with stakeholders in a way that takes serious account of their views. It does not mean involving stakeholders in every decision, or that every stakeholder request will be met. It means that stakeholder input should be acknowledged and thoughtfully considered. It is about giving stakeholders a voice, listening to what they have to say, and being prepared to act or react accordingly". (WBCSD, 2001)

In short, increasing the level of stakeholder engagement though stakeholder dialogue could lead to sustainable organization management because it is a mean to create true "shared value" (Porter and Kramer, 2011).

2.2.4 Two steps to improve environmental performance

Admittedly, it is challenging to find any specific frameworks or strategies concerning improving environmental performance towards sustainable development. Sustainability is a complex phenomenon. A good description of sustainability comes from Stead and

Stead (2009). They describe the concept as "trans-disciplinary and multidimensional". Having reviewed different literature, it is found that recommendations regarding environmental performance improvement towards sustainability are often written for specific industries. As there is no explicit guideline for public organizations, thus the researcher decided to create one by combining three theoretical concepts, believed to be most relevant for this thesis, into two steps: (1) foundation step: laying the groundwork with the triple bottom lines and (2) improving step: creating stepping-stones by combining the four signposts with the Finnish sustainable environmental goals.

2.2.4.1 Foundation step: laying the groundwork with the triple bottom lines

The phrase "the triple bottom line" (TBL) was coined in 1994 by "John Elkington, the founder of a British consultancy called SustainAbility" (The Economist, 2009). The term was born out of business management. He reasoned that companies should measure their success from three performances, the so called "three Ps: profit, people and planet" (ibid.). Similarly to measuring performance of financial account, companies should be able to measure performances of social and environmental accounts as well. Only companies taking the TBL concept into their operations could claim that they take true costs considerations in undertaking their businesses (ibid.). Stead and Stead (2009) agree with this. They support that management accomplishment should be defined by "economic success, environmental protection, social responsibility" as these could lead to "sustainable organizational management" .

Some say that the fourth bottom line, referred to as any of the following: 'purpose' or 'progress' or 'accountable,' should be added to form quadruple bottom lines. (Zahringer, n.d; Lawler, 2014; Cambridge Leadership Development, 2013). Since the arguments of these quadruple bottom lines have no consensus, it is thought the best solution is to stay within the well-grounded concept of the TBL. As the Helsinki Police Department is not a for profit organization, the researcher has changed the terms " profit, people and planet " to be 'people, environment and budget' for further reference in the gap analysis framework.

The TBL concept is perceived to be almost synonymous to the word sustainability as it is the bottom lines of all decisions. In practice, laying the TBL as foundation implies simultaneous multi-goal improvements. A good example comes from the Agenda 2030's 17 goals, where the UN does not set any steps for member states to follow. Instead, the member states decide by themselves what bottom lines they would initially improve at one's own pace, as long as the three bottom lines are bettered within the time span of 15 years.

2.2.4.2 Improving step: creating stepping-stones by combining the four signposts towards sustainability with the Finnish sustainable environmental goals

Since 2000, the World Business Council for Sustainable Development (WBCSD) has suggested its members that to reach a level of sustainability, an organization should adhere to the following path of four steps or signposts: " (1) compliance; (2) cleaner production; (3) eco-efficiency and (4) responsible entrepreneurship " (WBCSD, 2000: 10). Here again, the researcher has changed some wording to fit the context of the thesis as: (1) compliance; (2) greener function; (3) eco-efficiency and (4) responsible operation for further reference in the gap analysis framework.

Concerning compliance issue, ISO 14001:2015 requires that an organization wanting to pursue an EMS certification, or even to establish its own environmental program, should know the laws that are applicable to its identified environmental aspects. ISO 14001 advocates guidance on sources of compliance obligations, listed in table 10:

Table 10: ISO 14001's example sources of compliance obligations (ISO 14001:2015: 25)

Mandatory legal requirements	Supplementary legal requirements
a) requirements from governmental entities or other relevant authorities; b) international, national and local laws and regulations; c) requirements specified in permits, licenses or other forms of authorization; d) orders, rules or guidance from regulatory agencies; e) judgements of courts or administrative tribunals	a) agreements with community groups or non-governmental organizations; b) agreements with public authorities or customers; c) organizational requirements; d) voluntary principles or codes of practice; e) voluntary labelling or environmental commitments; f) obligations arising under contractual arrangements with the organization; g) relevant organizational or industry standards.

As said earlier, evaluating the HPD's environmental aspects against legal requirements is left out of the thesis scope. Thus, the abovementioned laws may be referred to if they are relevant to some important reasoning.

The next step is to make the operating environment greener whenever and wherever possible. The greener function broadly refers to an operation including its consumption pattern that can prevent pollution or continually reduce pollution of the environment (WBCSD, 2000: 10).

After that, eco-efficiency is the direction an enterprise should consider. According to the WBCSD (2000: 15) guidelines on eco-efficiency improvement, the critical characteristics of eco-efficiency are: (1) reduction in the material intensity of goods or services; (2) reduction in the energy intensity of goods or services; (3) reduced spreading of toxic materials; (4) improved recyclability; (5) maximum use of renewable resources; (6) greater durability of products; and (7) increased service intensity of goods and services.

Finally, the concept of responsible operation is the ultimate step to climb. The WBCSD defines this step as an aim "to balance all three pillars of sustainability", which goes back to the concept of the TBL (triple bottom lines). Arguably, Moon (2007) and Vogel (2005) believe that responsibility is not necessary the driver enabling an operation to be sustainable. To some extent, the researcher agreed with Moon and Vogel. However, since the researcher could not find a better framework for this study, it was decided that suggesting the HPD to aim at being responsible in operation would bring the organization close to being sustainable in this study.

Within this step, the researcher also integrated the three mentioned Finnish sustainable environmental goals with the four signposts: (1) the goal no. 5 'carbon-neutral society' fits in the step 'greener function'; (2) the goal no. 6 'resource wise economy' is in the step 'eco-efficiency'; and (3) the goal no. 7 'sustainable lifestyles' fits in the step 'responsible operation'. This seamless integration is illustrated below in figure 7.

2.2.5 Conceptual framework for the gap analysis

The conceptual framework used in this thesis is based on the discussions on the sustainable environmental direction and practices, as outlined in figure 7.

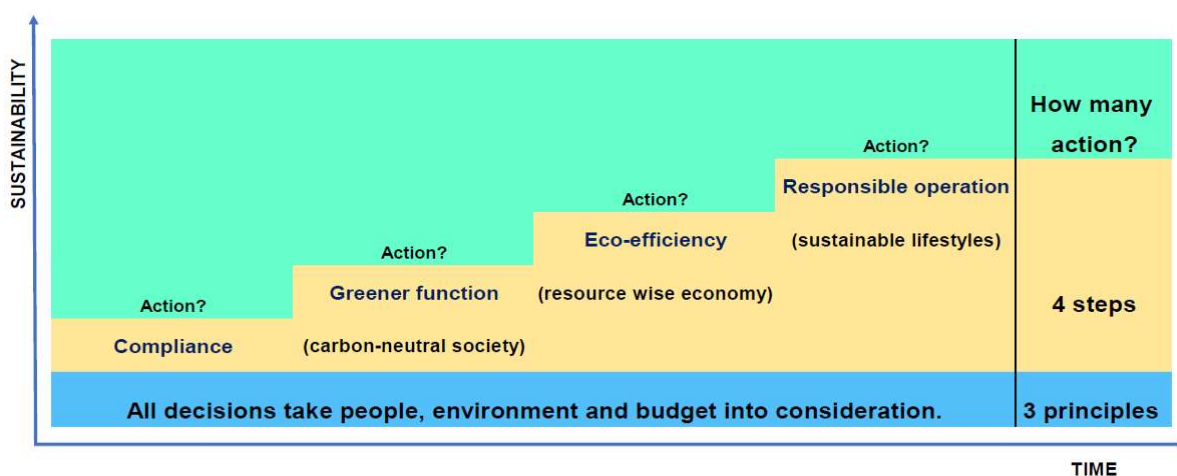


Figure 7. Conceptual framework for the gap analysis

This framework is based only on the notion that sustainability takes time and continuously improves itself. As said, the research task focuses on what the HPD could do to improve its overall environmental performance and related costs towards sustainability. Therefore, it is practical to search for a direction and actions that could be examples from the literature reviewed (TBL, 4 signposts towards sustainability, Finnish sustainable environmental goals) and from real-life examples (sustainable environmental direction and practices from Ministry of Environment and the city of Jyväskylä).

3 DATA AND RESEARCH METHOD

This chapter justifies the research approach and methods used for collecting data and analyzing the findings.

3.1 Qualitative research approach

This study is of qualitative standpoint. The differences between conducting a qualitative or quantitative research are various, and both methods have different advantages and disadvantages to answer different questions. For example, quantitative approaches collect facts and study the relationship of one set of facts to another. It has nature of numerical data and result; the content generated from and to forms of graphs, charts, tables, compared numbers, statistics. These facts allow researchers to explore and describe the relationships and trends. Quantitative research tends to produce quantified and generalized conclusions, this is why it is often used on subjects related to science or business (Saunders, Lewis and Thornhill, 2007: 406).

Qualitative approach seeks to apprehend individual's perception of the world. It looks for insight rather than only statistics. Researchers who adopt this approach ask if the scientific or quantitative methods can always be used when dealing with human beings or social phenomenon. The results evaluated are not directly numerical in nature, instead, it is words or narration or description of behavior which must later be categorized or quantified into numerical value, so that it can be analyzed. It tends to be used in education, humanity and social sciences issues related (ibid). Additionally, Kananen (2011) recommends that the qualitative approach and inductive should be applied if the researcher does not know much about the topic of study and wishes to learn more about one phenomenon. The data could include numerical information to a significant extent, and could still be perceived as qualitative if the data is used to build knowledge and understanding of one phenomenon. Having considered all facts thus far, it is concluded that the most suitable research approaches for this study is the qualitative and inductive.

3.2 Case study research method

The research question is one of the factors that determine the appropriate research method (Yin, 2014: 4). Under qualitative approach, some methods suggested are: experiment, survey, archival analysis, history and case studies. They are used for different applications (Yin, 2014: 9). As this research is meant to examine only one organization, a case study would be the only choice for varied reasons. Bell (2004: 10)

rationalizes that case studies allow researchers to study a particular context that may require multiple sources of evidences to answer only one question. It tends to answer the questions: ‘Why? What?’ and ‘How?’. In some situations, case studies can be used for exploratory purposes. Yin (2014) agrees with Bell (2004) and further elaborates that a case study is also proper to use for examining “a contemporary phenomenon within its real-life context” . Besides, the case study researcher could “ benefit from prior development of theoretical propositions to guide data collection and analysis. ” (Yin, 2014: 17).

In this research, the researcher aims to study a real-world case. The answers are sought to the question “What are...,” which needs several combined information sources. Constructing knowledge from integrating the theoretical knowledge with the empirical data to understand this organization is another task. In short, the research question asked in this study fits to the context of case study with all the reasons mentioned above.

Another point to consider is the purpose of the research method. Robson (2005: 81-82) purposes four factors to determine the type of a study: (1) purpose; (2) theory; (3) method; and (4) sampling strategy. Of the four features, only the purpose is left to be examined. The main goal of this thesis research is to investigate what the HPD could do to improve its overall environmental performance and related costs. Thus, one purpose of this study involves some extent of evaluation. Robson (2005: 202) defines evaluation as “as attempt to assess the worth or value of some innovation, intervention, service or approach ”. He continues that on one hand, evaluation seeks to enhance accountability within evaluated areas. On the other hand, it underlines issues of change (Robson, 2005: 202-203).

There are several types of evaluation, as many as 100 types according to Patton (1981) and it is impossible to explore them all. Thus, only the relevant types are examined: formative and process evaluations. Formative evaluation is projected to aid in the development of “ program ” that is the emphasis of the evaluation. As the name suggests, this type of assessment leads to forming changes. However, it tends to be conducted in timely manner for certain projected changes. Consequently, it is often carried out in limited time. Sometimes, this raises the questions of quality, reliability and validity of the study (Robson, 2005: 208). Process evaluation is complementary to the formative evaluation because it seeks answers to the questions “ how or what is going on ” and tasked with “ measuring how far a program, practice, innovation or policy met its stated objectives or goals ” (ibid.). This study is considered evaluation research because it fits into the definition and characters of both types of evaluation. It is recommended that the most crucial aspect of conducting an evaluation research is “ feasibility ” . Robson (2005: 208) maintains that no matter how excellent an evaluation is, it is useless if recommendations made for such improvement are not feasible to implement (ibid.).

3.3 Ethical consideration

The purpose of this research was to find out what the Helsinki Police Department (HPD) could do to improve its overall environmental performance and related costs from the perspectives of sustainable development. The chosen research approach and method therefore were decided based on the research task and questions.

As a matter of fact, it is the techniques in conducting initial environment review (IER) that command how data is collected and analyzed. To begin with, one must try to understand an organization that want to have an IER conducted by visit the place and understand its needs and context. After that, asking open ended-questions and direct observation are the most two common data collection methods of an IER. If needed, other data i.e. archive or internal document may be used for further understanding. Based on this description, it is obvious that the empirical data is to be collected through interviewing. The type of interview that is thought to be applicable is called 'factual interview', which is not only attending to on interviewees' own viewpoints and interpretations but also on finding facts that are vital. (Brinkmann and Kvale, 2015: 176).

Brinkmann and Kvale (2015) advocate that ethical issues should be considered when designing research strategy, especially when collecting data via interviews, for it could reveal someone's personal life or public issues. They support that ethics should be integrated into the whole research process. They suggest that an interview-based-research should be set out in seven phrases. Thus, the relevant ethical issues are also expressed in seven steps as follows: (1) " theming " : one of aims of an interview study should " improve human situation investigated " ; (2) " designing " : potential research participants are informed and can voluntarily choose to contribute. Their " confidentiality " is guaranteed and any aftereffects should be taken into account; (3) " interview situation " : an interview should not cause personal issue, i.e. anxiety during and after the interview; (4) " transcription " : anonymity of interviewees must be safeguarded and " transcribed text " is not distorted; (5) " analysis " : consideration on how deep the content could be analyzed and if interviewees can " interpret their statements " (not interpreted by researcher); (6) " verification " : it is researcher's duty to report facts and knowledge that are safeguarded and confirmed; and (7) " reporting " : when reporting, " confidentiality " and " consequences " must be seriously considered. (Brinkmann and Kvale, 2015: 85-86).

There were three more ethical issues the researcher seriously considered: (1) no misleading question; (2) impartiality; and (3) reporting only relevant facts. No misleading question was a critical issue as it laid the foundation of this study. As Yin (2014: 73) mentions, the data collection starts with good questions. However, she does not define what 'good question' means in practice. The researcher interpreted this matter and concluded that the question should not misguide to avoid bias. This was the main criterion when compiling the IER questions. The other two ethical issues are interrelated. The researcher became aware during the data collection that some interviewees

expressed their emotional opinions in several topics. Sometimes, those were not relevant to the research questions. As a result, it was important to remain impartial while documenting facts because eventually only facts were reported.

Before beginning the research, the researcher signed a non-disclosure agreement (NDA) with the Helsinki Police Department (HPD). Having considered all ethical issues on top of the NDA, the researcher tried to be as ethical and efficient as possible in conducting the research with this organization. In the research project, the Chief of Security was the researcher's immediate superior within the HPD, who coordinated with other interviewees. In the beginning, 115 IER questions were sent to the Chief of Security to pre-check. He was satisfied with them, but also asked for extra questions for the subcontractors. Afterwards, he listed the names of other interviewees that could answer the IER questions. Via an internal communication channel, the interviewees were made aware of this project. They were also informed (by the Chief of Security) to prepare data for this project-research's questions forwarded to them. After that, the researcher contacted them by email to ask for in-person interview appointments. All interviews took place on agreed dates as early as two weeks or two months in advance.

Based on the NDA and the mentioned ethics, the name of interviewees could not be disclosed. Their names were denoted with 'interviewee' while their work titles could be revealed. The eleven interviewees are listed ¹as follows:

- Interviewee 1: Chief of Police, Helsinki Police Department (HPD);
- Interviewee 2: Superintendent, Chief of Security, (HPD);
- Interviewee 3: Property and building services maintenance coordinator, (HPD);
- Interviewee 4: Material management specialist, (HPD);
- Interviewee 5: IT manager, (HPD);
- Interviewee 6: Superintendent, in charge of the vehicle issues, (HPD);
- Interviewee 7: Fleet vehicle inspector, (HPD);
- Interviewee 8: Head of security guards, (police jail) (HPD);
- Interviewee 9: Property manager, Senaatti Properties;
- Interviewee 10: Cleaning manager, Lassila & Tikanoja Oyj;
- Interviewee 11: Restaurant manager, Eurest Restaurant.

3.4 Collecting data and analysis

3.4.1 Collected data

In this study, the main purposes of the IER were to understand and identify different facts and figures concerning: (1) HPD's stakeholders and their needs; (2) leadership and management style; (3) current environmental practices and; (4) environmental aspects and potential environmental impacts. Thus, it was logical that the IER questions were

¹ The list of all interviewees of this research is supplemented as [Appendix 4. List of interviewees.](#)

designed in themes e.g. organization overview, energy, waste, use of raw materials and natural resources, emissions, transport, land use, emergency, suppliers and subcontractors, etc. (ISO 14001: 24; Edwards, 2004: 62-63). There were altogether 154 initial environment review (IER) questions used in this research. At first, only 115 IER questions were compiled and categorized in 7 themes around mid-August 2016. These were based on the request of the Chief of Helsinki Police to discover facts about the building and fleet management. Later, 39 questions under the theme 8 concerning restaurant and cleaning services were added by the request of Chief of Security by early October 2016. The main reasons behind theme 8 came from security reasons - as Eurest just started their services to the HPD in summer 2016, the Chief of Security wanted to learn more about this sub-contracted operation. Of all 154 IER questions, 134 were answered. This accounted 87.01 percent. The list of 20 questions that were not answered were mentioned in the following chapter and also marked in the first page of the first appendix. All IER themes and questions are detailed below:

- (1) Organization overview (17 questions);
- (2) Property management (46 questions);
- (3) Procurement, material use and office practices (11 questions);
- (4) Hazardous material (9 questions);
- (5) Environmental training (5 questions);
- (6) Environmental incident (4 questions);
- (7) Fleet management (23 questions); and
- (8) Most visible subcontractors (39 questions).

According to Yin (2014: 103), case study evidence may come from diverse sources depending on research design. Six main sources, according to Yin (2014) are: (1) documentation; (2) archive records; (3) interviews; (4) direct observation; (5) participant observation; and (6) physical artifacts. Each source of evidence has its strengths and weaknesses. In this study, the empirical data was collected from four sources: (1) interviews; (2) direct observation; (3) archive records; and (4) documentation. Accordingly, advantages and disadvantages of the four types are described.

Interviewing is the most common method to collect data in case study because of its narrow focus on studied topic and ability to yield insight information e.g. clarifications and viewpoints. However, it could lead to bias if questions are poorly constructed and conveyed. Bias or influence of the interviewees may shape analysis if they give only information they believe the researcher may want to hear. Besides, inaccuracy of data may be formed if interviewees cannot recall certain information (Yin, 2014: 106). Direct observation offers opportunity for directly seeing the "real-world setting of the case" for general comprehension of the case context (Yin, 2014: 113). Nonetheless, it is a time-consuming method. Interviewees may selectively show only places that display positivity; therefore, a team of observer is preferred for increased range of observation and objectivity (ibid.). Documents and archive records have similar merits and pitfalls. Good traits are the facts that both could be investigated repetitively if they are publicly accessible; are not presumptuous; contain correct names, actualities and references; may

chronologically cover actions and situations of prolonged period of time; detailed and numerical in nature. In the other hand, they can be challenging to retrieve and find if they are not publicly available or contain incomplete data and bias coverage (ibid).

For this study, the interview was the primary data collection method, in conjunction with direct observation for the reasons explained earlier. Examples of the retrieved documents were e.g. annual report, facts from the website of Police of Finland, news, statistics, internal notices; whereas, the given archive records were the list of motor fleet and fleet related costs of the specific period during 1.11.2015-31.10.2016.

The duration of data collection was about six months, during late September 2016-early March 2017. The reason the data collecting period took quite long for the thesis of this size was simply that all interviewees were always busy. As there were several steps in data collection and analysis, the communication between the researcher and interviewees was never fast.

During the period of face-to-face interviews, notes were taken and summarized as soon as possible (use of voice recorder was not an option with respect to the NDA). After that, the interviewees were asked to proofread the notes, to check on facts and spelling of names (if any was mentioned). At times, there was a need to send follow-up questions asking for more information. Then, the notes of extra information were sent to be verified again and again. It should be noted that not all answers received questions for two reasons. Simply, there was no available answer or no one had ever collected and organized such data before (though the information existed). Verifying the notes and giving extra information were done through e-mail exchanges and phone calls.

During the analysis phase, the same interviewees were also asked if they agreed with: (1) identified environmental aspects; and (2) the researcher's evaluation on deciding which environmental aspects were considered as significant environmental aspects (SEAs); and (3) if they could offer suggestions on how to improve the identified environmental aspects. If they did not agree, they could explain further why and re-evaluated them or suggest something else as well. However, the interviewees agreed with most of the researcher's analyses (identified environmental aspects and identified SEAs). Some interviewees also proposed some suggestions that were related to their works. This phase was done through explanation in person and through e-mail exchanges.

Of all interviews, the interviewee 10 (Cleaning manager, Lassila & Tikanoja Oyj) was the only one whom the researcher had never met in person. Between Interviewee 10 and the researcher, everything was done through email exchanges. However, the researcher visited the room for storing cleaning supplies and machines, with the help of the interviewee 3 (HPD's property and building services maintenance coordinator). The main purpose of that visit was to check whether the cleaning detergents had eco-labels on them as claimed, and they had indeed.

The collected data was processed collectively, not individually, as one big picture. After the data had been verified, simplified and synthesized, it was assessed.

3.4.2 Methods for analyzing the collected data

Based on the life cycle perspective steered by ISO 14001, the data analytical technique was of logical analysis. This means that data was presented as causes and effects throughout life cycles and evaluated accordingly. The data was analyzed in three stages: (1) identifying environmental aspects; (2) identifying significant environmental aspects (SEAs); and (3) identifying gap between the current environment performance and desired sustainable environment direction and practices.

The first two analyses were conducted to answer the first research question. Identifying the environmental aspects is the first step in data analysis. It is important because it could reveal other relevant information such as potential or real environmental impacts and significant environmental aspects (SEAs). Also, it could reveal opportunities to improve the situations. The criteria in deciding what activities are perceived as environmental aspects were already described in the previous chapter. Next, identifying SEAs was based on two criteria suggested by ISO 14001:2015 and Edward (2004): frequency of occurrence and severity of impacts. To ease the analysis, both criteria were quantified as recommended by Edward (2004) in conjunction with Likert scaling, which is often used in opinion-statement research (Veal, 2006: 265). It is based on the idea that individual's opinion can be scored as no. 1-5 or 1-7. In this study, the scale of 1-5 was considered sufficient for easy understanding. The method of evaluation the SEAs was formulated and detailed in table 11:

Table 11. Evaluating criteria of significance of each environmental aspect

Frequency of occurrence (criteria of aspect)	Severity (hazards, toxicity) (criteria of impact)	Total combined score	SEA
5 = Daily or weekly 4 = Once a month 3 = Once every few months 2 = Once a year 1 = Hardly occur	5 = Severe environmental impact 4 = High environmental impact 3 = Moderate environmental impact 2 = Low environmental impact 1 = Minimum environmental impact	9 or 10 = significant environmental aspect or SEA 1- 8 = not SEA	Y= Yes N= No
Evaluation method: Frequency + Severity = total combined score			
Exception, if any environmental aspect seems significant based on scientific knowledge or knowledge of an interviewee, that aspect should be marked as significant environmental aspect at once whether it is positively or negatively significant.			

Last, identifying gap between the current environment performance and desired sustainable environment practices was necessary to answer the second research question. As mentioned earlier, this study is based on evaluation research. Often an evaluation is conducted against desired " objectives or goals " (Robson, 2008: 208), in forms of standards, codes of conducts or legal requirements. However, this thesis was challenging from the fact that there was no such thing given from the HPD. As a result, that compelled the researcher to choose the believed-to-be most relevant theoretical framework to evaluate against - as mentioned in the previous chapter.

4 RESEARCH FINDINGS

This chapter reveals the answers to the 154 initial environmental questions, which were themed in eight topics. The data obtained under the first topic 'organization overview' is treated as background information. Whereas, the data acquired under the rest of the topics are reported as findings. There was great amount of collected information. The data thus, to substantial extent, was simplified, synthesized and compacted in forms of figures, tables and paraphrases. Also, many large numbers were given as factual figures, of which some were computed to create meaning. As a result, these numbers were presented with only maximum three significant figures (ex. 1.00) for the ease of understanding and analysis.

In addition, certain sections of data were collected from certain interviewees. If it is mentioned that a specific interviewee gave information of a specific section, that source would not be referred throughout that section. With this reduction technique in reporting, facts are not encumbered and the reading flows smoother.

4.1 Organization overview

The Helsinki Police Department (HPD) is a law enforcement agency. Founded in 1826, it is one of 11 local Finnish police departments and one of the largest police forces in Finland. The HPD's main role is to maintain public order and security, principally through giving guidance, direction and ensuring order. Though it primarily serves the city of Helsinki, it also performs several special police duties at the national level. At present, the HPD employs approximately 1,600 staff, of which about 1,300 are police officers. The Helsinki Chief of Police heads the organization (Police of Finland, 2016a).

The HPD consists of four police stations and each is answerable for different tasks. Pasila Police station, formed of two large buildings known as Pasila building 1 and 2, commands all operations; Malmi station is the location of crime investigation and patrol units; Töölö station is a holding cell for intoxicated individuals; the station in Itäkeskus only houses patrol vehicles. If need be, this station can also act as a holding cell in Helsinki. Pasila Police station (the Pasila building 1 and 2) and Malmi police station operate around-the-clock (Interviewee 2).

4.1.1 Budget and costs of administration during 2014-2016

In the past three years, the HPD received roughly the same annual budget of €120 million. If the funds were not expended during the budgeted year, the remaining funds would be appropriated to the following year's budget. Additional budgeted funds could be requested in case of special tasks being assigned. Generally, the administrative costs are

structured in three groups as displayed below. They are expended flexibly. If one could save money in some areas, there would be some budget left for others. As this project focuses on environmental issues, it is natural that the group 'Materials and services of daily operations' is the focal point of this review (Interviewee 4).

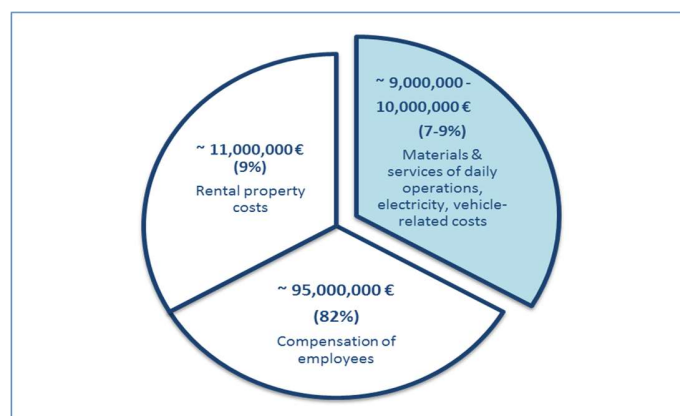


Figure 8. The Helsinki Police Department's budget during 2014- 2016 (Interviewee 4).

4.1.2 Organization structure

There are nine operating units under the HPD as shown below:

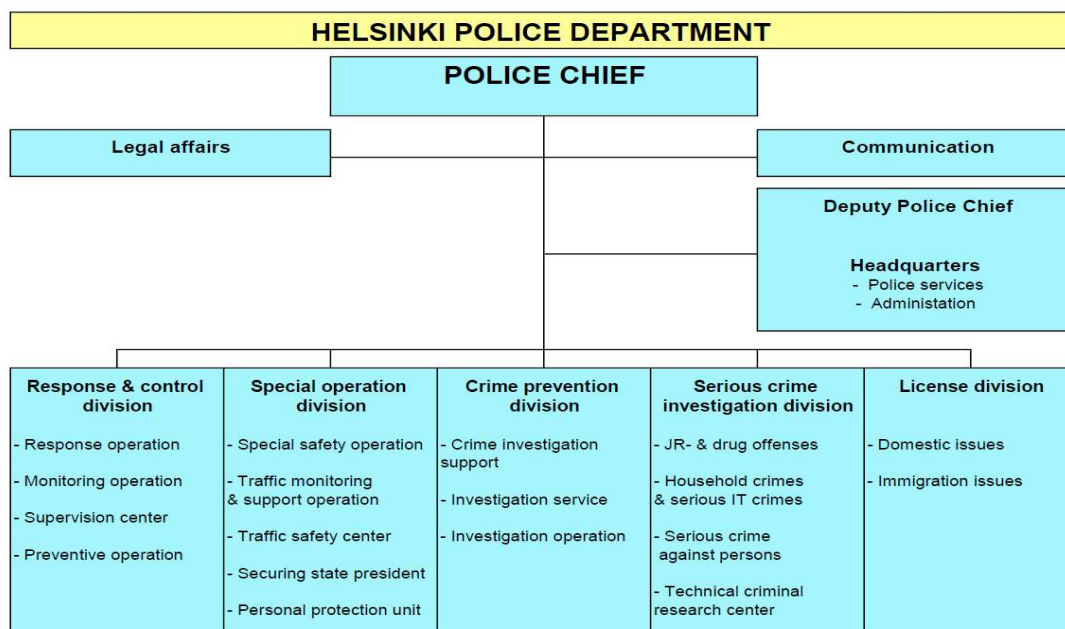


Figure 9. Helsinki Police Department organizational chart as of 1.3.2016 (Interviewee 2).

4.1.3 Duties of each unit

The information of this section came mostly from interviewee 2. According to the organizational chart, the nine operating units can be generally divided into two groups: administration and operation. The divisions managing administrative tasks are: (1) the Police chief; (2) Deputy Police Chief and supportive functions such as IT; procurement; human resource and property management; (3) legal affairs and (4) communication. The remaining five units performing field work are: (5) response and control; (6) special operations; (7) crime prevention; (8) serious crime investigations and (9) license servicing.

On the administrative level, working culture is similar to private corporations where the staff consults with one another when working together. Each employee has his / her own supervisor and supervisors control and monitor the work of staff. However, the operational level assumes a quasi-military policing culture. In practice, this means the police officers often wear uniforms and work under a command, which tend to flow from top to down levels. Broadly speaking, the Helsinki Police executes a wide variety of tasks inside and outside the headquarters buildings. On the strategic, planning and managing level, the Chief of Police works with the Deputy Police Chief to ensure smooth operations through working with the heads of all divisions and supportive functions.

On the operational level, each unit oversees different assignments: (1) the response and control division responds to emergency requests, assists in traffic control and monitors public events; (2) the special operations division is answerable for diverse assignments, for examples, overseeing Operational Command Centre functions, providing dignitary protection, undertaking intervention and counter-terrorism, etc.; (3) the crime prevention division engages in preventive work and conventional police investigations; (4) the serious crime investigation division undertakes crimes that have major adverse effects on society, e.g. financial crime, serious narcotics offences, serious organized crime, etc.; (5) the license division handles licenses and permits related to safety and security issues within and around Finnish territories., for example, travelling, firearms, hosting of public events, etc.

In addition to the abovementioned units, there are six other units. These are: (1) mounted police; (2) marine police; (3) police dog; (4) internet police (5) national special intervention unit and (6) police band. These units are barely mentioned in this report because they are excluded from the project scope. On the municipal level, the mounted police, the marine police and the police dog tend to take charge of general public safety. The remaining three police units assume responsibilities on the national level.

4.1.4 Activities inside the headquarters

As previously mentioned, the head office consists of two large buildings, which are next to each other in Pasila. The buildings are officially numbered 1 and 2. The space of the building no.1 is 27,036 m², and building no.2 is 27,165 m². Total space is 54,201 m² (Interviewee 3). Before the year 2010, the second building belonged to the Helsinki Court

House. When the court moved out of this location in the year 2010, the HPD began use of the building (ibid.). The HPD does not have ownership of the two buildings. Both are owned by the state enterprise Senaatti Properties, which is specialized in property and real estate management (ibid.). Senaatti Properties dutifully provides basic utilities and services related to the buildings' usage such as energy, water and waste management. Additionally, building 1 is equipped with a backup electrical generator that is powered with diesel fuel (diesel generator). This backup electrical generator is monthly tested for potential power outage. It is deployed roughly once every three years (Interviewees 3 and 9).

Main activities such as core policing work and crucial supportive functions, e.g. information technology, procurement, communication, legal affairs and maintenance of materials and buildings are executed by the HPD. Non-dispensable supportive tasks i.e. cleaning, catering, fleet repair and maintenance for the buildings are outsourced. Currently, there are roughly 100 subcontractors and suppliers working with the HPD. Generally, the HPD organization consumes large amounts of materials, goods and services for its operations (Interviewees 3; 4; 7 and 8).

The Helsinki Police Department also possesses multipurpose facilities and machineries for different uses inside their headquarters. Below is a summarized list of major facilities, machinery and services or goods provided by major suppliers (ibid.):

Table 12. List of major supportive facilities, machineries and consumed goods or services

Facilities	Machineries	Goods or services provided by major suppliers
1) Office	1) Car	1) Food service
2) Meeting room	2) Van	2) Cleaning service
3) Crime investigation room	3) Bus	3) Recycling recyclable paper
4) Forensic lab	4) Motorcycle	4) Hauling and recycling of dangerous waste, chemical waste, lap waste, confidential paper, electronic waste and decommissioned vehicle
5) License granting area	5) Boat	5) Recycling of drug-related-waste
6) Indoor storage	6) Segway	6) Hauling and recycling of household and recyclable wastes
7) Climate controlled storage	7) Armored vehicle	7) Leased computer
8) Gym	8) All-terrain vehicle	8) Leased printer and its ink (big printer)
9) Sauna	9) Snowmobile	9) Ink for HPD desk printer
10) Changing room	10) Trailer for vehicle, boat and horse	10) General office supply
11) Shooting range		11) Property maintenance
12) Parking place		12) Electricity transmission
13) Police Nap room		13) Use of electricity
14) Police dog kennel		14) Sewer maintenance
15) Detention facilities: holding cells for crime suspects and prisoners on remand		
16) First Aid room		

Out of the 1,600 employees, approximately 1,100 staff work inside the headquarters. Police officers usually work in three shifts covering 24 hours per day, whereas the back-office staff are working during 7-17.00 (Interviewees 4 and 8). In short, the headquarters is an eventful place.

4.1.5 Stakeholders

Apart from facilitating to diverse activities and workforce, the HPD must consider the needs and interests of numerous stakeholders in addition to employees and managers. In Finland, the Finnish Government directly steers the police operation or Police of Finland, through the Ministry of the Interior, but the organization is supervised by the National Police Board. Being a two-tiered organization, the HPD is obliged to perform at its best because its overall performance is watched and assessed as part of public spending (Police of Finland, 2016a).

Senaatti Properties, the owner of the HPD's headquarters buildings, is one of the Finnish state owned enterprises. The main purpose of the company is to assist public organizations to appropriately manage state properties according to the national standard. In general, the company supplies energy e.g. cooling and heating, water and common waste management services through its contracts. On one hand, the HPD and Senaatti are not equal partners because Senaatti Properties represents Finnish government control. On the other hand, both join forces to ensure smooth policing operations. In this respect, they team up well. Senaatti Properties has been certified with the ISO14001 standard and the company exercises its expertise on environmental management on all of its properties (Interviewee 9).

The HPD works with various authorities for two main reasons, as supportive or operational partners. Example of supportive partners are such as Valtori, the government ICT center who provides solutions and services related to IT infrastructure for public administration; and Hansel, the government's purchasing body, who arranges for everyday life goods such as office supplies, furniture, garage services, etc. (Interviewees 3; 4; 5 and 9). To maintain public safety, security and well-being, the HPD cooperates with other authorities, such as City of Helsinki, Finnish Customs, other local police departments, the Finnish Border Guard, the Finnish Defense Forces, Emergency Response Centre Administration and other police authorities in other countries such as Europol or Interpol or other police networks (Interviewee 2).

The organization generally serves a great number of people (Interviewee 1). According to statistics provided, during 2016 Helsinki was home to roughly 630, 000 residents, of which about 55,000 are of foreign background. Roughly, 80% of residents speak Finnish, Swedish speakers are about 6 % and other languages amount to 14 %. Catering to the multilingual inhabitants compels the organization to create services accessible in multi languages (Interviewee 2). The HPD also receives a large number of clients at the Pasila Police Station. These are the license service customers at the Police House 2. Besides, there are many clients in the pre-trial investigation at the Police House 1 (Interviewees 1 and 2)

The HPD also operates the police jail, which houses detained criminal suspects or prisoners on remand. Approximately, the police jail incarcerates 6,000 detainees per annum, or roughly between 40 to 60 detainees at any given time. Prisoners held in custody are provided with basic needs i.e. food, drink, rest, personal hygiene, outdoor

recreation and health care. If needed, other related services such as finding an attorney or language interpretation are provided as well (Interviewee 8).

As cited, there are approximately 100 subcontractors and suppliers working with the HPD. Within the scope of this project, their roles are also important. It is not possible to examine their practices due to the limited time and resources for this project. However, two notable subcontractors, the cleaning operator (L&T) and catering operator (Eurest), were selected to be part of this review. The results derived from reviewing them are detailed in the next chapter.

4.1.6 Current strategies and outlook

The Police of Finland is aware of its current and future challenges in the form of constantly changing operating environments and constrained public finance. Determined to manage their resources efficiently and to undertake the work effectively, the Police of Finland has set four strategies of 2017-2020; " (1) to promote safety and security; (2) to combat crime; (3) to provide high-quality services and (4) openness of action and promotion of effectiveness" (Police of Finland, 2017). These apply to all police departments.

The Police of Finland has gone through a series of changes throughout its long history. The latest change agent is the latest police reform started in the year 2009. The Police reform is known in Finnish as 'Poliisin hallintorakenneuudistus' or nicknamed PORA (Police of Finland, 2016e). Different evidence suggest that there are two influential movements behind this change: austerity and climate change (Yle News, 2015; European Environmental Agency, 2016; Lindroos, 2016). The national austerity policy and measures have forced the Finnish government to tighten its belt by cutting down unnecessary budgets of public sectors. At the same time, Finnish public organizations are still expected to provide services of good quality and efficiency to residents. This is not to mention that they must 'green' themselves as a part of national and international efforts to combat climate change (European Environmental Agency, 2016).

A series of changes are believed to continually take place on national and local levels. A good example is seen from the number of the HPD's active workers. By the year 2000, the HPD had hired about 2,000 employees. Now in the year 2017, the organization has employed around 1,600 staff (Interviewee 6). Within the HPD's headquarters, there will be a few changes soon taking place. To begin with, energy saving measures will be tightened. For example, all current light bulbs will be replaced with LED light bulbs from inside and outside the two buildings whenever possible. It is assessed that a normal office light bulb's operating life is roughly five years, while an LED light easily doubles that period of time. Though the LED light bulb is more expensive than others, it consumes much less electricity and has a much longer life. (Interviewees 3 and 9). This is a part of an effort in increasing the green energy profile of the building. At the moment, the HPD's building no.2's energy profile is rated as F class (6) out of A-G classes (1-7) (Interviewee 3). In addition, from the year 2018 onwards, the HPD will buy all its computers to reduce

the cost of operating its own ICT system. At present, many computers are leased from the Government ICT center Valtori (Interviewees 4 and 5).

There will also be two main changes inside the police jail: a new IT system and jail renovation. When possible, the unit will be given new computers with newer IT systems that assist crime investigators in recording the details of criminal offenses. These systems will directly reduce the need to use paper. There has been an effort to go towards paperless crime investigation in the last ten years. However, the previous IT company that provided IT solutions could not provide the system requested by the HPD. Now that the HPD is working with another company, the same request is again being made. It is believed the current IT partner can deliver such a system within five years (Interviewee 8). It was mentioned that the Töölö Police station is a detention facility expressly for holding intoxicated individuals. The Helsinki Police Department has a plan to renovate this station in the year 2017-2018 and transfer its operations to the headquarters facilities. This requires the need to enlarge the current detention space in Pasila. At present, the police jail covers the area of eight floors. At the time of this writing, it is not known how much additional space will be needed, but it is certain that some areas will be renovated for such purposes (Interviewees 2; 3; 4 and 8).

4.2 Findings

When the thesis started in the autumn of 2016, it was thought the relevant information would be from the year 2015, but the researcher realized soon enough that the better period for referenced information would be from 2014-2016. Therefore, several related statistics retrieved and described were from this time frame. However, some of them might only be from a single year such as 2015 or 2016 due to the non-availability of relevant data.

Out of 154 initial environmental review questions, 134 were answered. The 20 questions that were not answered were as following: 22; 26; 27; 37; 39; 41; 42; 52; 53; 66; 68; 93; 94; 95; 114; 115; 137; 138; 139 and 146. Since these are 20 long open-ended questions, the researcher decided not to write them in the findings section. Instead, please see [the Appendix 1. 154 initial environmental review questions](#). Overall, the missing answers to 20 questions did not affect the findings and analyses.

4.2.1 Property management

As mentioned, Senaatti Properties own the headquarters buildings. The enterprise has set management policy and action plans for utility consumptions. This largely concerns the consumption of heating, electricity, and water. At the moment, it is challenging to

totally monitor, measure and control the consumption of these utilities in each operational unit because there is only one type of meter per building. Senaatti Properties once thought about installing a device to meter electricity in each department, however the cost of the device was much higher than estimated. This was why the decision to meter electricity in departmental level was dropped (Interviewee 9).

On the policy level, Senaatti Properties sets the consumption goals for heating, electricity, and water at a 1% reduction rate per year. On a practical level, the company tries to ensure its policy fitness by sending its janitor, outsourced by the company ISS, to monitor overall consumption (ibid.).

4.2.1.1 Energy consumption

According to interviewees 3 and 9, the HPD consumes three energies: electricity, heating and cooling. They are provided by Helen Oy (formerly known as Helsinki Energia) which operates the Helsinki district power plant. Its system combines heat and power (CHP) as products. The cooling energy also comes from the same system. Total amount of the energy consumptions and costs during the year 2014-2016 is shown below in table 13:

Table 13. Energy consumptions and costs during 2014-2016 (Interviewees 3 and 9)

Year	Electricity consumption (kWh)	Cost (€)	Heating consumption (MWh)	Cost (€)	Cooling consumption (MWh)	Cost (€)	Total cost of 3 energies (€)
2014	5,519,280.02	543,003	5,043.05	240,696	940.80	64,385	848,084
2015	5,491,276.00	598,145	4,446.45	227,551	753.80	54,494	880,190
2016	5,568,364.00	536,893	5,506.02	276,338	808.10	54,336	867,567

From the consumption of these energies, the amount of emissions to air as by-products of the energy production was not determinable as there was no information available.

On the Senaatti Properties side, different control mechanisms are put in place to save energy costs. The first example is a default indoor temperature, which is set at 21.5 degree Celsius. If someone would request a higher level of heating, the maximum temperature could be adjusted to 23-24 degrees Celsius. However, temperatures cannot be changed without Senaatti Properties permission; due to the fact the janitor holds a key to lock-shield needed to adjust the temperature. Another example is heating avoidance in summer. During the hottest months of the year, Senaatti Properties discourages the use of heating. This is the reason why the heating function is out of service throughout summer (ibid.).

Electricity is also controlled wherever possible. Lighting is an example. Throughout the year, there are two light setting modes: day time and night time. The day

time mode is between the hours of 05:00 and 22:00, all lights are on during this time. The night time mode is between 22:00 and 05:00, a minimum of lights are on during these hours. For example, the lobby has only 2 to 3 light bulbs lit during the night. A motion sensor system has been embedded, which activates lights when there is movement during the night (Interviewee 3). Another example of energy control concerns indoor air quality control. In most areas, the ventilation system is set to be functional 100% during the daytime, but reduced to 50-70% of its full function in the night. For instance, the ventilation system power decreases to 70% during the night time in the police jail area (Interviewee 8).

It is noticeable that Senaatti Properties pays special attention to heating cost, especially during the cold season months. This concern most likely comes from the reason that the heating cost is included in the fixed monthly rental fee. The company carefully monitors the heating cost by incorporating weather forecast into its calculation. If the weather is not too cold in some months, but the cost of heating of that period abnormally rises, Senaatti Properties will notify the HPD to inspect the issue (Interviewees 3 and 9).

On the HPD's side, there are certain levels of effort to limit resource uses in operations as an effort to control the operational environment as much as possible. An example of control is seen with electrical lighting. The HPD's lighting control system is mostly centralized. Thus, it is impossible to turn on or off an individual light bulb. Accordingly, several light bulbs are on in some areas all the time despite no user or activity- another concern. One worry of not having the ability to manipulate the lighting system at one's own desire, is the high frequency of light switching, which tends to shorten the life of light bulb. If a light bulb is broken, the HPD must pay extra cost to have it replaced because this service is not included in the fixed contract with its maintenance provider ISS. This is one reason why the HPD has, to a large extent, centralized the lighting system- so that all light bulbs can be used as long as possible (Interviewee 3).

The police jail unit is a good example in efficient energy use. For example, the lighting here combines both motion censored and manually controlled switches for different needs. Wherever possible, motion sensor light bulbs are preferred and installed. At present, about 80% of the lighting panels are installed with LED light bulbs. The ventilation system power is down to 70% power during the night in comparison to day time operational levels.

Energy audits have been conducted to assess the energy profile of the buildings. At present, the HPD headquarters building no 2's energy efficiency is rated as F class (all ratings are A-G classes) (Interviewee 3). The HPD has not installed any specific energy saving devices, but the organization always looks for ways to save energy whenever and wherever possible. As a matter of fact, some devices and equipment save energy by default because of newer technology embedded in them, i.e. energy saving bulbs or LED lamps. If an electrical machine or device is to be replaced, a newly purchased item tends to be rated under the energy efficiency level of A-B classes (ibid).

As parts of the HPD's operations are performed around the clock, this is one reason why ventilation, heating, cooling and water are consumed all the time in both buildings. Also, there are 17 saunas in both buildings. All of them are turned on for nearly

24 hours, seven days per week and thus they consume a great amount of electricity (Interviewee 9). Additionally, the constant heat in saunas also shortens the life of the interior wood used on the walls and benches. Typically, a wooden sauna has 10-15 functional years. Inside the HPD headquarters buildings, Senaatti Properties renovates saunas approximately every five years. Each sauna renovation, even a small one, costs between 10,000-15,000 euros.

When Senaatti Properties bears the cost of the renovation and the HPD pays for the electricity cost, there should be an agreeable approach in better utilization and operation of the saunas. It is believed that certain financial benefits could be achieved if the use of saunas would be maximized or minimized (ibid).

4.2.1.2 Water consumption

The Helsinki Region Environmental Services Authority or Helsingin seudun ympäristöpalvelut (known as HSY) provides both clean water and wastewater treatment services for the Helsinki Police Department (HPD). The total amount of the water consumption and costs during the year 2014-2016 is shown in table 14 below:

Table 14. Water consumption and costs during the year 2014-2016 (Interviewee 8)

Year	Water consumption (m3)	Cost (€)
2014	16,125.00	41,277
2015	17,030.00	62,953
2016	16,392.40	51,364

Water use and wastewater treatment costs are included in fixed monthly rental fee. It is noted that it is very difficult to control water consumption because the water valve cannot be locked. At present, there is no specific method currently designed for water control consumption from Senaatti Properties' side (Interviewee 9).

The HPD has not installed specific water saving devices either. However, some devices are water efficient by design if they have been recently purchased, such as the computerized lavatory system installed in the police jail unit for the long-term prisoners three years ago (Interviewee 8) Although it is rather expensive, one toilet set comprised of toilet seat; sink for hand washing and pump system cost about 150,000 euro, it serves the purpose very well. It is made of stainless steel and saves water from controlled flushing. It allows for only one flush every five minutes. The hand rinsing function lasts for only 30 seconds. It is water-efficient and extremely durable (ibid).

The police jail also provides good examples of water-efficient activities e.g. showering and using sauna, which are scheduled by the guards. Each prisoner in remand is permitted to shower three times a week and go to the sauna once a week. Though the

main purpose of such controlled activities is simplifying time management of basic needs, it is also a water-efficient practice (Interviewee 8).

The HPD does not have an internal water treatment facility as the headquarters buildings are directly connected with the Helsinki sewer system through the HSY. The cost of wastewater treatment was not determinable because it is included in the water bill sent to Senaatti Properties, and is a part of monthly rental fee assessed to the HPD (Interviewee 9).

There was no evidence to show that the water use has been audited or analyzed to date. The only available information is general water consumption within the police jail located in building 1. This is due to the reason that the people consuming a great amount of water in this building are the detainees (ibid). In addition, any problem concerning water use such as leaking taps or sewer and storm water discharge issues were not found during the review (Interviewee 3).

4.2.1.3 Waste management

The most outstanding result to emerge from the review was that the waste management policy and practices are well executed inside the Helsinki Police headquarters buildings. The HPD separates, reuses, recycles and recovers most of its wastes and requests the same practices from all sub-contractors as well. The researcher was aware that this review could not retrieve all waste-related data, but the information obtained was enough to indicate the general situation of waste management within the organization. The HPD produce many types of wastes, broadly classified into common and operational wastes. They can be further broken down into three groups: reusable, recyclable or recoverable and non- recyclable. Table 15 below details the waste types produced by the HPD:

Table 15. Type of wastes produced by Helsinki Police Department (Interviewees 3; 4; 5; 7; 8 and 9)

Reusable	Recyclable / recoverable waste	Non- recyclable waste
1) Old office furniture	1) Biowaste 2) Paper 3) Cardboard & Packaging paper 4) Glass 5) Metal 6) Returnable drink cans/ bottle 7) Ink cartridge 8) Waste electrical and electronic equipment (WEEE) 9) Decommissioned police vehicles 10) Lead (from shooting practice) 11) Copper (from shooting practice) 12) Bullet casing (from shooting practice)	1) Mixed waste 2) Energy waste 3) Confidential paper 4) Hazardous waste 5) Chemical waste 6) Lap waste 7) Police protective clothing 8) Narcotics-related-waste 9) Old light bulb

Different companies manage the HPD's waste stream. For example, the HSY handles the mixed waste, bio-waste, energy waste and recyclable wastes i.e. cardboard and packaging paper, glass and metal. For recyclable paper, Lassila ja Tikanoja (L&T) removes it at no cost. Kuusakoski, a special waste recycler, treats confidential paper, hazardous waste, chemical waste, lap waste, police protective clothing, out-of-use-phones, waste electrical and electronic equipment (WEEE) and decommissioned police vehicles. Narcotics related wastes and old electric-lamps are destroyed by Ekokem (ibid).

Broadly speaking, the wastes are managed according to their conditions and physical properties. For reusable materials, such as old office furniture (i.e. table, desk, chair, cupboard, space divider), the HPD tries to reuse them wherever feasible. The ideal situation is to have them reused within the HPD or by other police departments. If this is not possible, Finnish laws allow donation of these old office fixtures to a third party such as a school, university or institution that might have need for them. However, old office furniture cannot be given to any individual staff member of the HPD due to the fact that it is not a fair opportunity for all. If something is to be given to the HPD staff, the only condition is that all HPD staff (about 1,600 of them) has a fair chance to get it (Interviewees 3 and 4). The reason why old office furniture is labelled as reusable waste comes from the fact that if it is not reused at all, eventually it will be considered as waste. For recyclable or recoverable wastes, the most common wastes are treated accordingly by the HSY (Interviewee 9). The total amount of the common wastes and costs during the year 2014-2016 is shown below:

Table 16. Total amount of the common wastes during 2014-2016 (Interviewee 9)

Common wastes/ year (Kg)²	2014	%	2015	%	2016	%
Biowaste	49,824	51%	72,864	50%	74,880	52%
Energy waste	23,600	24%	37,200	25%	25,300	18%
Glass, clear	240	0%	375	0%	360	0%
Metal	528	1%	946	1%	1,034	1%
Cardboard & packing paper	3,975	4%	5,370	4%	5,880	4%
Mixed waste	18,900	19%	30,276	21%	35,266	25%
Total weight (Kg)	97,067	100%	147,031	100%	142,720	100%

Other recyclable or recoverable wastes are handled differently. For instance, the returnable drink cans and bottles are handled by Eures't's restaurant staff. They will cash-in the cans and bottles, and then buy snacks and drinks offered free of charge to HPD

² Please note that there was no available data concerning the recyclable paper (one of most common wastes) due to an agreement that allows L&T to haul it out at no cost for the HPD.

personnel during lunch hours. The ink cartridges are bought from two suppliers: Staples and Canon. Both companies recycle used ink cartridges for the HPD (Interviewee 3).

Precious metals and reusable parts from waste electrical and electronic equipment (WEEE) and the decommissioned police vehicles are extracted by Kuusakoski. Some of the electronic waste is collected from outside, e.g. phones from crime scenes. However, they must be destroyed when they are no longer needed as crime evidence and the HPD bears the cost of destruction. In these cases, the means of demolition is to break the phones up into pieces and then recycle them. They are also sent to the Kuusakoski. Lead, copper and brass bullet casings from shooting practice are sold back to the market for their metal values (ibid.).

Interviewees 3 and 4 said that all wastes are collected on a regular basis but not always at the same time, for example:

- Weekly: mixed waste, energy waste, cardboard and packing paper biowaste (stored in cold storage before being collected)
- Biweekly: paper, glass and metal, waste bins maintained by Kuusakoski
- As needed: ink cartridges from the HPD's printers are collected and recycled by Canon and Staples whenever representatives of both companies come to supply the new ink cartridges, they will take the old ones away with them.

The non-recyclable wastes are treated variously as well. For example, mixed waste, energy waste, confidential paper, lap wastes, protective clothing and narcotics-related-wastes are often incinerated. The wastes with hazardous properties such as energy-saving light bulbs, fluorescent lights, vehicle batteries or motor waste oil are sent to be treated at the proper treatment facilities. If the HPD is uncertain of any items found from their operations, they may be incinerated as well for security reasons (Interviewee 3). The amount of the three non-recyclable wastes, specifically the confidential paper, the WEEE and the police protective clothing, produced during the period 1.1- 31.5.2016 were retrieved and shown in the table below:

Table 17. Total amount of three non-recyclable wastes produced during 1.1- 31.5.2016 (Interviewee 3)

No.	Waste type	Weight (Kg)	Remark
1	Confidential paper	7,339	These wastes were collected from the Pasila main buildings, Malmi police station and Töölö police station.
2	Waste electrical and electronic equipment (WEEE)	1,418	
3	Police protective clothing	893	
	Total (Kg)	9,650	

It was found that the quantity of all wastes types is never the same from year to year, for several reasons: (1) level of activities inside the HPD headquarters; (2) amount of detected crimes; (3) numbers of confiscated crime evidence; (4) timing for destroying different kinds of wastes i.e. confidential paper; (5) condition of some tools or devices that are considered no longer functional e.g. police's protective clothing or vehicles. Apart from the differed annual sum of the waste stream, the cost of waste handling seems dissimilar as well. Below are the total costs of all waste handling during 2014-2016:

Table 18. Total costs of all wastes handling during 2014-2016 (Interviewee 4)

Year	Cost (€)
2014	8,300
2015	27,647
2016	66,273

Interviewee 4 explained that the costs of waste handling and treatment during the year 2015-2016 were higher than for the year 2014 from the change of the waste handler. The Police Technical Centre (PTC) used to handle a large amount of the HPD's operations waste such as hazardous waste, lap waste, waste electrical and electronic equipment, police uniforms and decommissioned police vehicles. The PTC did not charge the HPD for the waste treatment costs. However, as the PTC was disbanded in 2014 from the PORA reform, the HPD started to pay all costs of waste handling and treatment to Kuusakoski and Ekokem beginning in 2015 (Interviewee 4). Another reason why the cost of waste handling in 2016 was higher than that of 2015 was because of large amount of confidential papers were destroyed (Interviewees 3 and 4).

It was not found that the waste stream was either analyzed, or audited before this time period (Interviewees 3 and 9).

4.2.1.4 Restrooms and kitchen

Recent evidence shows that the hand drying paper towel and tissue paper used in the HPD's restrooms are made of post-consumer product and not bleached. The cleaning products for hands and the toilet are eco-label detergents. In addition to the cleaning services, the company L&T supplies these items for the HPD. This greatly helps the organization as they do not have to keep track of toiletry items. The HPD just pays monthly bills, which include the cleaning services and toiletry materials (Interviewees 3; 4 and 10). However, the source of paper and percentage of recycled-paper-content of both items were not determinable since they are bought through the third-party company L&T. For the kitchen areas, the HPD always seeks electrical appliances that belong to the class A or B of energy efficiency rating. All refrigerators are CFC free (Interviewee 3).

4.2.2 Procurement, material use and office practices

The HPD has its own procurement department known as the procurement and material management office. It handles supplying different materials and services for administrative and police actions. Another unit that carries out similar tasks is the IT department. The IT staff take charge of ordering and maintaining electronic devices e.g. computers, printers, mobile phones, fax machines, TV, IT-related services and licenses for communication networks (Interviewees 4 and 5).

Both departments are often in contact with all suppliers and sub-contractors to ensure smooth police operations. Current sub-contractors and suppliers have been awarded the contracts through public competitive e-tendering, centrally organized for the Police of Finland (Police of Finland, 2016e). As a rule, the Helsinki Police Department (HPD) obtains necessary materials and services through the supportive network of government agencies who are experts in their fields. At present, the HPD makes use of the services provided by Senaatti, the National Police Board, Valtori and Hansel (Interviewees 4 and 5). Practically, they assist the HPD by handing over lists of screened suppliers and contractors that the organization might need. Nonetheless, the HPD has the freedom to choose its own suppliers if a specific product or service is not offered on these lists. Currently the HPD has about 70 direct contractors who deliver materials and services e.g. electricity, computers, printers, cleaning, catering, special waste treatment, etc (ibid.). The procurement's supportive network for the HPD is displayed as follows:



Figure 10. Helsinki Police Department's procurement's network (Interviewees 4 and 5)

Interviewee 4 held that the procurement processes have changed since 2014. Beginning in that year the Police Technical Centre (PTC) stopped operations. When this center was active, it had a large warehouse where all supplies were centrally held for the

police. Whenever a police department wanted more supplies for its operations, each could make direct orders from the PTC. That was one reason why most materials used for police operations were somewhat cheaper than today due to the fact that they were bought in great bulk by the center itself. Now there is no central warehouse available anymore. The HPD itself does not have a big storage either. Thus, when the procurement office makes a purchase decision, it tries to buy as much as possible in order to fill its storage. For example, ammunition is bought for one year's use in advance. However, not all materials can be placed in stock. Consequently, prices of some items purchased by the HPD are higher per unit in comparison to when they were procured by the PTC.

There was no list of procurement and total costs made in 2015 available because no one had ever asked for it before. It is possible to acquire the data, but it would take a long time to collect all the figures. Besides, the percentage of environmental friendly materials used in comparison with all materials could not be determined because the HPD buys most materials from the screened lists (Interviewees 4 and 5).

Concerning material consumption, the Finnish Police are aware of the large volume of use of everyday materials for policing operations, thus the concerning policy and action plans have been laid down for the local police departments. On the national level, the 'Resource Unit' under the National Police Board is tasked with a "performance management process and the strategic planning, management, supervision and development of police information, finances, human resources, facility, material and document management." (Police of Finland, 2016f). Accordingly, different actions have been followed such as, "steps were taken to develop procurement coordination methods and overall material management, and to deepen cooperation with Hansel, the governmental central purchasing body. Equipment and accessories in new police vehicles and other operation equipment were updated as necessary for current policing needs." (Police of Finland, 2016e)

Locally, it was found that the HPD constantly reduces the use of unnecessary materials. For instance, the organization stopped the use of most of fax machines a long time ago (Interviewee 5). The fixed-line desk phones and subscriptions were also stopped during the year 2013-2014. Mostly, mobile phones are employed at present (ibid). Reusing the packaging materials or containers is another endeavor. Thus far, the HPD collects the wooden pallets from buying in bulk. When the number of the pallets is big enough, the HPD calls the relevant suppliers to pick them up for further reuse (Interviewee 3).

Noticeably, many existing materials were purchased on the ground of durability or necessity. For example, most of the fixtures and furniture in the police jail are designed to be strong and durable so that they are not destroyed easily even with the use of strong physical force. Acquisition of new office furniture is another example. An employee may request for an electric, height adjustable new work desk to if three conditions are met: (1) having permission from his/ her superior (2) having doctor statement supporting health issue; (3) there is enough annual budget.

Another type of material used is the electronic devices. The HPD owns and leases electronic devices and equipment at different rates. The table below displays relevant details:

Table 19. Electronic devices and equipment use of the HPD (Interviewee 5)

No.	Item	Owned by the HPD	Leased
1	Computers	x	x
2	Printers	x	x
3	Photocopiers	x	x
4	Faxes	x	
5	Portable work stations	x	
6	TV and cable systems	x	

Interviewee 5 explained that all electronic devices and equipment have different warranty and replacement periods. For instance, computers have warranties of up to four years. Accordingly, the computers are changed approximate every four years. The HPD leases some computers from Valtori. From general observation of the responsible staff, each computer has a three to four year of productive life cycle. Yet, there is an exception. If a computer runs too slowly, it could be replaced earlier. At present some computers are leased, but the HPD plans to own all of its computers in the near future. Large photocopiers have a lease warranty of five years. Since the HPD leases them from Canon, it is determined by the agreement and the condition of the machines. In the previously mentioned list, only the TVs and cables are changed when they are broken. When these are replaced, the HPD cannot claim that they buy the most environmental friendly and energy efficient devices and equipment. As the procurement and material management office does not know in advance about the energy rating, prices and brands of this equipment, because Hansel and Valtori have pre-chosen them. In this respect, the HPD only hopes that these agencies always choose the most economical models (and most environmental friendly) for them (Interviewees 4 and 5).

Currently, the ratio of personnel to the number of electronic equipment varies. For example, the percentage of using small devices such as computers is 1 employee to 0,98 computers (about 1:1) (Interviewee 5). Whereas larger equipment such as printers are shared between 50-100 staff to 1 large printer, depending on location and tasks. Customarily, every crime investigator has one small printer (there is often a need to print out papers right after an investigation). Managerial staff or top management tend to have their own printers as well (ibid).

There is an effort to save energy in use and placement of electronic equipment. For instance, the standby function or energy-saving mode is the default setting for printers. However, it is not possible to do this with the computers because of constant updates to the operating systems throughout the day. Apart from that, security is another big issue. If someone would shut down the computer, no one knows if the same user would log on again. Due to that fact, no single user can log off their computers even when not using them. In addition, there is no need to arrange any specific-electronic-areas, which may lead to extra energy and resource consumption, because these devices and such equipment are located or utilized or taken to where they are needed (ibid).

Another example regards the use of double-sided paper printing or copying. From general observation, it seems that double-sided paper printing or copying is available but it is not set as default. This practice was demonstrated when someone printed documents for the researcher. In such a case only one side of the paper was more often printed on. It was found that the printers generally can print with recycled paper, but the police do not use recycled paper at all because of archive-related-issues (Interviewee 5). Much of the paper is consumed by the crime investigation division. Within Finnish policing work, general documents are kept between one to three years before being destroyed. In an important case, some documents must be preserved up to 100 years (stored in Finnish national archive storage). Therefore, only new printing paper is taken into purchase consideration because it lasts longer than recycled paper (ibid.). Interviewee 4 and 5 did not know if parts of these devices and equipment are recyclable. Both were neither certain that product data sheets regarding energy consumption of the devices and equipment were kept with or near them.

In the office settings, the staff also use other objects e.g. pens, binders, ink cartridge, envelopes, staples, and folders. There are a few detected internal material usage control practices, either agreed among the staff or between the HPD and its suppliers. For example, many administrative personnel have recently decided they will save paper by storing most of their official papers in electronic form. The office supplier Staples refills stationary items every two weeks. By contract, there are certain amounts of all items to be replaced. For instance, if there are less than 25 pens, then a new box of pens is delivered (Interviewee 4).

4.2.3 Hazardous material

According to the Council of State Decree on Waste (179/2012): Annex 3, the properties that render any substance hazardous are of following: " (1) explosive; (2) oxidizing; (3) 3-A) highly flammable and 3-B) flammable; (4) irritant; (5) harmful: if inhale or ingested, might entail health risk; (6) toxic; (7) carcinogenic; (8) corrosive; (9) infectious; (10) toxic for reproduction; (11) mutagenic; (12) waste which releases toxic or very toxic gases in contact with water, air or an acid; (13) sensitizing: substances and preparations which, if they are inhaled or if they penetrate the skin, are capable of eliciting a hypersensitization reaction; (14) eco-toxic: substances and preparations which present immediate or delayed risks for the environment; and (15) waste capable by any means, after disposal, of yielding another substance, e.g. a leachate" (Finlex, 2017). The review found some hazardous substances, summarized in table 20 below:

Table 20. Detected hazardous substances (Interviewees 3; 7 and 11)

Hazardous properties	Examples of detected substances
Flammable	<ul style="list-style-type: none"> • Vehicle fuels e.g. diesel or gasoline • Vehicle engine oil • Vehicle engine coolant • Windshield washer liquid
Irritant	<ul style="list-style-type: none"> • Ad-Blue liquid (to break down the nitrogen-oxide emissions from burning diesel fuel into nitrogen and oxygen - the natural harmless gases)
Corrosive	<ul style="list-style-type: none"> • Acid in spare electric generator's battery • Acid in vehicles' batteries • Vehicle brake fluid
Toxic	<ul style="list-style-type: none"> • Oven cleaner (used by Eurest Restaurant)

The HPD usually holds high standards for safety and security. It seems that hazardous materials or harmful chemicals are kept and handled in a safe manner, as well as are audited by the users of these types of materials (Interviewee 3). The substances that are stored on the underground level are mostly for fleet (motor pool) maintenance i.e. engine oil, engine coolant, and windshield washer liquid, Ad-Blue liquid and brake fluid. They are kept in safe places with appropriate safety measures. For instance, they are kept inside fire-proof storage, which are also well ventilated. These liquids are purchased in bulk containers of about 100 liters per container. Product safety data sheets are affixed to the containers. The HPD does not store any vehicle fuel as the refueling system is done outside at contracted gas stations (Interviewee 7).

It was mentioned that some harmful chemicals are used by the crime investigation lab. However, chemical names could not be specified because it would require special permission to review them. This was one reason why the lab was outside the scope of this study. In addition, no pesticide or fertilizer was found inside the head offices even though there are small grassy areas in front of the Pasila Police station. This green area is owned and managed by the City of Helsinki (Interviewee 3).

Batteries, from electric generators or police vehicles, are maintained by responsible staff. When they are no longer in use, they are kept in designated areas before being sent to be treated at the Kuusakoski's treating facilities. The same treatment technique applies to liquid wastes from fleet maintenance (Interviewee 7).

The only toxic substance detected was an oven cleaner from Eurest Restaurant. The product is properly stored and handled by the restaurant staff. It was mentioned that the product is used two times a month. As a rule, a staff member performing the oven cleaning wears protective eye glasses and gloves to avoid direct contact with the toxic content (Interviewee 11).

4.2.4 Environmental training

According to interviewee 3, the HPD's in-house training that would concern environmental awareness has yet to be created. It was also found that an environmental attitude survey has not been done as yet. However, general environmental information exists. There is an electronic platform called 'Info TV' broadcasted by Senaatti Properties. This program provides good environmental tips on how to save costs from different practices regarding heating and electricity and water use. At times when a waste material or item is placed in an incorrect bin, the HPD staff will be informed of such in order to prevent future mistake. The review found that risk assessment training related to environmental disaster is provided. In general, everyone who works inside the HPD is trained to evacuate in case of fire. The personnel operating police vehicles receive additional training. Both police officers and non-police staff are well trained to perform several tasks when required; they are aware of the risk they engage themselves with.

As communication within this organization is quite flexible. There are several communication channels for the HPD employees such as an internal chat program, face-to-face discussion with superiors or direct request. The staff is able through these channels to request additional environmental training that might suit their needs. Thus far, the HPD has no plan to organize future training related to environmental management. It is believed that there is a need to develop preparedness and to increase environmental traineeship within this organization.

4.2.5 Environmental incident

The organization has emergency preparedness plans. Specifically, they are: (1) a safety plan for fire and other accidents; and (2) a preparedness and contingency plans tailored for the HPD's operations (Interviewee 2). There is no record of an environmental disaster. However, four environmental incidents have been spotted.

The first one was leaking of fuel from police vehicles into the indoor sewer from police vehicles. However, this incident took place some time ago. This incident was at a time when the majority of vehicles were repaired and maintained by in-house auto mechanics. To solve the problem, an 'oil catch' method was applied. This technique is effective as an oil filter, as extra layer, is added to all indoor sewers where the police vehicles are parked nowadays (Interviewee 9).

Another concern was the potential clogging of the outdoor sewer by run-off water from a great amount of sand. The situation was resolved by using a 'sand catch' technique. Both occurrences were handled by an expert in sewer maintenance, Eerola (ibid.).

The third incident was a potential explosion of the backup electrical generator's battery. At the time the backup electrical generator's battery was found to be overheating because of its old age. Fortunately, a responsible staff member discovered this and replaced it with a new battery instantly (Interviewee 2).

The last event was an intentional fire set inside the police jail cells used for holding criminal suspects or prisoners on remand. To solve this issue, the police jail cells were

equipped with a fire suppression system and the prison guards are vigilant and use precautions at all times (Interviewee 8).

4.2.6 Fleet management

The data concerning the fleet management came mostly from the interviewees 6 and 7. The motor vehicle fleet utilized by the Helsinki Police Department (HPD) is managed by two stakeholders, the National Police Board (NPD) and the HPD. The NPD retains ownership of all vehicles operated by all police departments. Accordingly, the NPD also sets criteria for fleet procurement, vehicle outfitting, general use and vehicle replacement. The HPD manages the asset, which includes assigning vehicles for different operational uses; maintaining and repairing vehicles; tracking fuel usage and day-to-day operating costs and decommissioning vehicles when possible.

4.2.6.1 Fleet management policy

On the strategic level, some important fleet subjects such as green fleet policy, sustainable transport policy, fuel efficiency, incentives for good driving performance or vehicle life cycle cost analysis were not detected. Nevertheless, common characteristics in modern fleet management, i.e. use of telematics and teleconferencing as well as relevant operational training were noted. The two telematics systems embedded inside all police patrol vehicles are the police radio and global positioning system (GPS) systems. Both allow patrol officers and supportive units to see where all patrolling vehicles are at any given time and that they can communicate with one another instantaneously.

For any general communications, different departments usually communicate with one another through mobile networks, an internal chat program, and email or teleconferencing programs. It is possible for a staff member responsible for fleet management to directly communicate with the NPD and Hansel, if a problem or issue is big enough and it affects his or her works and others. Overall, teleconferencing and digital communication channels generally reduce the use of vehicles. However, it is still common that senior managers occasionally meet in a high level gathering, such as in a nationwide annual conference organized for fleet managers or financial managers.

Police officers are trained in vehicle safety. They are aware that they should perform basic vehicle check-ups, such as checking e.g. the level of engine oil, gasoline, window-cleaning liquid, air pressure in the tires and the vehicle's lighting, at the beginning of their work shifts. This is the reason why a safety checklist is not recorded on paper. Nonetheless, the police officers do not always perform preventative check-ups. This is one reason why some police cars have higher maintenance costs than others. There are also auto safety checklists inside all parking spaces. They are placed on the parking space walls to remind the vehicle operators of what to check for. In addition, many office staff members may also drive police vehicles and they are specially trained for such a purpose. Thus, they are expected to know how to economically and safely drive police

vehicles. However, there is no information available on their practice of automobile check-up routines.

4.2.6.2 Daily fleet management practices

Use of motorized vehicles for daily work and operations varies. For policing duties, there are three groups of people who usually need to travel in vehicles: (1) patrol officers, always patrol in motor vehicles; (2) crime investigators, often travel to crime scenes or give evidence in courts; and (3) other non-police personnel may run errands necessitated by their work. The vehicles are based where the work requires. Most of the police motor vehicles are parked in the Pasila and Malmi police stations. Vehicles that are used for state government security work are parked in the Helsinki city center or Mäntyniemi area. Some police vehicles are also parked at the Töölö police station and Suursuo area for the mounted police.

The Helsinki Police department operates its vehicles in three different environments. The first and most common are in Helsinki urban centers, suburbs and motorways. The second circumstance is within the Finnish national border executed by the Police Rapid Response Unit or " Bear group " , which carries out special missions when needed. The last area concerns the state security assignment. The police who work in this force serve anywhere within or outside of Finnish territory as required.

Usually, the police vehicles carry all necessary equipment at all times while working, which is similar to having a mobile work station. This is the main reason why the police vehicles are heavier than private cars. In the case of a state security mission, often an armored vehicle is utilized. This type of car is heavier than a standard patrol vehicle because of the higher level of protective shields.

Patrolling unit accounts about 25% of all the HPD's motor fleet. As a result, there are details and examples regarding vehicle uses found within this unit more than from other units. For instance, as a rule, the HPD plans patrol routes and routines covering all areas of Helsinki. Accordingly, the patrol police unit is based in three locations; in the north, east and south of Helsinki. The level of monitoring is based on different activities throughout the year. For instance, the patrol officers perform their routines on weekdays. However, they will increase the level of vigilance and number of patrols during weekends, holidays or special events that might cause disruption of the common peace. The most important purpose in the planned patrol routes is that the police roam around designated areas. As a result, the selected driving routes are not always the same. Perhaps, this explains why the use of routing software for patrolling was not found. In theory, although it is possible that vehicle operators always use the most fuel efficient and/or smallest vehicle fit for a specific purpose, it is not always so in practice. For example, any given patrol police officer tends to prefer a large vehicle, such as a van instead of a sedan or motorcycle because a larger vehicle is more comfortable to sit in for a long period of time.

Greener vehicles such as electric-hybrids, motor bikes or Segways are seasonally deployed or only on occasion. The HPD has a hybrid vehicle (Toyota Prius) for patrolling.

It was found that the hybrid vehicle is not popular among the patrol officers. This is why the electric vehicle is deployed infrequently. Motor bikes are in use during warm periods, about six months per year, approximately between April and October. The HPD owns 5 Segways. During the review period of fleet management internal documents (Oct-December 2016), the Segways were not listed in the HPD's fleet inventory because they were still being tested. During this time, the main group of people who travelled with the Segways were parking inspectors and staff of the Helsinki-Vantaa Airport, who borrowed them from the HPD.

Refuelling is managed through a monthly invoicing system. The current fuel suppliers are Teboil and Neste. Each patrol vehicle has a credit card, affixed in the vehicle and can be used only for that vehicle. The patrol officers are supposed to visit only gas stations that belong to either of the two companies. If necessary, it is possible to refuel the vehicle in stations belonging to other companies, but the receipt and additional explanation are required.

4.2.6.3 Vehicle maintenance and repair

During the data collection period, there were two in-house car mechanics, nicknamed (for the confidential reason) A-K and J. The main fleet inspector, A-K, is mostly responsible for administration and this is why the general check-up and repair work are taken care of by J.

According to in-house fleet maintenance protocol, the auto mechanics check the vehicles' kilometers every last day of a month. Then they know how much time each vehicle may need before it is sent to be serviced next time. In case a vehicle does not properly function, an appointment to a subcontracted garage for service is made right away. J has been working for about a year and he has already saved a great amount of costs. He is capable of performing general vehicle check-ups, maintenance and repairing many mechanical parts that take less than two hours, provided that this work does not involve digital analysis. Third-party service providers usually take bigger repair jobs that J cannot undertake because they may require larger space and tools to complete the task. At the moment, J is constantly busy. If he has more work than he can handle, subsequently some jobs are outsourced.

Two smaller maintenance examples are: filling 'Adblue' liquid and car light changing. Nowadays several car makers are obliged to introduce technology to reduce harmful nitrogen-oxide emissions in diesel cars because of the Euro 6 emissions standard (Griffiths and Haining, 2016). The HPD has many diesel-engine-vehicles and this is one reason the Adblue liquid is constantly filled (on top of other car fluids such as windshield washer fluid and brake fluid) to the HPD's automobiles. Apart from filling the Adblue liquid, the vehicle lights are replaced very often. Changing each light takes roughly five minutes. Both work examples are simple and take a short time to perform by an in-house auto mechanic. At present, the price of a single outsourced filling of the Adblue liquid is 20 €. With a large fleet, the annual amount of this service alone is rather costly. It would

be financially much more economical to do this type of minor work by an in-house auto mechanic.

In addition, the HPD staff will save time on driving to and from the contracted service location, which takes an about 30 minutes to drive from Pasila police station and another half an hour to drive back. Several productive hours are often lost from this driving alone. If there is a long queue in the subcontracted garage, it may take up to half a day to get a vehicle back in service. If no one needs to drive far away for such small work, this will prevent natural wear and tear of car tires and the HPD will save on fuel consumption cost, general maintenance cost and productive work hours if some small vehicle-related work is done in-house.

The main fleet inspector wished that the HPD would hire at least one more car mechanic as soon as possible and acquire less outsourced car maintenance services. She revealed that the HPD planned to hire an extra auto mechanic to start work in April 2017. The two main reasons for this are the outsourced services come with value added tax (VAT) and higher prices, in comparison to the in-house services. As the HPD is not a VAT liable organization by default, it will be economically sensible to buy products and services without VAT as much as possible.

Concerning vehicle-related accidents occurring to the HPD's fleet, there are three types of vehicle-related accidents: (1) unavoidable accident; (2) avoidable accident and (3) accident caused by a third person. The unavoidable accident refers to situations that force police officers to drive or move fast around tight and unfamiliar environments. Consequently, the police vehicle might bump into something e.g. rock, a building's corner, fence, etc. The avoidable accident refers to circumstances where the accident is caused by an operator's complacency or carelessness. One example is when a patrol van back side was dented from complacent parking and it cost over 2,000 euro to fix it. The final type of accident is caused by a third person. Someone who dislikes the police may attempt to destroy or hit police vehicles when police officers are not in or next to their vehicles. This type of damage is rare, but has happened. There are also damages that are caused by other cars in traffic, a normal accident that can happen to anyone.

4.2.6.4 Fleet use overview

Currently the HPD operates with 227 vehicles. However, the fleet-related data for the analysis was retrieved from the period 1.11.2015-31.10.2016, which then contained 203 fleet vehicles. The snapshot of this single year data was the basis of the review concerning the HPD's fleet management and performance. The HPD's fleet of 203 vehicles was comprised of five broad categories: (1) sedan vehicle; (2) van; (3) truck; (4) bus and (5) seasonal or special vehicle. Of the whole fleet, vans made up the largest number of the fleet at 89 vehicles or 44%; whereas the second largest group was the sedan automobile at 72 vehicles or 35%. The third largest type belonged to the seasonal or special vehicle group, which contained mixed means of transportation at 37 vehicles or 18%. The truck and the bus groups were small, making up only three percent of the whole fleet.

Most of the police vehicles consume diesel, whereas some are powered with gasoline. Almost all the sedan vehicles and vans are equipped with automatic transmission systems. In general, the police vehicles are washed inside the Pasila and Malmi police stations. With a large fleet, it is practical to have their own car washing station. As a rule, the HPD does not buy insurance from any third-party service provider. The HPD is self-insured (funded and insured by the state of Finland).

The information regarding average annual available days of each vehicle and annual average vehicle utilization rate could not be determined due to lack of data.

4.2.6.5 Fuel, mileage and CO2 monitoring

Since the majority of vehicles are used for different assignments at different times of the day and by different drivers around the clock, it is impossible to average the fuel efficiency rate even within the same police operations. The best representation of the HPD's fuel economy is believed to be a general picture of fuel usage of how many liters the vehicles consumed during the period of data collected, which was between 1.11.2015-31.10.2016³. More details of the reviewed fleet inventory and fuel efficiency are shown in [Appendix 5. The HPD's fleet inventory and fuel efficiency of period 1.11.2015-31-10.2016](#)

It was also problematic to calculate the average annual fuel consumption of each vehicle. As the fuel consumption levels varied greatly between zero to over 8,000 liters per vehicle during the selected period. The only possible solution is to demonstrate the total annual fuel consumption instead. It was found that the total fuel consumed of all vehicles combined was 369,981.45 liters. Similarly, the average total annual mileage per vehicle cannot be justified. The amount of mileage is relative to the amount of fuel consumption. The vehicle that had high fuel consumption also had high annual mileage, which varied between zero to over 60,000 kilometers. Once again, the best explanation is the total annual fuel mileage instead. It was found that the total annual mileage of all vehicles combined was 3,707,700.00 kilometers.

Average maximum distance before each vehicle is replaced is 350, 000 kilometers or 8 years. An estimated driving distance of a Helsinki police vehicle during one year is between 35,000 - 40,000 kilometers in Helsinki, but it could be much higher in some northern regions where the distance is generally greater. The main fleet inspector thought that the kilometer is not the best indicator for auto replacement criterion because of a high idling time level. The better indicator is an engine-hour meter, which records an engine's operating conditions such as the hours of operation and idling hours. The kilometer alone does not tell all the information about a vehicle's condition that the HPD should know. At present, there is no device that measure the idling time, though the technology exists.

³ Apart from the information obtained from general interviews with the responsible staff on the fleet management topic, there were also two similarly additional data sets retrieved from the HPD's central database. However, only one data set was chosen based on its most updated relevant statistical figures; therefore, the other one was dismissed.

The information regarding CO2 emission could not be determined because there is no meter that measures the level of CO2 installed inside any HPD's police vehicles.

4.2.6.6 Fleet operating cost

As cited, there is no information concerning e.g. costs of insurance; pollution cost; road use fee; fixed cost per vehicle and total emissions to air; accordingly, they will not be mentioned in this section. The HPD labels the costs of fleet management into two broad groups: the cost of car parts and the cost of fuel consumption. Within the group of car parts, it is further sub-categorized into five groups: (1) tires; (2) maintenance; (3) repair; (4) accidents and (5) other costs. From the data given, these numbers are summarized as following:

Table 21. Total costs of the HPD's fleet extracted during 1.11.2015-31.10.2016.

	No.	Type of annual cost	Amount of costs (euro)	%
Group 1:	1	Tires	62,622.51	6%
	2	Maintenance	115,700.47	11%
	3	Repair	366,852.67	35%
	4	Accident	101,768.08	10%
	5	Other costs	29,291.00	3%
Group 2:	6	Fuel consumption	357,563.26	35%
		Total	1,033,797.99	100%

Similar to the fuel consumption and mileage monitoring, it was problematic to average the six costs mentioned in table 25. However, it was possible to compare the maintenance cost against the repair cost. The maintenance cost was roughly one third of the repair cost. The three vehicles that consumed the highest amount of fuel during the selected period belonged to the patrol unit, between 6,000-8,000 liters per vehicle. They also had high mileage. This is natural because this unit patrols more than others in general.

The policy concerning police vehicle procurement has been changed in the past six years. Up until 2011, each police department could purchase their own vehicles. Then, each police department watched their own fleet budget. When a vehicle was old enough, it would be replaced in due time, because a decision maker made the purchasing decision based on each vehicle's condition. Thus, an overall cost of car maintenance was better controlled. However, the current policy is different. Every year the HPD receives a limited budget of one million euros for acquiring its new fleet. For instance, one Mercedes Benz (for state-security assignments) was replaced in 2016, and it cost 750,000 euro. The rest of the budget (about 250,000 euro) made it difficult to buy many new cars. Value-

added tax (VAT) also eats up a big proportion of the vehicle budget. For example, the total cost of a police van such as a Volkswagen Transporter is 75,000 euro, of which the VAT accounts 20-27% of the whole cost or about 15,000-20,000 euro.

The review also found that many patrol officers feel that design of patrol vans' inner utility spaces are not practical for daily tasks. This feedback was given through the vehicle inspector (the interviewee 7). Though it was impossible to link this issue with vehicle accidents in this review, it is perhaps useful for decision makers to take it into account when ordering new generation of patrol vans in the future.

4.2.7 Most visible subcontractors

Of about 100 subcontractors and suppliers, the cleaning service provider L&T and the catering service operator Eurest were chosen to be part of the review because of its most visibility to the HPD's staff. Apart from performing their daily routines, they are required to sort out the common wastes. The main source of the information concerning cleaning service (L&T) came solely from interviewee 10; likewise, interviewee 11 was the only person showing facts of catering services (Eurest).

4.2.7.1 Lasila & Tikanoja (cleaning service)

The company L&T highly regards its standard in different areas. This can be proved by three voluntary accreditations: (1) ISO 9001 (quality); (2) ISO 14001 (environment); and (3) OHSAS 18001 (health and safety). The total of square meters (m²) being cleaned at the headquarters buildings is 40,200 m². The covered zones and frequency of the cleaning services are detailed below:

Table 22. Cleaning details within the Pasila Police Station

Daily	Weekly	Once a month / summer or twice a month / winter	Area not allowed to clean	Extra cleaning on request
<ul style="list-style-type: none"> - Kitchens - Common resting areas - Toilets - Changing room - Lobby - Lunch place - Crime investigation lab - Underground tunnels 	<ul style="list-style-type: none"> - Offices - Sauna - Underground tunnels 	Car parking spaces	<ul style="list-style-type: none"> - Climate control storages - Heating-and-cooling control rooms - Water control room 	<ul style="list-style-type: none"> - Windows - Floor waxing - washing of chairs
	Twice a week			
	<ul style="list-style-type: none"> - Gym - Shooting range 			

Currently, there are 8 cleaning staff working inside the two buildings, 6 cleaners during Monday - Friday and 2 on the weekend. The regular cleaning hours are mainly 06:00 - 14:00 and one shift is 10:00 - 18:00. Usually, these personnel have already basic cleaning education before they became L&T's employees. Still, each staff is trained before starting their work, which include one day basic training and on-site training. If a new cleaning machine or products are purchased, they will receive extra training sessions e.g. by cleaning machine producers or material suppliers. In addition, they will receive extra training and special instruction if they handle a highly sensitive area such as crime lab, prison, shooting range. The company also revealed that all detergents put into use have eco-labels.

There are three types of machines exploited in the cleaning provision: cleaning, washing and tumble-drying machines. The cleaning machines belong to L&T and they are used for floors, restaurants and other free floor spaces. They are new, modern machines and are energy and water efficient. The washing machine is only for laundering mops and cloths, whereas the tumble-drying machine makes all the cleaning clothes dry very quickly. Only microfiber cloths and rags that are usually durable and consume minimum amounts of detergent are used. The Helsinki Police Department own the washing and tumble-drying machines.

From general observation, the company states that the police jail imposes a health threat to cleaning workers, especially from viruses, bacteria, parasites and any kind human secretions that originate from the crime suspects. However, this is not the issues that L&T is concerned about. The company also proclaimed there has not been any accidents involving L&T cleaning staff occurred at these locations. When asked about the complaint, it was admitted that the enterprise, from time to time, receives complains concerning quality. Nonetheless, it is not of serious matter.

4.2.7.2 Eurest (Lunch service)

Eurest is the food caterer for HPD staff and the criminal detainees held in the police jail. It is estimated that the number of people dining in the restaurant during a single day is between 250-300. The restaurant prepares most meals by itself. At times Eurest may use pre-cooked ingredients as part of the meals. The restaurant claims that strict internal control is among the top priorities to ensure quality control. To support the claim, the latest 'food control inspection' results, certified by Helsinki Environment Centre (HEC) were provided. Food quality control (in Finnish elintarvikevalvonta) is the standard for food monitoring nationally conducted by local municipalities. The latest inspection took place on 24 August 2016 and the restaurant operation has been given an 'A' rating from all 25 reviewed topics, as shown in table 23 below:

Table 23. Eurest Restaurant's food control inspection results of 24th August 2016

No.	Themes	Sub-topics	Evaluation Mark	Reviewed topics
1	Self-control plan	1.1 Self-control plan and its auditability	A	1
		1.2 Self-control plan's sufficiency	A	2
2	Adequacy, sufficiency and maintenance of premises and tools	2.1 The suitability of the premises to activities	A	3
		2.2 Condition of premises	A	4
		2.3 Tools, fixtures and equipment	A	5
3	Cleanliness of the premises, surfaces and tools	3.1 General tidiness and cleanliness of premises	A	6
		3.2 Cleanliness of tools and equipment	A	7
		3.3 Cleanliness of cleaning situation and tools	A	8
		3.4 Hindrance and other animals	A	9
		3.5 Waste maintenance	A	10
4	Staff performance and training	4.1 Personnel's hygiene method	A	11
		4.2 Hand hygiene	A	12
		4.3 Work uniform	A	13
		4.4 Monitoring health status of employees	A	14
		4.6 Hygiene knowledge verification	A	15
6	Food temperature control	6.1 Preserving food	A	16
		6.2 Food that are kept cold	A	17
		6.3 Food that are kept warm	A	18
		6.4 cooling	A	19
7	Sales and service	7.2 Product shelf-life and control during sale hours	A	20
		7.3 Product shelf-life and service during sale hours	A	21
10	Agents causing allergies and intolerances	10.1 Separation and cross-contamination	A	22
14	Packaging and food contact materials	14.1 Packaging and other food contact materials	A	23
15	Food supplies	15.1 Food receiving	A	24
18	Oiva-report on display	18.1 Oiva-report on display	A	25
A = Excellent, B = Good, C = To be corrected, D = Poor				

As a rule, the Helsinki Environment Centre (HEC) randomly inspects restaurants without notice in advance. After that, each inspection result is provided to the company. From the restaurant manager's experience, if the total rating is 'A', the HEC will not visit that restaurant every year. Thus, Eurest acknowledged that total 'A' rating is very crucial. It not only reflects good standards of the company, but also helps save costs by having less frequent visits from the HEC.

Product acquisition criteria

The restaurant has two main suppliers: HK for meats and Metro Wihuri for other supplies. Usually, the suppliers provide Eurest's with choices and they deliver the ordered products to the premise two times a week. The purchasing manager buys selected

ingredients according to the needs of restaurants. Accordingly, it is not easy for the restaurant manager (Interviewee 11) to determine whether green procurement is part of the company procurement process; whether locally produced food(s) are bought and whether seasonal products and fresh produce (s) are sought.

During the review, the restaurant manager reported that environmental friendly operations are important to the company. A good example is seen from the eco- friendly selection of cleaning detergents, dishwashing liquids and rinsing aids purchased for the restaurant. However, the oven cleaner solution is not. It has health hazardous ingredients that require using gloves and goggles when cleaning with it. When asked why this product was acquired, the simple reason was 'there is no environmental friendly oven cleaner available from the supplier '. Similarly, Eurest buys unbleached and bleached paper products. For examples, the coffee filter is brown (unbleached), while the baking paper is white and napkins are of assorted colors (bleached). The researcher was convinced to believe that the company does not want to work with the hazardous oven cleaner or to buy bleached paper products. At present, there are not enough environmentally friendly choices of certain products.

Household goods

Eurest serves food with reusable kitchenware and single-use containers. The restaurant uses almost all durably reusable kitchenware e.g. plates, mugs, plastic cups, forks, knives, spoons, napkins, tablecloths, egg cup. However, only disposable utensils are consumed in the jail area for simple waste management. Most of the kitchenware and machines inside the restaurant are owned by the HPD. Though the majority of these are made of stainless steel, there are some aluminum pots. It was found that the aluminum pots are not used frequently, approximately once a month. The restaurant manager seemed aware that kitchenware made of aluminum is not good for cooking acidic food. Acid reacts with aluminum and slowly corrodes the surface of it, then tiny amount of aluminum may leak in the food. Large amount of aluminum ingestion may be health risk. (Bassioni, 2016).

Machinery and equipment

The restaurant employed diverse types of machinery and equipment, e.g. ovens, grills, stove, tipping pots, freezers, cold rooms, cooling cabinet, ice maker, blender, food preparation appliances (large and small). The restaurant has a strict plan for cleaning different kitchen machinery. Some are cleaned every day, at least all are cleaned once a week. The energy rating level for the machinery and equipment is not determinable because they are owned by the HPD. Eurest does not monitor its energy consumption for meal preparation and service but it operates in a way that energy is saved. For

example, devices are turned on only when necessary or residual heat is used e.g. in the oven to raise dough of breads and buns. The dishwashing machine is fully loaded before it is turned on. Refrigerators and freezer rooms are zoned apart from the heat-generating products or devices. The temperature of refrigerators is set at 4 to 7 degrees, freezers are set at minus (-) 22 Celsius. The lamps inside the cold storage facilities are not on continuously, only when the doors are opened. However, the refrigerators and freezers are opened often throughout the day. From the observation, the temperatures of these cold storage facilities are never constant. This depends on how often and how long they are opened.

In-house control

Eurest has very specific operational control plans, which are guidelines concerning controlled functions; control methods; contingencies; general measurements to be carried out; responsible persons and measures in risk situations; hazard prevention measures and risk management. Therefore, the restaurant knows, for example, whom to contact when the main machines and equipment such as the dish washing machine, the oven or the refrigerators or freezers do not function well. Also, the restaurant retains a sample of its prepared foods by keeping them frozen for about three to four weeks for potential food inspection concerning food poisoning. Below are some of the disclosed control methods:

- Refrigerator' temperatures for different food are set between + 3- + 6 °C;
- Temperatures of hot food must be kept, at least + 70 ° C, in poultry meat at least + 75 ° C;
- Food that is kept cold must have temperature up to + 6 ° C, in serving not more than + 12 ° C;
- Surface and equipment to be cleaned are: desks, floor, walls, ceilings, refrigerators and cold rooms, bookcases, vegetable slicers, mixers, ice-cube and crushed-ice-makers, coffee makers, ovens, stove, dishwasher, hood and grease separator, cleaning cupboard;
- Cleaning control is recorded once a week;
- The dishwasher temperature shall be recorded once a week. Maintenance details are always recorded in case they are not mentioned in maintenance manual from the company issuing the document.

5 ANALYSES, SUGGESTIONS AND DISCUSSIONS

This chapter discusses the results of three analyses: (1) identified environmental aspects; (2) identified significant environmental aspects (SEAs); and (3) identified three areas for improvement (gap between the current environment performance and desired sustainable environment practices). After that, the researcher proposes suggestions on what the Helsinki Police Department could do to improve the chosen SEAs in conjunction with the gap analysis framework.

5.1 Analysis results

5.1.1 Analysis 1: identified 54 environmental aspects

From the research findings, 54 environmental aspects were detected, of which 23 were assessed as SEAs. All 54 environmental aspects and the SEAs (highlighted in dark red color) are summarized in themes in table 24 below. More details on all identified environmental aspects, related environmental impacts and evaluation results of all SEAs, please see [Appendix 6. Identified 54 environmental aspects](#)

Table 24. Identified 54 environmental aspects

No.	Theme	Identified environmental aspects
1	Theme 2: Property management & theme 4: hazardous materials (no. 1-15: 15 aspects)	Use of energy ((1) electricity; (2) heating; and (3) Cooling)
2		Use of water
3		Use of materials (such as pen, ink for printing, etc.)
4		Paper consumption
5		Waste sorting during operating hours
6		Mixed waste in landfill
7		Biowaste in landfill
8		Wastes to be recycled or recovered.
9		Operational wastes to be incinerated
10		Use of hazardous substances (i.e. chemicals from forensic lab or different liquids for fleet maintenance and repair)
11		Running ventilation system 24/7

12		Use of sauna 24/7
13		Sauna renovation every 3-5 years (from the use of sauna 24/7)
14		Use of storing space on the underground level (Storing some old office furniture)
15		Damaged furniture and fixtures inside the jail cells
16	Theme 3: Procurement, material use and office practices (no. 16-17: 2 aspects)	Green procurement criteria to the HPD's suppliers or sub-contractors
17		Promotion and practices of sustainable material use within the HPD
18	Theme 5: Environmental training (no. 18-20: 3 aspects)	Environmental information on the consumption of electricity and water
19		Lack of general environmental awareness training
20		Lack of employee involvement in activities promoting good environmental practices
21	Theme 6: Environmental incident (no. 21-26: 6 aspects)	Fuel leaked from police vehicles to indoor sewer
22		Runoff water with great amount of sand that could clog the outdoor sewer
23		Potential explosion of spare electrical generator's battery
24		Intentional fire set inside the police jail cells
25		Fire safety plan tailored for the HPD
26		Preparedness and contingency plans tailored for the HPD
27	Theme 7: Fleet management (no. 27-41: 15 aspects)	Use of fuels in vehicles' engines (i.e. diesel and gasoline)
28		Emissions to air (i.e. CO2 and other pollutants)
29		Replacement of vehicle parts (i.e. lamp, battery, brake pad, etc. as regular wear & tear)
30		Modifications to police vehicles and parts
31		Inconsistent pre-checking up of motor vehicles for patrolling at the beginning of each shift
32		Long idling hours (Heavier use of police vehicle engines in comparison to any private cars)
33		Use of windshield washer fluid that includes ethanol
34		Use of brake fluid that is corrosive
35		Use of Adblue liquid that is irritating to skin
36		Washing vehicles inside the HPD's headquarters
37		Vehicle accidents
38		Scheduled timetable for regular vehicle maintenance
39		Use of telecommunication devices and systems among the police vehicles and supportive functions (min. car use)
40		Use of in-house auto mechanics for small vehicle maintenance and repair works
41		Use of outsourced garages for small vehicle maintenance and repair works
42	Theme 8 (1): Most visible subcontractors:	Certification of ISO14001 awarded to L&T Company

43	cleaning service from L&T (no. 42-46: 5 aspects)	Proper trainings to cleaning staff (i.e. basic and on-site trainings)
44		Use of eco-labelled detergents
45		Use of cleaning machines that are efficient in energy, water and chemical dosage
46		Use of durably reusable cleaning clothes
47	Theme 8 (2): Most visible subcontractors: lunch service from Eurest Restaurant (no. 47-54: 8 aspects)	Use of durably reusable kitchenware in the restaurant side
48		Use of disposable plastic dishware and utensils in the prison side
49		Use of bleached paper products (i.e. napkin, baking paper or coffee filter)
50		Use of ecological dishwashing detergents and rinsing aids
51		Energy-efficiency- practices (i.e. devices are turned on only when necessary; the afterheat in the oven is used for the rise of doughs for baking breads & buns; dishwasher is fully filled before it is started.)
52		Regular cleaning of kitchen machinery
53		Zoning freezer rooms and cold rooms away from the heat-generating areas
54		Emergency action plans for the Eurest Restaurant operations

5.1.2 Analysis 2: identified 23 significant environmental aspects

The identified initial 23 significant environmental aspects (SEAs) were scrutinized further. The researcher found that they were either positively significant (marked as +) or negatively significant (marked as -). Having contemplated these SEAs, the researcher decided to select only the ones that could be strategically improved, based on feasibility to improve and ability to be logically clustered. The selected 13 SEAs in table 25 below were highlighted in red.

Table 25. Identified 23 significant environmental aspects and selected 12 SEAs for improvement

SEAs		+	-
1	Use of energy (Electricity, heating and cooling)		x
5	Waste sorting during operating hours	x	
11	Running ventilation system 24/7		x
12	Use of saunas 24/7		x
16	Green procurement criteria to the HPD's suppliers or sub-contractors	x	
17	Promotion and practices of sustainable material use within the HPD	x	
19	Lack of general environmental awareness training		x

20	Lack of employee involvement in activities promoting good environmental practices		x
24	Intentional fire set inside the jail cells		x
25	Fire safety plan tailored for the HPD	x	
26	Preparedness and contingency plans tailored for the HPD	x	
27	Use of fuels (i.e. diesel and gasoline)		x
28	Emissions to air (i.e. CO2 and other pollutants)		x
29	Replacement of vehicle parts (i.e. lamp, battery, brake pad, etc. as regular wear and tear)		x
30	Modifications to police vehicles and parts		x
31	Inconsistent pre-checking up of motor vehicles for patrolling at the beginning of each shift		x
32	Long idling hours (Heavier use of police vehicle engines in comparison to any private cars)		x
37	Vehicle accidents		x
41	Use of outsourced garages for small vehicle maintenance and repair works		x
42	Certification of ISO14001 awarded to L&T Company	x	
43	Proper trainings to cleaning staff (i.e. basic and on-site trainings)	x	
53	Zoning freezer rooms and cold rooms away from the heat-generating areas	x	
54	Emergency action plans for the Eurest Restaurant operations	x	

5.1.3 Analysis 3: identified three areas for improvement

The selected 13 significant environmental aspects (SEAs) were further examined, then categorized into three topics of improvement opportunity, as follows:

- (1) energy management from the SEAs 1, 11 and 12;
- (2) stakeholder engagement from the SEAs 19 and 20;
- (3) fleet management from the SEAs 27, 28 29, 30, 31, 32, 37 and 41.

5.2 Suggestions and discussion on improvement opportunity

After having reviewed additionally relevant literature and discussed with interviewees, there is no direct path towards environmental sustainability for the HPD. This can be largely explained by four main reasons.

Firstly, there is no standardized sustainable environmental framework that could be evaluated against. The researcher discussed this issue already in the theoretical framework. Secondly, the environmental management standards used in this research (ISO 14001 and ISO 14031) only advocate that environmental improvement starts from setting objective to improve. Thirdly, there are various external issues that constantly affect police operations: (1) financial austerity; (2) social movements e.g. climate change, sustainable development, immigration, basic human rights; (3) globalization i.e. international crime and cooperation; (4) increasing use of technology to increase efficacy and to compensate lost manpower; (5) higher level of scientific evidence based policing practices; and (6) societal demand for good quality and easily accessible police services, etc. As a result, these issues force the police to regularly adapt their internal strategies and resources to respond to the external changes (Yle News, 2015; NAOF, 2010; Interviewees 1; 7 and 8; Neyroud, n.d.; Rowe, 2014; Heyer, 2016). Lastly, sustainable development has a nature of multi-objective continuous improvement based on the triple bottom lines. Nonetheless, combined facts from the primary and secondary data have created certain direction and actions to consider toward improvement opportunities, as detailed below:

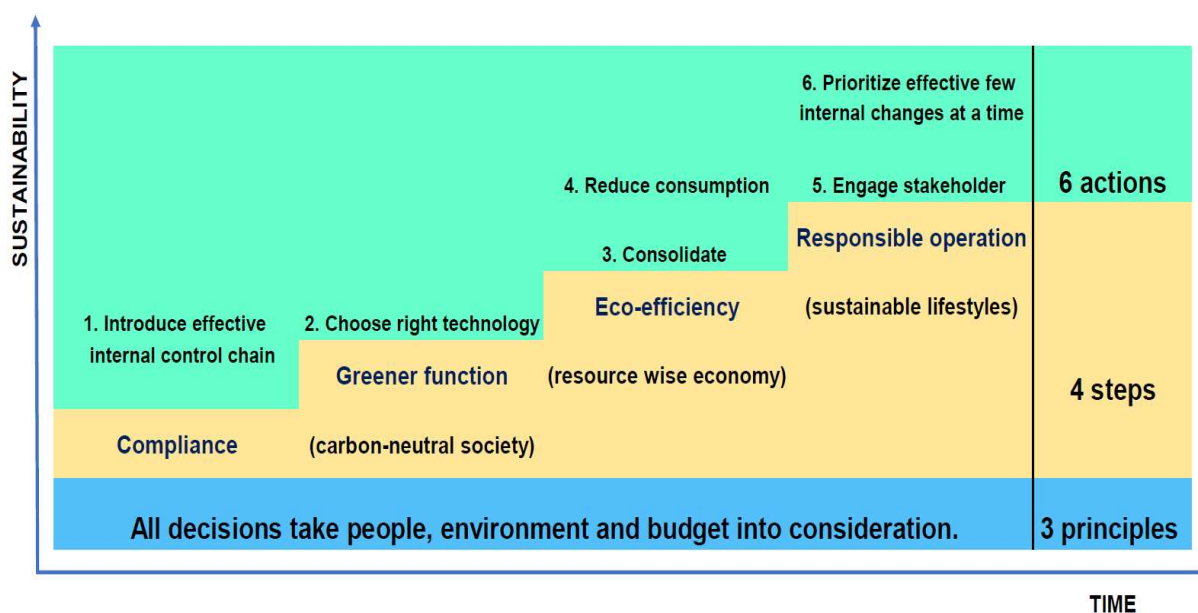


Figure 11. Recommended actions towards environmental sustainability

The researcher believes that the direction towards environmental sustainability within the HPD is based on three concepts (TBL; four steps towards sustainability combined with the three Finnish sustainable environmental goals) and six actions. The three concepts were already explained. Last are the six recommended actions to climb the four steps, which are evidence and thoughts aiming to improve the HPD's overall environmental performance and related costs, operational efficiency and effectiveness. Each action's implication is summarized as below:

- 1) **Introduce effective internal control chain:** internal control is a crucial process put into an organization to ensure that its goals and objectives are met. The internal control, often forms of various control mechanisms and should be placed at all steps of operational processes from designing up to discharging. The internal controls should be strategically harmonized and practically show accountability (Objective Controls, n.d; Lunday, 2010; Interviewee 7).
- 2) **Choose the right technology:** choosing the right technology is crucial as it may not only save money, but also give the right information for making certain decision (Rastrac, n.d; Interviewees 7 and 8; Lindroos, 2016; Melville, 2016).
- 3) **Consolidate:** consolidation often makes use of merging operational units to reduce resource consumption, especially on human resources, capital and materials. It is a stepping stone of optimization (Heyer, 2016; Interviewees 4; 7; 8; Lindroos, 2016).
- 4) **Reduce consumption:** reducing consumption is the beginning of operational efficiency after preventing consumption (Rastrac, n.d; Lindroos, 2016; Melville, 2016; Lindroos, 2016; Interviewees 4; 7 and 8).
- 5) **Engage stakeholders:** stakeholder engagement and commitment are extremely essential for any organization to achieve its own goals and objectives (ISO 14001:2015; ISO 14031; Lindroos, 2016; Melville, 2016).
- 6) **Prioritize a few effective internal changes one at a time:** As an organization has many changes to adapt to, a good beginning is to prioritize the changes and selectively implement the ones that are impactful and could lead to other changes in the future (Heyer, 2016; Andersen, 2012; Schneider, Brief and Guzzo, 1996).

In the following, the researcher combined the selected 13 SEAs, suggested 4 steps and 6 actions to form recommendations and discussions for improvement. The order of the improvement topics is believed to be logical if they start from the areas of the highest number of significant environmental aspects to the lowest.

5.2.1 Improving overall vehicle fleet performance

The chosen 8 SEAs, in conjunction with the suggested four steps, advises that the HPD should improve its overall current fleet management as indicated in table 26 below.

Table 26. Improvement opportunity in fleet engagement

	Compliance	Greener function	Eco-efficiency	Responsible operation
Prioritize effective few internal changes at a time				<ul style="list-style-type: none"> • Modifications to police vehicles and parts • Vehicle accidents
Engage stakeholder				
Reduce consumption			<ul style="list-style-type: none"> • Use of fuels • Replacement of vehicle parts • Use of outsourced garages for small vehicle maintenance and repair works 	
Consolidate				
Choose right technology		<ul style="list-style-type: none"> • Emissions to air • Long idling hours 		
Introduce effective internal control chain	<i>Inconsistent pre-checking up of motor vehicles for patrolling at the beginning of each shift</i>			

Improving fleet performance needs a holistic view. Broadly speaking, there are six crucial factors leading to overall fleet performance: (1) fleet management policy; (2) daily management of fleet performance and efficiency; (3) driver behavior; (4) choice of technology; (5) overall fuel consumption; and (6) maintenance costs (Rastrac n.d.: 16-22). The review could not, with certainty, determine the efficiency level of the Helsinki Police Department's vehicle fleet performance. However, the analysis suggests that the overall performance and efficacy can still be enhanced. The four recommended steps in this section will outline what the opportunities for improvement are.

5.2.1.1 Under compliance step

The researcher views the word 'compliance' as an action that one is obliged to fulfill, whether by legal mandates or organizational requirements (external) or operational codes of conduct or personal ethics (internal). The SEA '*Inconsistent pre-checking up of motor vehicles for patrolling at the beginning of each shift*' falls into the compliance category because it does not meet the organization own's "d) voluntary principles or codes of practice." (Reference: Table 10. ISO 14001's example sources of compliance obligations).

Since this SEA could lead to unnecessary higher cost of maintenance and repair costs (Interviewee 7), it should be reviewed again at the policy level. After that, it could be improved with a re-design of internal controls. It is up to management to decide between automated or manual internal control mechanisms. Solving or reducing the degree of this SEAs not only optimizes the operational tasks, but also prevents related costs (Interviewee 7).

5.2.1.2 Under greener function step

These two SEAs '*Emissions to air*' and '*Long idling hours*' concern technological choices. As cited earlier, the HPD does not have meters installed inside the HPD's motor vehicles to measure emissions and idling hours. An initial step in improving this issue would be to make emissions and idling hours measurable by installing metering devices (ISO 14001:2015; ISO 14031:2013; Interviewee 7). After this step is completed, a plan to reduce the level of emissions to air and needless idling hours as continuous improvement could begin.

5.2.1.3 Under eco-efficiency step

The three SEAs '*Use of fuels, Replacement of vehicle parts*' and '*Use of outsourced garages for small vehicle maintenance and repair works*' cover areas of daily management of the fleet's performance and efficiency, choice of technology, overall fuel consumption and maintenance costs. Consolidation and consumption reduction are foundations of eco-efficiency because they prevent and decrease waste streams (WBCSD, 2000; US EPA, 2016; Lindroos, 2016). Due to limited reporting pages, the researcher would only mention the three most pragmatic actions (under consolidation and consumption reduction) recommended to the HPD.

To consolidate the fleet management, the three actions recommended were: (1) deciding right fleet size; (2) sharing car use among non-police staff; and (3) keeping fleet manager position among civilians. Determining on the right size of the fleet is a true beginning of fleet optimization and efficiency (Transport for London, n.d; Interviewee 7). To do that, there is a need to choose measurable metrics, then measure them. Examples of the metrics are: "utilization rate by type of vehicle; departmental cost per vehicle; depreciation; fuel cost and consumption; accident rates and costs; lifecycle cost" (Automotive Fleet, 2012). Besides, car sharing among non-police staff should be considered. Sharing in this context means all the vehicles of non-police staff members are retitled as 'standby vehicles' and they are used as needed. This will cut down on unnecessary departmental ownership and related maintenance costs (Interviewee 7; Silverman, 2016). Civilianizing fleet manager position is also crucial. As sworn officers are not expert in auto maintenance and repair, their fleet management may cost the

organization more than the one that managed by fleet civilian managers who have proper training and years of experience. (OOAG, 2007; Interviewee 7)

To reduce the fleet consumption, the three actions recommended were: (1) reviewing fuel efficiency policy and management plans; (2) increasing use of fully integrated fleet management software (to check on actual vehicle usage, driving speed, fuel costs, idle time, preventative checkup routines simultaneously through Internet of Things (IoT); and (3) reminding driver/operator of the positive environmental impacts of eco-economic driving as often as possible (Department of transport, 2005; OOAG, 2007; Botham and Barker, 2014; Owen, 2011; Rastrac, n.d.; Energy Saving Trust, 2013; Interviewee 7). All suggested actions are meant to encourage the police officers and non-police staff to drive police vehicles less, on the ground of necessity, economy and environmental preservation. Besides, driving less naturally leads to less use of fuels. Improved fuel efficiency will reduce the level of emissions to air; the level of wear and tear; then less replacement of vehicle parts as a chain reaction.

5.2.1.4 Under responsible operation step

The last 2 SEAs '*Modifications to police vehicles and parts*' and '*Vehicle accidents*' relate to the fleet policy and driver behavior, or the topics of administration and people management. Moving operations upwards towards sustainability is a form of change management and it requires many factors to succeed, among them, stakeholder engagement and the need at levels to gain stakeholder commitment.

The researcher views these two SEAs as interrelated. Usually, after the vehicles have been acquired, they are then up-fitted and their parts are modified for various police assignments. While patrol officers drive them, accidents take place now and then. As discovered, an avoidable accident took place in a patrolling unit that was caused by two reasons: complacency of the driver and impractical design of the patrol vehicle that blocked the rear-view mirror.

Having studied this issue, the researcher suggested to the HPD that the topic '*preventing avoidable accidents*' could be set as an example of a desired internal change because it concerns both SEAs. In addition, a few recommended topics to be reviewed and prioritized for changes were: (1) fleet management policy; (2) daily management of fleet performance and efficiency; and (3) driver behavior. These should include organizing constructive seminar among relevant staff and police officers to discuss this matter and find constructive solutions on how to prevent avoidable accident.

There were more suggestions concerning fleet management proposed to the HPD, these could be further viewed in [Appendix 7. Additional recommendations on fleet management](#)

5.2.2 Improving energy efficiency

The chosen 3 SEAs, in conjunction with the suggested four steps, advise that the HPD should improve its energy efficiency, as indicated in table 27 below.

Table 27. Improvement opportunity in energy management

	Compliance	Greener function	Eco-efficiency	Responsible operation
Prioritize effective few internal changes at a time				
Engage stakeholder			<ul style="list-style-type: none"> • <i>Use of energy</i> • <i>Use of sauna 24/7</i> • <i>Running ventilation system 24/7</i> 	
Reduce consumption				
Consolidate				
Choose right technology		<i>Use of energy</i>		
Introduce effective internal control chain				

When comparing the reviewed energy-related-data against the energy review framework, the given data revealed only a fraction of entire energy performance. In part, this can be explained by the fact that the researcher had a limited amount of time to conduct the review (roughly six months) and was only able to interview 8 persons from the organization. Therefore, it was challenging to see the whole picture of the HPD's energy performance. Besides, the nature of an initial environmental review (IER) is to view an organization from a big picture, not in-depth in any particular area. Therefore, it is natural that the IER cannot do the work that the energy review requires. Regardless, significant issues concerning energy use were discovered and are the basis of these three SEAs.

Another matter aside from the 3 SEAs was the energy efficiency rating of building no. 2 - F class. Concerning the building energy efficiency level, interviewee 3 said that the HPD's overall building energy efficiency rating is very low. The researcher noticed an info TV displaying the stated information in the lobby of the building no. 2', but not in building 1 (at least the info TV of building of no.1 is not in a place that the researcher noticed). As a result, it was not possible to conclude that both buildings have the same building energy efficiency rating. Still, it is possible to say that the HPD should aim at improving the overall energy efficiency of both buildings. This suggestion is based solely on the energy efficiency rating of the building no. 2.

It is believed that conducting an energy review will improve the mentioned three energy related SEAs. To begin with, the source of current energy and related emissions from energy production should be ascertained. As Finland is moving towards a low carbon economy, it is important to consume energy that comes from greener sources, especially if one cannot immediately reduce consumption (Lindroos, 2016; Melville,

2016). According to ISO 50001:2011: 3, an organization consuming green energy contributes to lower "greenhouse gas emissions and other related environmental impacts" on national and local levels.

In the HPD's case, the use of operating saunas 24/7 is considered to be as 'activity' while running the ventilation system 24/7 is a 'process.' Since many stakeholders are a part of this activity and process, it is difficult to suggest how to make these two SEAs to be more efficient.

An idea derived from interviewee 9 that "the two buildings should be zoned and restricted activities within each zone". The suggested two zones are: office and round-the-clock environments. The area that should be restricted more than the other is the office zone. It is proposed that the energy and water consumption, the ventilation system and the use of saunas should be completely stopped outside of office hours (Interviewee 9). Is this recommendation feasible? The answer to this question cannot be determined until a larger number of stakeholders are involved for further discussion and review.

5.2.3 Engaging stakeholders through stakeholder dialogue

The chosen 2 SEAs, in conjunction with the suggested four steps, advise that the HPD should increase its stakeholder engagement level, as indicated in table 28 below.

Table 28. Improvement opportunity in stakeholder engagement

	Compliance	Greener function	Eco-efficiency	Responsible operation
Prioritize effective few internal changes at a time			<ul style="list-style-type: none"> • Lack of general environmental awareness training • Lack of employee involvement in activities promoting good environmental practices 	
Engage stakeholder				
Reduce consumption				
Consolidate				
Choose right technology				
Introduce effective internal control chain				

The information retrieved from the interviews suggested that some significant issues regarding motor fleet management and energy management could be improved if the HPD would include the opinions of operational staff in decision making. In addition, incentives that could motivate or demotivate towards desired actions or behaviors should be taken into account as well (Interviewees 3 and 7).

Stakeholder dialogue, a mean to create shared value (Porter and Kramer, 2011), is a stepping stone to the last recommended action - prioritize a few effective internal changes at a time. Transforming the HPD to the level of responsible operation needs numerous internal changes along the way. An initially pragmatic step could be to

establish a steering group called 'Green Team' within the HPD and organize diverse activities for the HPD staff all year round. For example, an environmental awareness training could be organized at least once a year. The 'Green Team' concept comes from Green Office environmental management system certification, founded by the natural conservation organization WWF of Finland.

This 'Green Team' would have members from each unit working together. The leader of the team must be well respected by the rest of the team and other staff, so that cooperation between units is smooth (Lindroos, 2016). The next recommended phase would be to determine what are a few initial internal issues concerning environmental management and improving cost reduction. The team may consider any of the 13-detected significant environmental aspects (SEAs) from the review or add extra SEAs and ideas through employee dialogue.

It is noteworthy that there is one sustainable consumption practice detected inside the Helsinki Police Department (HPD). From the beginning of the review, the researcher noticed that the HPD staff organized an internal-mini coffee shop alongside the police operation. This coffee shop concept and process is very simple. Coffee is sold at only 20 cents per cup. There are several mini-coffee shops available in several locations of the headquarters buildings. As many employees enjoy drinking coffee and feel that the drink is vital to their productivity, they often buy it. This business sustains itself through social interaction between sellers and buyers (all are HPD's staff) during coffee break times. According to interviewee 2, this practice has been ongoing for at least a few decades. The researcher views this idea as simple, but it is a brilliant example of internal sustainability.

Having reviewed literature on this concept, the business has been sustainable and successful for four likely reasons: rational choice, habit, pleasure and ease (Jackson, 2005). Jackson (2005) describes that rational-minded consumers often calculate costs and benefits that come together e.g. utility, maximization, functionality, productivity, etc. Yet, some consumers do certain things out of habits or routines, which are normal to their daily life. Some might support certain consumption simply because it brings joy (emotional side of the human) or it is easy to do or to conform to. Buying a cup of coffee fits into all these rationales. Therefore, it is thought that a future 'Green Team' could use the knowledge gained from the coffee shop concept to engage staff and implement internal sustainable practice changes in the future.

5.2.4 Seeing the big picture through life cycle analysis

As advocated by ISO 14001:2015, one should see big picture through life cycle perspective. All 13 SEAs are placed in the life cycle analysis related to an organization's activities, products and services, highlighted with three different colors, as illustrated in figure 15 below:

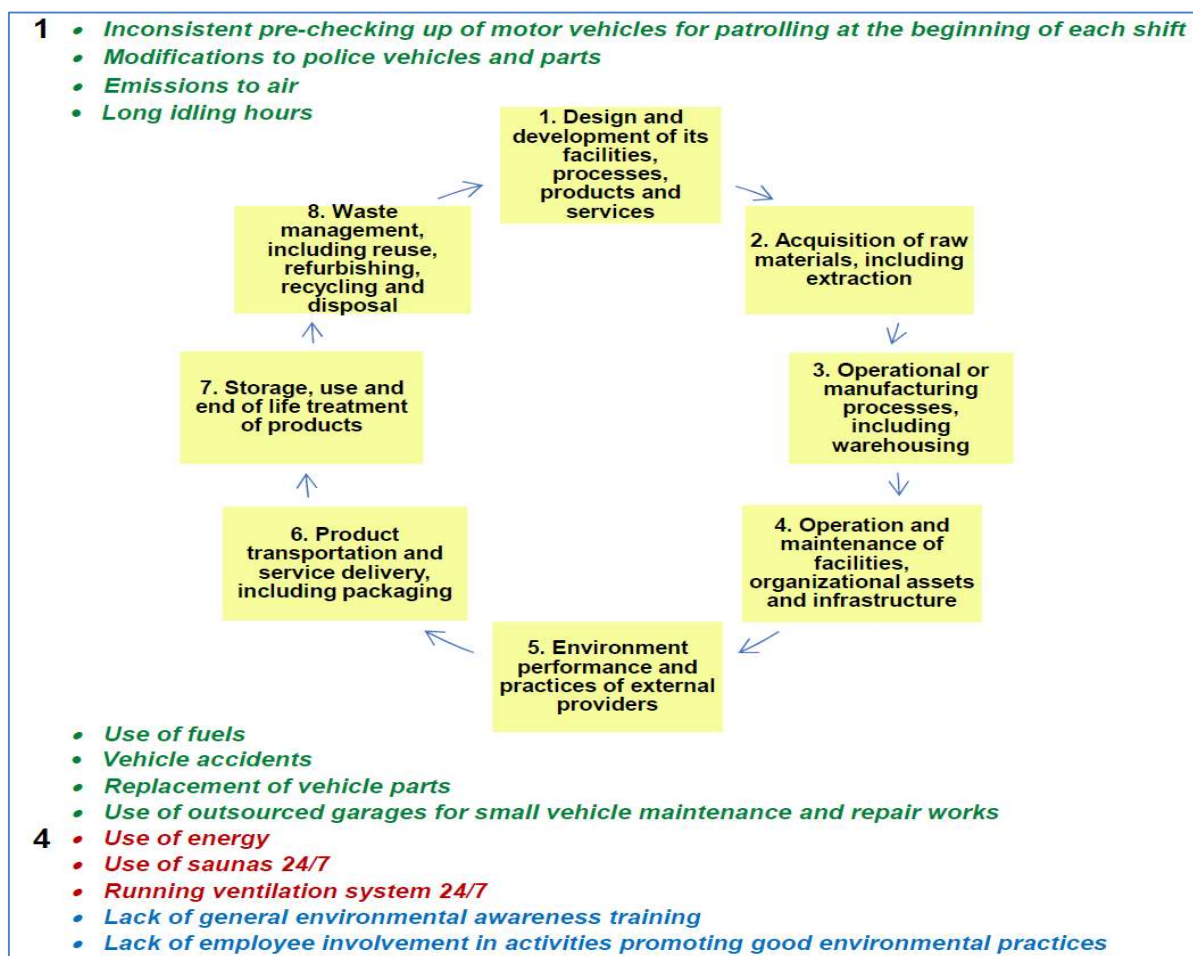


Figure 12. Identified 13 significant environmental aspects in life cycle perspective (ISO14001:2015: 24)

According to the diagram, the analysis shows that the selected 13 SEAs could be divided into two areas of improvement: the management level from number 1 and the operational level from number 4. The researcher suggested to the HPD that the organization could improve its overall environmental performance though considering the proposed recommendations and available examples. Improving some or all these detected 13 SEAs will directly better other relevant environmental aspects inside the organization as well. Besides, the HPD should also consider exercise its control and influence concerning environmental aspects over its outsourced suppliers and sub-contractors if possible, as encouraged by ISO 14001:2015.

Planning on improving organization's overall environmental performance and selecting relevant indicators are the next recommended steps. The researcher has summarized additional guideline on how to proceed in the report submitted to the Helsinki Police Department based on ISO 14031:2013. However, that information is not attached as appendix in this report because it is not directly relevant to this thesis.

6 CONCLUSIONS

This chapter aims to link the research findings, analyses and discussion with the research task and questions. The research's reliability and validity are evaluated. Limitations are also deliberated. Finally, future research suggestions are proposed.

6.1 Conclusion to research task and questions

This section is meant to justify answer to the research task of this study, that is:

What Helsinki Police Department could do to improve its overall environmental performance and related costs from the perspective of sustainable development

The researcher had set two research questions to find answers to the research task. The first research question *What are the Helsinki Police Department's current environmental practices, environmental aspects, potential environmental impacts and significant environmental aspects?* was answered through conducting an initial environmental review (IER). The IER 's findings were presented in chapter 4. These findings were the stepping stone for the second question *What are sustainable environmental direction and practices that the Helsinki Police Department should aim for?* which was replied through combining believed-to-be relevant theoretical concepts, retrieved real-life examples and interviewees' thoughts and suggestions. The answers to the second research question were presented in chapter 5.

The answers of both research questions were combined and analyzed one more time to answer to the research task. It is concluded that there are three answers to the research task: (1) aiming to be responsible operation; (2) setting realistic environmental goals and targets to improve in short and long terms; and (3) including employees in planning and implementing actions towards desired goals and targets. These three actions are the fruit of the researcher's considerable contemplation on the research findings and all analyses. They are also the stepping stone of one another. Aiming in the direction of responsible operation needs internal changes across-the-board. These need realistic goals and target settings and all stakeholders to participate to the levels that they commit to. The researcher had already given reasoning behind these three actions in chapter 2 and chapter 5. In addition, these recommended three actions are in line with the recommendations of both ISO 14001 and ISO 14031, that real sustainable and environmental improvement start from setting achievable goals and this require commitment of all stakeholders, especially from the top management. However, in the Helsinki Police Department case, it is the top management who wants to improve the whole operation. As a result, the level of commitment in this organization must come from the opposite side, from the operational staff or from the bottom instead.

Concerning the research questions, the researcher spent some time evaluating the role and soundness of the theoretical concepts to find answers to research task of this study. The main question asked here was:

Did the two chosen theoretical concepts support the research purpose?

To a considerable extent, the researcher believes that both theoretical concepts worked well according to the research design. The initial environmental review (IER) concept was a tool to retrieve the answer in a logical way. By following IER guideline steps carefully- as directed by ISO 14001 and EMAS, the researcher discovered enough evidence that should be revealed. However, everything has limitations. In this study, the information could be only retrieved as much as the researcher was allowed. In this sense, the limitation was not in the tool but in the availability of the data itself.

Concerning the concepts behind sustainable environmental direction and practices, the researcher already mentioned that it would be better if there would be a specific standard to evaluate against. Since that was not an option, the researcher then decided to work with the believed-to-be most relevant theoretical concept. As a matter of fact, the researcher scrutinized the concept of 4 signposts towards sustainability before choosing it as the main framework for gap analysis. It is not a perfect framework because it does not explain itself so much, nor offers any checklists for assessment. However, it frames the big picture, which is very significant (if not most vital) in this study. As least it accentuates the top priority to consider - responsible operation.

Though some scholars argue that responsibility is not the necessary driver enabling an operation to be sustainable (Moon 2007; Vogel 2005), the researcher views that being responsible operation could bring the organization (the HPD) closer to being sustainable.

From the researcher's observation, being responsible is not the top priority of the police operation. Being efficient and effective are, because the HPD must serve a large amount of people within limited time and resources (e.g. in emergency responses or crowd control in large events). Suggesting the organization to be more eco-efficient and responsible (the top two steps in the 4 signposts towards environmental sustainability) would make them think more on how sustainable they are as a whole.

Increasing the level of stakeholder engagement, as advocated by ISO 14001 and ISO 14031, is also very practical. The researcher recommended this in the report submitted to the HPD. As mentioned that the HPD has a culture of quasi-military style. Thus, the operational personnel's opinions are not always a part of the decisions from the top management. Inside the Helsinki Police Department, there are various layers of controls to control almost everything. In the researcher's perspective, one underlying reason why the researcher was asked to help in this project (as an outsider) was to help find a way to better control the system. Nonetheless, in the researcher's opinion, even a perfect controlling system could only contribute to a greater eco-efficacy level - not responsible level. As the operation is executed by humans, including them in decision

making could elevate the operation level from being eco-efficient to responsible. For the operational staff may increase their level of participation and commitment.

6.2 Evaluation of the research reliability and validity

When choosing a method for a research study, one should bear in mind its reliability and validity as both contribute to the research's quality and credibility.

Brinkmann and Kvale (2015: 281) define reliability as " consistency and trustworthiness of research findings" . The reliability of data is mainly based on seven characteristics: (1) multi sources of evidence; (2) unbiased; (3) verified; (4) categorizable; (5) interpreted by interviewee (not by researcher); (6) adequate; and (7) reproducible (Yin, 2014: 118; Brinkmann and Kvale, 2015: 277-281). In fact, the first five features were already discussed in the chapter 3. Only the last two features are left out for reasoning in this section. Concerning the adequacy of collected data, the researcher had a chance to talk about this with the Chief of Security or interviewee 2. We agreed that the amount of the retrieved data was enough for a thesis of this size. The last issue of reproducibility, it should not be a problem for another researcher to repeat a similar kind of study. For this research processes followed ISO 14001: 2015 and EMAS standards, both guidelines are rather straightforward and logical.

Language correctness was a crucial issue in data reliability of this study. Some data given was originally in Finnish. If the researcher needed to translate it, then it would be rechecked by some Finnish native speakers who are fluent in English to ensure accuracy of the translation. There was only one set of questions that required translation from English to Finnish, which was the 21 questions to Eurest restaurant manager. Luckily, the researcher had a contact who is a professional translator of Finnish-English and she was willing to do it. In this case, the answers from the Eurest restaurant manager were translated again into English and proofread.

In fact, integrity of the data was one concerning matter that could affect the reliability of this research. The researcher was aware (during data collection) that the data given was based on the grounds of 'need to know'. This means that there were several things that the researcher was probably not told. If told, it was a bit too late. For example, interviewee 7 said that police union is an important stakeholder in the Finnish police organization. The rules of the police union affect police operations. How much do these rules influence daily operations? The researcher was not certain because this interviewee did not explain much further on this topic due to confidential reasons. Since this information came at the end of February 2016 (the end of data collection period) made it difficult to include the police union as a potential interviewee for this thesis (even though the interview allows that flexibility). Thus, the researcher can only claim that the quality of this research is largely based on the integrity of the data given.

Brinkmann and Kvale (2015: 282) also define validity as "method investigates what it purports to investigate." Similarly to the ethical consideration, they maintain that

the validation should be integrated throughout the seven stages of the entire research, as follow: (1) " theming " : the validity of a research depends on the relevance and depth of the theoretical background; (2) " designing " : the validity of generated data is based on design's suitability, methodology and purpose; (3) " interviewing " : validity at this point relates to the reliability of the data given and the quality of the interviewed content; (4) " transcribing " : refers to the accuracy of transcription from spoken to written form; (5) " analyzing " : this holds whether the questions used for finding answers are relevant and whether interpretation is logical and thorough; (6) " validating " : this raises question on what kind of validating technique used to verify interviewed data; and (7) " reporting " : this pertain whether the source of findings are credible and the readers of the report validate that point (Brinkmann and Kvale, 2015: 283-284).

Having considered the abovementioned reasoning, the researcher may well claim that the validation was critically considered throughout the seven stages of conducting this study. As a matter of fact, much of the argument regarding the validity of this research was already mentioned in the chapter 2 and 3. The researcher feels that the research findings were adequate enough to answer most of the initial environmental review questions (134 out of 154 questions were answered). Also, the analyses were carried out together between the researcher and most interviewees. Out of 11 interviewees, 10 (except interviewee 1- Chief of Police) verified the interview notes, co-analyzed the findings and proposed some suggestions. In fact, the almost-ready-project-report was submitted to the Helsinki Police Department in mid-March 2017 for final checking of all facts and findings. The researcher received the feedback from the Chief of Security in writing as " ...the report is excellent..." . Although there are a few trivial details to complete and to add to the project report, they are not going to change the fact that a reader of the thesis report has already validated this study.

6.3 Limitation and future research suggestions

The fact that only one police department was studied in this research is a limitation in itself. Based on a singular case, it is challenging to generalize the results. At the moment, this research benefits only one organization - the Helsinki Police Department. It would be more societal relevant and beneficial if a similar study would be conducted in other Finnish police departments as comparative studies. Alternatively, one could also consider conducting related studies based on this research such as sustainable policing, energy review or fleet management review for the Helsinki Police Department, to add to the environmental information for the organization.

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APPENDICES

Appendix 1. 154 initial environmental review questions

Area of consideration	Operation/ Activity	Aspects of consideration
1	Organization overview (17 questions (Q): Q 1-17)	<ul style="list-style-type: none"> - Type and context of organization - Number of personnel and visitors - Current activities and services - Types of goods/ services provided by major suppliers
2	Property management (46 questions: Q 18-63)	<ul style="list-style-type: none"> - 2.1 Energy (16 questions: Q 18-33) - 2.2 Water (12 questions: Q 34-45) - 2.3 Waste (14 questions: Q 46-59) - 2.4 Bathroom and kitchen (4 questions: Q 60-63)
3	Procurement, material use and office practices (11 questions: Q 64-74)	<ul style="list-style-type: none"> - Possibility of green purchasing in all aspects - Sustainable use of all materials
4	Hazardous material (9 questions: Q 75-83)	<ul style="list-style-type: none"> - Storage - Handling
5	Environmental training (5 questions: Q 84-88)	<ul style="list-style-type: none"> - Environmental awareness training - Environmental attitude survey - Risk assessment training related to environmental disaster - Channel for personnel internal communication
6	Environmental incident (4 questions: Q 89-92)	<ul style="list-style-type: none"> - Record of environmental accident - Record of complain from community - Record of complain from personnel - Emergency preparedness plan
7	Fleet management (23 questions: Q 93-115)	<ul style="list-style-type: none"> - 7.1 Environmental fleet policy and practice (20 questions: Q 93-112) - 7.2 Fleet use overview (1 big question: Q 113) - 7.3 Fuel, mileage and CO2 monitoring (1 big question: Q 114) - 7.4 Fleet operating cost in 2015 (1 big question: Q 115)
8	Most visible sub-contractors (39 questions: Q 116-154)	<ul style="list-style-type: none"> - 8.1 Cleaning service (L&T Company) (18 questions: Q 116-133) - 8.2 Lunch service (Eurest Restaurant) (21 questions: Q 134-154)

Please note: out of 154 questions, there were no answers to 20 questions as follow:

22, 26, 27, 37, 39, 41, 42, 52, 53, 66, 68, 93, 94, 95, 114, 115, 137, 138, 139, 146

Area of consideration 1: Organization overview (17 questions)

No.	IER question	Notes / Comments
1	Organization structure (department personnel and structure chart)	
2	Type of organization	
3	Current activities / services (List activities/services)	
4	No. of employed police officers	
5	No. of employed non-police officers	
6	No. of personnel whose work related to office work (both police officers & non-police officers)	
7	No. of customers or visitors per year	
8	Environmental coordinator	
9	Type of facilities	
10	Type of machineries	
11	Types of goods provided by major suppliers	
12	Types of services provided by major contractors	
13	Any restaurants? (If any, own or sub-contract)	
14	Any cleaning service department? (If any, own or sub-contract)	
15	Any waste handling department? (If any, own or sub-contract)	
16	How big is the whole space? (unit: m ²)	
17	Any future activities / services/ changes	

Area of consideration 2: Property management:
2.1 Energy (16 questions)

No.	IER question	Notes / Comments
18	How many type of energy is used in the two buildings? (If there is more than one, list all the sources of energies, i.e. oil based or gasoline based heating system, or others like furnace/ boiler / combined heat and power CHP?)	
19	Service provider of thermal energy? (if any)	
20	Total amount of thermal energy consumption in 2015 (if any, unit: kWh)	
21	Total cost of thermal energy (heating) in 2015 (if any, unit: Euro)	
22	Major thermal energy usage groups/ operations/ areas?	
23	Service provider of electrical energy?	
24	Total amount of electrical energy consumption in 2015 (unit: kWh)	
25	Total cost of electrical energy in 2015 (unit: euro)	
26	Major electrical energy usage groups operations/ areas?	
27	Emissions to air in 2015 - carbon dioxide (hiilidioksidi) (g/MJ) - sulfur dioxide (rikkidioksidi) (mg/MJ) - Nitrogen oxide (typen oksidit) (mg/MJ) - Particles (hiukkaset) (mg/MJ) (If information available, consider asking this information from the service provider of electrical energy, to calculate how much emissions were released from the HPD)	
28	Is there an energy management policy/ plan? (if any, has the energy management policy /plan been implemented? Plan may consist of initiatives, such as visible information displays about energy efficiency use)	
29	Have energy audits been conducted? (if any, obtain the report if possible)	
30	Analysis of energy bills? (if any, obtain the report if possible)	
31	Installation of energy saving devices?	
32	Adjusting timer switches for seasonal and daylight saving changes?	
33	p) Allowing staff access to stairs as an alternative to lifts?	

2.2 Water (12 questions)

No.	IER question	Notes / Comments
34	Service provider of water?	
35	Total amount of water consumption in 2015 (unit: m ³)	
36	Total cost of water consumption in 2015 (unit: Euro)	
37	Major water consumption groups/ operations/ areas?	
38	Any indoor water treatment facility?	
39	Cost of wastewater treatment? (if any)	
40	Is there a water management policy/ plan? (if any, has the water management policy /plan been implemented? Plan may consist of initiatives, e.g. visible information displays about water conserving use)	
41	Have water audits been conducted? (if any, obtain the report if possible)	
42	Analysis of water bills? (if any, obtain the report if possible)	
43	Installation of water saving devices? (e.g. screened faucets, dual-flush toilets)	
44	Any ongoing notification and repair of leaking taps?	
45	Any ongoing investigation of sewer and stormwater discharge issue? (both indoor and outdoor)	

2.3 Waste (14 questions)

No.	Question	Notes / Comments
46	<p>How many types of waste are produced? (Choose from the list)</p> <ul style="list-style-type: none"> - White paper (Yes / No) - Mixed paper (Yes / No) - Confidential paper (Yes / No) - Packaging paper (Yes / No) - Recyclable cardboard (Yes / No) - Electronic waste (Yes / No) - Biowaste (Yes / No) - Sanitary waste (Yes / No) - Mixed waste (to landfill) (Yes / No) - Burnable waste (to energy) (Yes / No) <ul style="list-style-type: none"> - Plastic waste (Yes / No) - Returnable drink cans and bottles (Yes / No) - Electronic waste (Yes / No) - Metal waste (Yes / No) - Glass waste (Yes / No) - Hazardous waste (Yes / No) - Chemical waste (Yes / No) - Technical waste (e.g. lap waste) (Yes / No) - Office wastes (e.g. ink cartridge) (Yes / No) - Special waste only from the HPD (Yes / No) - Anything else? 	
47	Total cost of all waste handling and treatments in 2015 (unit: Euro)	(if possible, specify the type of waste and obtain the recorded amount)
48	Total amount of waste sent to landfills in 2015 (unit: kg)	
49	Total amount of waste recycled in 2015 (unit: kg)	
50	Total amount of waste composted in 2015 (unit: kg)	
51	Any existing waste management policy/ plan/ waste separation/ recycling program? (if any, has the waste management policy /plan been implemented? Plan may consist of initiatives such as: visible information displays about waste separation or reusing some waste as secondary material)	
52	Have waste audits been conducted? (if any, obtain the report if possible)	
53	Analysis of waste bills? (if any, obtain the report if possible)	
54	Any unwanted materials items that are possible to be reused/ recycled?	
55	How does the HPD handle own electronic waste? (e.g. old computers, phones, printers) (if possible, obtain the recorded amount)	
56	How HPD handles own hazardous waste? (if any, e.g. old batteries, fluorescent lamps, paints, solvents, drugs)	
57	How HPD handles own chemical waste? (if any, e.g. chemical that is harmful to human health and environment, or flammable, explosive, toxic, irritating, etc.)	
58	How HPD handles own special/ technical waste? (if any)	
59	How HPD handles own office waste? (if any, e.g. ink cartridge)	

2.4 Bathroom and kitchen (4 questions)

No.	IER question	Notes / Comments
60	Types of available hand drying amenity? (e.g. cloth, electric or paper towel) For paper products, observe % of post-consumer product, forest or plantation source, bleached/ not bleached)	
61	Types of available tissue paper for bathroom (observe % of post-consumer product, forest or plantation source, bleached/ not bleached)	
62	Types of cleaning products (are soaps and detergent phosphate free or eco-friendly?)	
63	List of kitchen appliances (note energy rating and whether refrigerators are CFC free)	

Area of consideration 3: Procurement, material use and office practices (11 questions)

No.	IER question	Notes / Comments
64	Does HPD have own procurement department? (or via a third-person company)	
65	Any existing material conservation /sustainable material use policy and measures?	
66	The percentage of environmental friendly materials in comparison with all materials	
67	Criteria of chosen sub-contractors and suppliers	
68	Details list of procurement and total cost made in 2015? (if available, observe e.g. major materials consumed and quantities)	
69	<p>Does HPD lease or own these:</p> <ul style="list-style-type: none"> • computers; • printers; • photocopiers; • fax; • (portable) work stations? <p>If HPD owns them, note:</p> <ul style="list-style-type: none"> - are parts of these devices recyclable? - the condition, energy rating, and brand - if there are any energy-saving functions /standby function - location of all equipment - Is there a dedicated room for the equipment, is there good ventilation in that room? - the ratio of personnel to equipment 	
70	<p>Observe and note the energy saving practices of all the devices mentioned earlier (question 69)</p> <p>From this list:</p> <ul style="list-style-type: none"> ▪ Is double-sided paper copying available and set as default? ▪ Any material awareness data sheet about energy use near the equipment? ▪ Is equipment switched off after hours/when not in use? ▪ Is equipment able to use recycled paper? 	
71	<p>Observe and note the consumption of paper and stationary products in office</p> <p>From this list:</p> <ul style="list-style-type: none"> ▪ Is there any material awareness data sheet about using recycled paper and other products? ▪ What stationery products are often used? <p>Answer: pens; binders; papers; ink cartridge; envelops; staples; folders, anything else?</p> <ul style="list-style-type: none"> ▪ Is recycled paper used, and for what purposes? ▪ the % post-consumer product, forest or plantation source, bleached etc. ▪ Is paper collected for recycling? ▪ How is paper disposal managed? i.e. how often, by whom, costs. ▪ Anything else? 	
72	Any materials usage control and/or recycling practices within office areas? (in conjunction with waste management policy/plan/ practice)	
73	Are packaging materials/ containers being reused, recycled or sent back to the suppliers?	
74	<p>Which department/provider orders these:</p> <ul style="list-style-type: none"> - cleaning products; - cleaning tools; - cleaning machines; - cleaning detergents/ chemicals? 	(in case the cleaning service is outsourced, we can skip this question)

Area of consideration 4: Hazardous material (9 questions)

No.	IER question	Notes / Comments
75	Are hazardous materials present? (e.g. toxic waste, lab waste, controlled substances)	
76	Are harmful chemicals present? (e.g. industrial chemicals or corrosive liquids)	
77	Any use of harmful pesticide/fertilizer on grass area?	
78	Are fuel tanks present? (e.g. diesel or gasoline storage. If there is, how much; where they are stored)	
79	Any weird chemical-like-smell present in any public space?	
80	Are the hazardous materials/ harmful chemicals or pesticide or fertilizer kept in safe places?	
81	Are underground storage tanks present? (If so, have the tanks been well maintained? (Observe, what is the tank used for? Is it a boiler system for heating? If it is, it is based on what fuel, oil based or gas based or something else?)	
82	Are current Material/ Product Safety Data Sheets available? (Where? Who maintains them? Are they updated?)	
83	Have hazardous material/ harmful chemical audits been undertaken? (if yes and possible, obtain report or include details). If information is available, note on: <ul style="list-style-type: none"> - types and quantity of materials stored; - material inventory and control; - expired products records; - spill / leakage record, time; - spill kits / tools or spill control plan) 	

Area of consideration 5: Environmental training (5 questions)

No.	IER question	Notes / Comments
84	Any existing environmental training program (e.g. an environmental awareness program) (if there is, note name, time, targeted staff)	
85	Any existing environmental attitude survey?	
86	Any existing risk assessment training related to environmental disaster?	
87	Any channel for internal communication that allows personnel to request an additional environmental training that might suit their need	
88	Any future training related to environmental management?	

Area of consideration 6: Environmental incident (4 questions)

No.	IER question	Notes / Comments
89	Any record of existed environmental accident? (e.g. material leakage, spillage) (if there is, note: date, reason, time of occurrence and corrective action)	
90	Any record of complaint concerning poor environmental management from the local community? (e.g. noise, smell)	
91	Any record of complaint concerning poor environmental management from HPD's personnel?	
92	Any emergency preparedness plan concerning potential environmental disaster?	

Area of consideration 7: Fleet management:

7.1 Environmental fleet policy and practice (20 questions)

No.	IER question	Notes/ Comments
93	Does HPD have a green fleet policy?	
94	Does HPD have other sustainable transport policies or strategies? (e.g. green police travel strategy, incentives for more walking while patrolling, vehicle sharing, cycling mileage competition and using public transport for patrolling trips?)	
95	Does HPD consider 'life cycle costing' or green vehicle guide rating or drivers' feedback when purchasing a new fleet?	
96	Does HPD use trip planning or routing software in patrolling? (as a measure to minimize vehicle mileage, especially for frequent or repeated route, to reduce wasted mileage while providing better journey time predictability) (Observe, how are vehicles scheduled in general; how far in advance is travel planned)	
97	Does HPD employ teleconferencing for business meetings? (part of sustainable police travel strategy)	
98	Does HPD use vehicle telematics to monitor and track vehicles? (to monitor fuel and mileage and improve vehicle scheduling and planning in case of traffic disruption)	
99	Does HPD provide safety vehicle check list for drivers before starting the work?	
100	What does HPD do to encourage fuel efficient vehicle use in general?	
101	Is it possible that HPD always use the most fuel efficient and/or smallest vehicle fit for purpose?	
102	Does HPD provide feedback and incentives for good driving performance? (e.g. reward to fuel champion of the month/year?)	
103	How often HPD uses alternative greener fuel vehicles such as electric fleet, motor bike, Segway, etc?	
104	For policing works, who usually need to travel on vehicles?	
105	Where are vehicles based? (only around HPD in Pasila or all over Helsinki)	
106	How is refueling managed?	
107	What sort of things or equipment are routinely transported within different vehicles? (e.g. any specialist tools or loading equipment. This is to check how heavy is each vehicle in general?)	
108	What sorts of locations do vehicles mostly operate in? (e.g. in urban centers, suburbs, motorway, etc.?)	
109	Does HPD have any vehicle-related in-house service providers? (If there is, how are vehicles maintained and where are records kept?)	
110	How many and what kind of vehicle-related services are outsourced to third-party service providers?	
111	When does HPD schedule service and maintenance plan for the fleet? (during or outside normal working hours?)	
112	What kind of vehicle-related accident tends to happen to HPD's operations?	

7.2 Fleet use overview (1 big question: question 113)

No.	Category of vehicle in use currently	Number of vehicles in use currently	Are the vehicles in the same category always the same model? (if the answer is no, note the model)	Who owns the fleet? P= Police L= Leaser R=Renter	Fuel type	Average available days of one vehicle / year (x days / 360 days)	Average vehicle utilization rate / year (X % / 100%)	Type of insurance coverage 1= collision 2=Liability 3=Comprehensive
1	Car							
2	Van							
3	Motorcycle							
4	Segway							
5	Other?							

7.3 Fuel, mileage and CO2 monitoring (1 big question: question 114)

No.	Category of vehicle in use currently	Number of vehicles in use currently	Average fuel usage / vehicle (fuel efficiency rate) (How many kilometers/ liter?)	Average total annual fuel consumption / vehicle (in liters)	Average total annual mileage / vehicle (in kilometers)	Average maximum mileage before replacement of each vehicle (in kilometers)	Average total annual CO2 emission/ vehicle (in kilogram)
1	Car						
2	Van						
3	Motorcycle						
4	Segway						
5	Other?						

7.4 Fleet operating cost in 2015 (in Euro) (1 big question: question 115)

No.	Category of vehicle in use currently	Average total annual maintenance cost/ vehicle	Average total annual tyre cost / vehicle	Average total annual insurance cost / vehicle	Average total annual fuel cost / vehicle	Average total annual pollution cost based on CO2?	Average annual tax/ road use fee / vehicle	Average total operating cost / vehicle	Average fixed cost per kilometer / vehicle
1	Car								
2	Van								
3	Motorcycle								
4	Segway								
5	Other?								

If information is available, find out also: (1) average annual preventative auto maintenance cost/vehicle **versus** average annual cost of auto repair/vehicle in 2015; (2) how many of liters of diesel/ gasoline were totally consumed by all vehicles combined in 2015; (3) how many kilometers of all vehicles combined in 2015 were driven; (4) which vehicles were the major consumers of fuel in 2015?; (5) total CO2 emissions to air from all vehicles in 2015.

Area of consideration 8: Most visible subcontractors:

8.1 Cleaning service (L&T) (18 questions)

No.	IER question	Notes / Comments
116	What is the total of square meters (m ²) being cleaned at the Pasila police facilities (two buildings)?	
117	How many individual departments is L&T responsible for cleaning? Does L&T clean all departments or are there exceptions? Is there is any area L&T is not allowed to clean?	
118	How many L&T cleaning staff are currently and regularly working inside the two buildings?	
119	What time are the regular cleaning hours within the two police buildings?	
120	How long is each staff member trained before starting their cleaning work? Who trains L&T cleaning staff, the L&T Company or an outside source?	
121	Does the L&T staff receive extra training if they handle a highly sensitive area such as the crime investigation lab?	
122	What type of cleaning detergents are used? Are they labeled as environmentally friendly, such as a certified green label?	
123	What type of machines and how many of them are being used in the cleaning operations at this time?	
124	Are the cleaning machines certified as energy-and-water efficient? What is the energy rating level of the machines?	
125	Is L&T's cleaning operation certified with any environmental management standards? Has L&T developed its own environmental standard or follow any specific environmental standard?	
126	What type of cleaning clothes such as wipes and rags are used? What fabrics are they composed off, micro-fiber, cotton, etc.?	
127	How often does L&T wash cleaning clothes and how they are dried? If a drying machine is used, what is the energy rating level of the machine(s)?	
128	Has L&T ever received any complaints concerning the quality of service?	
129	Have any accidents occurred involving the L&T cleaning staff at these locations?	
130	From general observation, are there any areas or activities that might impose a threat, risk or difficulty to cleaning workers?	
131	What would be an example of extra cleaning service(s) requested from L&T?	
132	How often does L&T clean the following areas? <ul style="list-style-type: none"> - Offices ___ - Kitchens ___ - Common resting areas ___ - Toilets ___ - Changing room ___ - Sauna & gym ___ - Lobby ___ - Lunch place ___ - Climate control storages (warm or cold) ___ - Car parking spaces ___ - Shooting range ___ - Crime investigation lab ___ - Underground tunnels ___ - Underground heating-and- cooling control room _ - (Underground) water control room ___ - Anywhere else? (Please specify) 	
133	r) What are the types of waste produced from cleaning operations?	

8.2 Lunch service (Eurest Restaurant) (21 questions)

No.	IER question	Notes / Comments
General information		
134	What is the estimated average number of people dining in the restaurant during a single day?	
135	What types of wastes are generated in the food service operations and how much? How many wastes are separated for disposal and or recycling?	
136	What non-food related materials are used in the restaurant? Please list and put them into the 2 categories below: (These may include cleaning solutions, etc.) - Eco-friendly: - Health hazard:	
Product acquisition criteria		
137	What kind of procurement criteria are considered in purchasing supplies for Eurest's food service? (Is green procurement being considered?)	
138	Does Eurest buy locally produced food(s)?	
139	Does Eurest buy seasonal products and fresh produce (no preservatives and no additives)?	
140	Does Eurest cook their own food or use ready-made meals or ingredients?	
Household goods		
141	What is the percentage of durably reusable kitchenware that is used compared to the single-use containers e.g. plates, mugs, plastic cups, forks, knives, spoons, napkins, tablecloths, egg cups?	
142	Does Eurest use any kitchenware made of aluminum?	
143	Does the restaurant use unbleached paper products, for example, baking paper or coffee filter?	
Machinery and equipment		
144	Does Eurest monitor its energy consumption for meal preparation and service?	
145	What kind of machinery and equipment is employed within the restaurant?	
146	What is the energy rating level for the machinery and equipment? (Please attach list.)	
147	Are the refrigerators, freezer rooms and cold rooms spaced apart from the heat-generating products or devices?	
148	How often does Eurest clean different kitchen machinery? For example, how often are ovens and stoves washed? How often is accumulated dust from the back of refrigerators and freezers removed?	
149	What are the set temperatures of refrigerators and freezers?	
150	Are the lamps inside cold storage facilities on continuously?	
151	Are dishwashers fully filled before starting?	
152	What kind of cleaning detergents and rinse-aids are used in dishwashers? Are they labeled as environmentally friendly, such as a certified green label?	
In-house control		
153	Does the restaurant have an in-house waste and energy use control system? (E.g. a guideline concerning controlled functions, control method, recognition of when something goes wrong, responsible persons and measures of risk situations, information, what measurements are carried out?)	
154	Does the restaurant have any hazard prevention measures or risk management plan? If so, what does the plan(s) entail?	

Appendix 2. United Nations and Finnish sustainable environmental goals and indicators

United Nations' sustainable environmental goals and indicators

(Total SDGs: 17 goals/ 169 targets/ 230 indicators)

(Potential relevance on environmental sustainability: 2 goals/ 16 targets/ 20 indicators)

Goal 12. Ensure sustainable consumption and production patterns (11 targets)	13 Indicators
12.1 Implement the 10-Year Framework of Programmes on Sustainable Consumption and Production Patterns, all countries taking action, with developed countries taking the lead, taking into account the development and capabilities of developing countries	12.1.1 Number of countries with sustainable consumption and production (SCP) national action plans or SCP mainstreamed as a priority or a target into national policies
12.2 By 2030, achieve the sustainable management and efficient use of natural resources	12.2.1 Material footprint, material footprint per capita, and material footprint per GDP
	12.2.2 Domestic material consumption, domestic material consumption per capita, and domestic material consumption per GDP
12.3 By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses	12.3.1 Global food loss index
12.4 By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment	12.4.1 Number of parties to international multilateral environmental agreements on hazardous waste, and other chemicals that meet their commitments and obligations in transmitting information as required by each relevant agreement
	12.4.2 Hazardous waste generated per capita and proportion of hazardous waste treated, by type of treatment
12.5 By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse	12.5.1 National recycling rate, tons of material recycled
12.6 Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle	12.6.1 Number of companies publishing sustainability reports
12.7 Promote public procurement practices that are sustainable, in accordance with national policies and priorities	12.7.1 Number of countries implementing sustainable public procurement policies and action plans
12.8 By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature	12.8.1 Extent to which (i) global citizenship education and (ii) education for sustainable development (including climate change education) are mainstreamed in (a) national education policies; (b) curricula; (c) teacher education; and (d) student assessment
12.a Support developing countries to strengthen their scientific and technological capacity to move towards more sustainable patterns of consumption and production	12.a.1 Amount of support to developing countries on research and development for sustainable consumption and production and environmentally sound technologies

<p>12.b Develop and implement tools to monitor sustainable development impacts for sustainable tourism that creates jobs and promotes local culture and products</p>	<p>12.b.1 Number of sustainable tourism strategies or policies and implemented action plans with agreed monitoring and evaluation tools</p>
<p>12.c Rationalize inefficient fossil-fuel subsidies that encourage wasteful consumption by removing market distortions, in accordance with national circumstances, including by restructuring taxation and phasing out those harmful subsidies, where they exist, to reflect their environmental impacts, taking fully into account the specific needs and conditions of developing countries and minimizing the possible adverse impacts on their development in a manner that protects the poor and the affected communities</p>	<p>12.c.1 Amount of fossil-fuel subsidies per unit of GDP (production and consumption) and as a proportion of total national expenditure on fossil fuels</p>

<p>Goal 13. Take urgent action to combat climate change and its impacts (5 targets)</p>	<p>7 Indicators</p>
<p>13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries</p>	<p>13.1.1 Number of countries with national and local disaster risk reduction strategies</p> <p>13.1.2 Number of deaths, missing persons and persons affected by disaster per 100,000 people</p>
<p>13.2 Integrate climate change measures into national policies, strategies and planning</p>	<p>13.2.1 Number of countries that have communicated the establishment or operationalization of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production (including a national adaptation plan, nationally determined contribution, national communication, biennial update report or other)</p>
<p>13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning</p>	<p>13.3.1 Number of countries that have integrated mitigation, adaptation, impact reduction and early warning into primary, secondary and tertiary curricula</p> <p>13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions</p>
<p>13.a Implement the commitment undertaken by developed-country parties to the United Nations Framework Convention on Climate Change to a goal of mobilizing jointly \$100 billion annually by 2020 from all sources to address the needs of developing countries in the context of meaningful mitigation actions and transparency on implementation and fully operationalize the Green Climate Fund through its capitalization as soon as possible</p>	<p>13.a.1 Mobilized amount of United States dollars per year starting in 2020 accountable towards the \$100 billion commitment</p>
<p>13.b Promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and small island developing States, including focusing on women, youth and local and marginalized communities</p>	<p>13.b.1 Number of least developed countries and small island developing States that are receiving specialized support, and amount of support, including finance, technology and capacity-building, for mechanisms for raising capacities for effective climate change-related planning and management, including focusing on women, youth and local and marginalized communities</p>

Finnish sustainable environmental goals and indicators

(Total: 8 goals/ 39 targets/identified 32 indicators)

(Potential relevance on environmental sustainability: 3 goals/ 13 targets/ 12 indicators)

Goal 5: Carbon-neutral society (4 targets)	2 Indicators
5.1 Energy consumption	5.1 Total consumption of energy in Jules (from 5 different sources: (1) fossil fuels, (2) energy peat, (3) renewable energy sources, (4) nuclear energy and (5) net imports of electricity)
5.2 Share of renewable energy in energy consumption (Statistics Finland)	N/A (link to http://tilastokeskus.fi/ or Statistics Finland → unspecific indicators)
5.3 Greenhouse gas emissions (Finland reports greenhouse gas emissions to the European Commission, the UNFCCC and the Kyoto Protocol.)	5.3 Direct Carbon Dioxide equivalent in kilogram (from 4 different sectors: (1) energy: production → final consumption; (2) industrial processes and product use; (3) agriculture and (4) waste management: landfills, composting and waste water treatment)
5.4 Greenhouse gas emissions / GDP (Statistics Finland)	N/A (link to http://tilastokeskus.fi/ or Statistics Finland → unspecific indicators)

Goal 6: Resource wise economy (4 targets)	3 Indicators
6.1 Total consumption of natural resources	6.1 The total use of natural resources in ton (such as wood, stone, oil and water; from 4 sources: (1) domestic direct inputs; (2) international direct inputs; (3) hidden flows of imports and (4) any unused input)
6.2 Consumption of natural resources (TMR) and GDP (Statistics Finland)	N/A (link to http://tilastokeskus.fi/ or Statistics Finland → unspecific indicators)
6.3 Increment and drain of growing stock (Finland's timber reserves)	6.3 Million cubic metres/ year
6.4 Renewable energy as a proportion of final energy consumption (Statistics Finland)	6.4 Energy consumption in petajoule (PJ) (from 10 different energy consumption by source: (1) oil; (2) coal; (3) natural gas; (4) nuclear energy; (5) net Imports of electricity; (6) hydro power; (7) wind power; (8) peat; (9) wood fuel and (10) Others)

Goal 7: Sustainable lifestyles (5 targets)	7 Indicators
7.1 Housing: square meters, energy consumption and greenhouse emissions (Asuminen: neliöt, energiankulutus ja kasvihuonekaasupäästöt) (Tilastokeskus) (in Finnish)	7.1.1 House heating in GWh
	7.1.2 Electrical consumption in GWh
	7.1.3 CO2 emissions from house heating and electrical consumption in kilogram
7.2 Personal car use: kilometers, emissions (Henkilöliikenne: kilometrit, päästöt) (Tilastokeskus) (in Finnish)	7.2.1 Traffic volumes in kilometre/day
	7.2.2 CO2 Emissions from traffic in ton
7.3 Ruoka: eri elintarvikepääryhmien kulutusmäärät (Tilastokeskus) (in Finnish)	Amount of vegetables, meat and fish food consumed in kilogram per year and per person
7.4 Research and development (Updated: 27.10.2016 - Next update: 26.10.2017)	7.4 Expenditure in Euro (from 3 combined sources: (1) business enterprise sector total; (2) public sector + PNP total and (3) higher education sector total)
7.5 Generation of waste (households and waste comparable to household waste generated in production, especially in the service industries)	7.5 Waste generated in kilogram

Appendix 3. Examples of Finnish sustainable environmental direction and practices

Best available sustainable environmental practices from the Ministry of the Environment of Finland who has been awarded ISO 14001 EMS and Green Office EMS certifications (Lindroos, 2016)

Goal	Target	Indicator	Examples of action
<p>Carbon-neutral operation</p> <p>(under Finnish sustainable development goal no. 5: 'Carbon-neutral society')</p>	<ul style="list-style-type: none"> - Reduce electricity consumption - Reduce heat consumption - Reduce emissions to air 	<ul style="list-style-type: none"> - Amount of CO2 in ton - Amount of electricity consumption in kWh - Amount of heating consumption in kWh - Percentage of renewable energy in total energy consumption 	<ul style="list-style-type: none"> - Strategically consolidating three old offices into one new office; smaller office means less overall energy and resource consumption - Setting target to step up its total building energy efficiency level to B level (currently at C level) - Teleworking is allowed 1-2 days/ week, this saves some electricity, water and energy consumption - Owning only one vehicle for running errands (of the whole ministry); this car is used on the need basis. The ministry avoids using taxi service, but may rent some vehicles and ask the ministry's employees to drive (to save cost on additional driver) if needed. - Less flying trip for work; less emissions to air - Easy accessibility within facilities; this makes people want to move around inside the building on foot, not by elevator - Renovating with conservation mindset; some of old building features have been preserved, this led to less natural resources depleted, less concrete use and less time spent in renovation. - Investing in solar panels to increase its share of renewable energy in final energy consumption - Switch to actions or activities emitting lower CO2 whenever possible - Investing in technologies: <ol style="list-style-type: none"> 1) systems to monitor real time consumption of electricity and heating; 2) meters to measure temperature and carbon dioxide content in working space (to be implemented later) 3) motion-sensing ventilation and lighting systems

<p>Resource wise operation</p> <p>(under Finnish sustainable development goal no. 6: 'Resource wise economy')</p>	<ul style="list-style-type: none"> - Reduce paper consumption Reduce water consumption - Increases space efficiency - Conserve material whenever possible - Green procurement as priority 	<ul style="list-style-type: none"> - Amount of material in kilogram - Amount of water in m³ - Max. 25 m²/person - Amount of recycled furniture from old offices in new offices - Amount of purchased durable and high quality materials 	<ul style="list-style-type: none"> - Setting target to reduce the amount of paper and water consumption - Shrinking overall office space per person, close to 20 m²/ person - Consolidating areas for specific uses e.g. work station, short stay room, bike parking place, changing room; no redundant or wasted space - Renovating with conservation approach; less depleted natural resources during the renovation - Reusing furniture from old offices in new office - Purchasing only durable and quality materials - Using only washable plates, cups and glass
<p>Sustainable operation</p> <p>(under Finnish sustainable development goal no. 7: 'Sustainable lifestyles')</p>	<ul style="list-style-type: none"> - Minimize car use - Reduce waste - Increase awareness of employees' consumption - Include employee in all different activities 	<ul style="list-style-type: none"> - Traffic volumes in kilometer/day - Amount of waste in kilogram (and amount of CO₂ in ton if equivalent data is available) - Number of participative employees 	<ul style="list-style-type: none"> - Moving to the new office, which is in the heart of Helsinki city center; very convenient to travel there via public transportation, by bike or on foot - Setting target to reduce the amount of wastes - Organizing diverse activities: <ol style="list-style-type: none"> 1) sharing old books; 2) workshops on ecological craft materials; 3) recycling week for household items; 4) DIY bicycle repair course 5) weekly yoga class, to raise fund for Saima ringed-seal through WWF

Jyväskylä resource wisdom roadmap 2015-2050 focusing on: (1) no emission; (2) no waste; and (3) no over consumption (Melville, 2016)

Theme	2015-2016	2017-2019	2020-2025	2030	2050
Energy production and consumption	Development of Kangas area and reference area	<ul style="list-style-type: none"> • Wooden office cluster new solutions • Energy efficient residential areas 	<ul style="list-style-type: none"> • 1-2 Wind power parks • Kangas solar power plant 	Carbon neutral electricity-and-heat production	Fossil free and carbon neutral energy production
Transport and urban structure	New solutions for public and light - transportation and for shared usage of cars	<ul style="list-style-type: none"> • Transport biogas, Electrical charge stations • Public transport using renewable fuels for commuter 	Intelligent solutions for combining different modes of transport	Attractive and high-speed transport combined with local centers	Fossil free and carbon neutral transportation

Consumption and materials	<ul style="list-style-type: none"> • Mustankor-kea biogas department • Industrial Symbiosis 	<ul style="list-style-type: none"> • Mustankorke-a eco-industrial park • Attitude change: waste = material 	<ul style="list-style-type: none"> • Communities 'waste 70% to be utilized as materials • New solutions of "sharing economy" 	Sustainable services as well as products that repairable and made of recyclable materials	The consumption of virgin raw materials, and sustainable use of recycled materials maximized
Food production and consumption	<ul style="list-style-type: none"> • Public procurement supports local production • Broadening of leftover lunch-concept 	Local vegetables of the season to replace the consumption of meat from the diet	Local production of strong brands, buying easy and affordable, significant effect on employment	<ul style="list-style-type: none"> • Household food waste decreased 75% • Meat consumption in a sustainable and healthy level 	Food produced and consumed within the limits of One Planet bring well-being, health and economic growth
Water use and natural water bodies	Water Business Centre	<ul style="list-style-type: none"> • Industrial closed water systems • Building-specific water meters in households 	<ul style="list-style-type: none"> • Sewage treatment plant biorefinery • Pure natural waters of Jyväskylä brand 	Wastewater treatment plant biorefinery utilizes all the waste fractions	The water business is a major source of income and export article
Sustainable communities	<ul style="list-style-type: none"> • The trial of Culture pioneer • Resource-wise hospital 	<ul style="list-style-type: none"> • Resource-wise thinking integrated into all schools' curriculum • Smart knowledge summit 	Greencare, nature- and well-being tourism	<ul style="list-style-type: none"> • City environment supports the development of smart technology and know-how • Diversified sustainable housing and entrepreneurship 	The area is vibrant and attractive to companies as well as the residents

City of Jyväskylä's environmental program during 2017-2018, of which high level of employee empowerment and engagement is the key in employee commitment (Melville, 2016)

Environmental goals	Means / Actions	Responsibilities	Timetable	Indicator (if possible)
The number of VIPS decisions printed are halved.	Tweb system deployment	City administration	2017	Share of VIPS decisions given electronically/ year, Municipal office
	Amendment to the Administrative Code; giving information electronically	City administration	2017	An amendment to the administrative Code has been made / not made
Applying for an electronic archive permit for final documents	Tweb system is used throughout the city	City administration	2017	Number of Tweb training / year, Municipal office has been trained / not trained
Reducing paper printouts of documents entered in the registry	Electronic registration, transfer to Tweb through drafters	City administration	2017-2018	Paper consumption pack / year City administration, electronically documented
Share of electricity from renewable sources in the city electricity purchase contract is increased by 70%	Electricity contract to be updated to match that level	Chief procurement Officer	2016-2017	Share of electricity from renewable sources of the total amount of purchased electricity

Competitive tendering is processed electronically throughout the city	Information and training on the competitive tendering system	Chief procurement Officer	2017-2018	Share of published requests for tenders that have been organized electronically since 2016
Updating of environmental policy	Sufficient resources from the administration to operation	Environmental expert	2017	Yes/No
Environmental report 2013-2016	Sufficient resources from the administration to operation	Environmental expert	2017	Yes/No
Recommendation for vegetarian food, durable dishware in common premises	Pay attention to orders and events	Every units	2007-2018	Share of vegetarian food of different events and used durable dishware
Skype meetings to compensate for traveling	Use Skype if possible	Every units	2017-2018	Skype meetings' measurable data/ year (IT administration), trips/year
Increasing access to virtual meetings and tracking usage	Monitoring the use of Skype and videoconferencing usage	IT administration	2017-2018	Skype licenses / year, video conferencing €/ year
Use of public transport instead of personal car	Use of single-journey tickets for mentoring missions	Every units	2017-2018	Single-journey tickets/ year, paid kilometers reimbursed / year
	Environmental information bulletins in the work places	School principal, Environmental expert	2017-2018	Information bulletins organized / year
Competence in development, work ability in supporting new environmentally friendly tools	Using Skype, video clips, intranet utilization, occupational health	School principal	2017-2018	Skype meetings' measurable data / responsible unit, number of views/ presentation
Reducing the use of paper	Use of paper in the selected processes of the service unit	Every units	2017-2018	Paper bought in pack/year, Printouts from online /year
Environmental criteria and energy efficiency of machinery and equipment in procurement	Use of environmental criteria and energy efficiency in procurement	IT administration	2017-2018	Energy labels, share of the environmental labelled equipment purchased /year
Electricity consumption in large room is optimized	The use of virtual servers, the consequence of capacity in relation to the number of users	IT administration	2017-2018	Electricity consumption in large room /year
Recycling of equipment is intensified	Removal process to be photographed	IT administration	2017	Yes/No
City events are organized in an environmentally friendly manner	Creating city's event evaluating criteria of operating model	Communication	2017	Post-event reporting / environmental section. % of reporting

Appendix 4. List of interviewees

1. Interviewee 1: The Chief of Police. (2017). Helsinki Police Department. (personal communication, February 29, 2016 and February 14, 2017)
2. Interviewee 2: Superintendent, Chief of Security. (2017). Helsinki Police Department. (personal communication, August 2016 - April 2017)
3. Interviewee 3: Property and building services maintenance coordinator. (2017). Helsinki Police Department. (personal communication, September 2016- January 2017)
4. Interviewee 4: Material management specialist. (2017). Helsinki Police Department. (personal communication, October 2016 - February 2017)
5. Interviewee 5: IT manager. (2016). Helsinki Police Department. (personal communication, October 11, 2016)
6. Interviewee 6: Superintendent, in charge of the vehicle issues. (2016). Helsinki Police Department. (personal communication, September 23, 2016)
7. Interviewee 7: Fleet inspector. (2017). Helsinki Police Department. (personal communication, September 2016- February 2017)
8. Interviewee 8: Head of security guards (Police jail) (2017). Helsinki Police Department. (personal communication, February 21, 2017)
9. Interviewee 9: Property manager, Senaatti Properties. (2017). Senaatti Properties. (personal communication, September 2016- February 2017)
10. Interviewee 10: Cleaning manager, Lassila & Tikanoja Oyj. (2017). Lassila & Tikanoja. (personal communication, October 2016- January 2017)
11. Interviewee 11: Restaurant manager, Eurest Restaurant. (2017). Eurest. (personal communication, January- March 2017)
12. Lindroos, K. (2016). Green office expert, Ministry of the Environment. (personal communication, September 27, 2016)
13. Melville, P. (2016). Manager of research and development under resource wisdom unit, City of Jyväskylä. (personal communication, March 28, 2016)

Appendix 5. The HPD's fleet inventory and fuel efficiency of period 1.11.2015-31-10.2016

Current Fleet by vehicle type	Model	Number of vehicles	%	Fuel efficiency (L / 100 kms)
1. Sedan				
1) Toyota	Corolla/ Avensis/Prius	17	8%	4.88-10.68
2) Volkswagen	Passat/Tiguan/Golf	17	8%	3.60-11.89
3) Skoda	OCTAVIA	15	7%	2.96-10.09
4) Mercedes-Benz	S or E class /CDI	10	5%	6.46-29.43
5) Ford	Mondeo/ Focus	7	3%	4.91-14.17
6) Audi	A6 / A8	3	1%	7.24-10.11
7) Nissan	Note	2	1%	7.68-8.12
8) Volvo	4D S80	1	0%	10.42
Total sedan vehicles		72	35%	
2. Van				
1) Volkswagen	Combi / Transporter/ Caravelle / LT46/ CADDY	76	37%	5.80-16.72
2) Mercedes-Benz	Geländewagen/ Sprinter/ Atego	11	5%	3.77-20.68
3) Citroen	Jumper Fourgon	1	0%	7.10
4) Toyata	HIACE	1	0%	22.40
Total vans		89	44%	
3. Truck				
1) Mercedes-Benz (4 wheels, big size)	1228	1	0%	19.31
2) Arctic Truck (4 wheels, medium size)	LC200 ATM APK	1	0%	13.37
3) Mitsubishi (4 wheels, medium size)	Pajero	1	0%	11.74
4) Toyota (4 wheels, medium size)	5D Land cruiser STW	1	0%	10.08
Total trucks		4	2%	
4. Bus				
Volvo	B12B/588	1	0%	N/A
Total bus		1	0%	
5. Seasonal/ special vehicles				
1) Motorcycle (Moottoripyörä)	KT/YAMAHA	22	11%	0.57-6.70
2) Boat trailer (venetrailerit = VT)	Majava VT 190-550LJ/449	1	0%	N/A
3) Rubber boat	Zodiac G 470 HPP	3	1%	N/A
4) Speed boat	Faster 840 or 940	2	1%	N/A
5) Boat (vene)		1	0%	N/A
6) All-terrain-vehicle (ATV)(nelipyörä)		1	0%	24.59
7) Snow mobile (moottorikelkka)		1	0%	N/A
8) Horse trailer	Hunter HB 510 R	1	0%	N/A
9) Water scooter (vesijetti)		1	0%	N/A
10) Auto trailer (perävaunu)	Majava M 5030 LJ/281	4	2%	N/A
Total seasonal/special vehicles		37	18%	
Total vehicles		203	100%	

Please note: N/A means the information is not available.

Appendix 6. Identified 54 environmental aspects

Theme 2: Property management & theme 4: hazardous materials (no. 1-15: 15 aspects)							
No.	Organization activity	Environmental aspect	Potential or real environmental impact	Evaluation of significance of each aspect			SEA
				Frequency of occurrence	Severity (hazards, toxicity)	Total combined score	Y = yes N = No
1	<ul style="list-style-type: none"> Property maintenance Office activities and services (supporting functions) Labs activities and services Police license services Storages Materials and products uses and end-of-life treatment Waste management Managing, monitoring and guarding the police jail cells which holding crime suspects or prisoners on remand 	Use of energy (Electricity, heating and cooling)	<ol style="list-style-type: none"> Air pollution from productions of electricity, heating and cooling energies Green house effects and climate change potential Depletion of non-renewable resources if electricity produced from fossil fuels i.e. coal, peat, etc. Acidification effect from CO₂, SO₂ or NO_x from electricity productions. Biodiversity loss if electricity produced from hydroelectric plants Radioactive contamination if electricity produced from nuclear power plants 	5	4	9	Y
2		Use of water	<ol style="list-style-type: none"> Depletion of water resource Water supply production consumes electrical and thermal energies and chemicals. Wastewater treatment processes consume electrical and thermal energies and chemicals. Greenhouse effects and climate change potential from water supply production and wastewater treatment processes. Water pollution if waste water accidently leaked to natural water bodies 	5	3	8	N
3		Use of materials (such as pen, ink for printing, etc.)	<ol style="list-style-type: none"> Depletion of natural resources Generation of different wastes: (1) mixed waste; (2) recyclable wastes; (3) biowaste; (4) operational wastes to be incinerated 	5	2	7	N
4		Paper consumption	<ol style="list-style-type: none"> Depletion of natural resource Paper production consumes electricity Generation of paper waste 	5	2	7	N
5		Waste sorting during operating hours	<p>Sorting wastes is believed to cause low environmental impacts from use of plastic bags and use of energy (cool room for biowaste). However, it increases level of material recyclability and reduces amount of wastes to landfill, which could also lessen:</p> <ul style="list-style-type: none"> contamination in landfill from less hazardous content of mixed waste contamination in water and soil if landfills leached less greenhouse effect from less release of CO₂ and methane in landfills 	The significance of this aspect cannot be determined by numerical value but it is thought that this aspect is significant.			

6		Mixed waste in landfill	<ol style="list-style-type: none"> 1. Landfill contamination from hazardous content of mixed waste 2. Water and soil contamination if landfills leached 3. Greenhouse effects from potential release of CO₂ and methane in landfills 	5	2	7	N
7		Biowaste in landfill	<ol style="list-style-type: none"> 1. Formation of methane gas within landfills 2. Greenhouse effects from emission of methane gas leaked to the atmosphere 	4	4	8	N
8		Wastes to be recycled or recovered	<ol style="list-style-type: none"> 1. Reducing wastes in landfill and incinerators 2. Conserving natural resources such as mineral deposits, wood, water, etc. 3. Reducing use of new raw materials, which is indirect avoiding of pollution, waste for raw material extractions and greenhouse gases that may contribute to global climate change 	5	1	6	N
9		Operational wastes to be incinerated	<ol style="list-style-type: none"> 1. Emissions to air from CO₂ equivalent greenhouse gas and ashes from incineration 2. High global warming potential 	4	4	8	N
10		Use of hazardous substances (i.e. chemicals from forensic lab or different liquids for fleet maintenance and repair)	<ol style="list-style-type: none"> 1. Unnecessary contamination to nature if any hazardous chemicals or liquids would directly spill to either land, water and air 2. Water pollution if wastewater from any dangerous chemical leaked to sewer pipe 3. Adverse effects to environment or human from chemical interactions if some occur in a combination in nature instantaneously 	5	3	8	N
11		Running ventilation system 24/7	<ol style="list-style-type: none"> 1. High level of electricity consumption 2. Similar impacts to the use of energy 	5	4	9	Y
12		Use of saunas 24/7	<ol style="list-style-type: none"> 1. High level of electricity and heating consumption 2. Similar impacts to the use of energy 3. High level of water consumption 4. Similar impacts to the use of water 	5	4	9	Y
13		Sauna renovation every 3-5 years (from the use of saunas 24/7)	<ol style="list-style-type: none"> 1. Depletion of natural resources 2. High level of all energies consumption 3. High level of water consumption 4. Noise, water, air pollution 5. Similar impacts to the use of energy 6. Similar impacts to the use of water 7. Generation of construction wastes and waste to landfill 	2	5	7	N
14	Storing some old office furniture	Use of storing space on the underground level	<ol style="list-style-type: none"> 1. Loss of some functional space 2. Consumption of electricity 3. Similar impacts to the use of energy 	4	3	7	N
15	Holding crime suspects or prisoners on remand	Damaged furniture and fixtures inside the jail cells	<ol style="list-style-type: none"> 1. Depletion of natural resources from replaced materials 2. Generation of different wastes e.g. mixed wastes or wastes to be incinerated 	4	4	8	N

Theme 3: Procurement, material use and office practices (no. 16-17: 2 aspects)							
16	Sustainable material use policy and management	Green procurement criteria for the HPD's suppliers or sub-contractors	This aspect is believed to cause low environmental impacts from the use of some materials, energy and water. However, it limits and controls adverse environmental effects to air, water, land and biodiversity.	The significance of this aspect cannot be determined by numerical value but it is thought that this aspect is extremely significant.			
17		Promotion and practices of sustainable material use within the HPD					
Theme 5: Environmental training (no. 18-20: 3 aspects)							
18	Informing staff of environmental information through 'info TV'	Environmental information on the consumption of electricity and water	1. Enhance staff awareness on such topics 2. Saving on natural resources and pollution to nature	5	1	6	N
19	Future environmental training	Lack of general environmental awareness training	1. No change in the level of in-house consumption of natural resources and materials and pollution level 2. Lower chance of positively engaging staff in future environmental program or practices	The significance of this aspect cannot be determined by numerical value but it is thought that this aspect is significant.			
20	Future engagement of staff in good environmental practices	Lack of employee involvement in activities promoting good environmental practices					
Theme 6: Environmental incident (no. 21-26: 6 aspects)							
21	Use of police vehicles	Fuel leak from police vehicles into indoor sewer	Contamination to the environment if the fuel would flow down a floor drain or indoor sewer	1	4	5	N
22	Maintaining outdoor sewer	Runoff water with great amount of sand that could clog the outdoor sewer	1. Clogging the outdoor sewer 2. Increasing the pollutants e.g. soil, dissolved chemicals and weeds to local waterways 3. Storm water pollution	2	2	4	N
23	Use of backup electrical generator	Potential explosion of battery (of backup electrical generator)	1. Health hazard from leaking of battery's strong acid if it would explode in front of a human 2. Depletion of natural resources for replacing a new battery 3. Generation of hazardous waste	1	5	6	N
24	Managing the police jail cells which holding crime suspects or prisoners on remand	Intentional fire set inside the jail cells	1. Air contamination from the fire plume 2. Released toxins and pollutants from burned materials 3. Depletion of natural resources from replaced materials 4. Generation of different wastes e.g. mixed wastes or wastes to be incinerated	4	5	9	Y
25	All activities under the Helsinki Police Department (HPD)	Fire safety plan tailored for the HPD	Creation of fire safety system is believed to cause low environmental impacts from the uses of some materials, energy and water. However, it could prevent potential adverse environmental effects mentioned in the environmental aspect of no. 24. (Intentional fire set inside the jail cells).	The significance of this aspect cannot be determined by numerical value but it is thought that this aspect is extremely significant.			

26		Preparedness and contingency plans tailored for the HPD	Creation of preparedness and contingency system and manuals is believed to cause low environmental impacts from the uses of some materials, energy and water. However, it could prevent potential adverse environmental effects to air, water, land and biodiversity.				
Theme 7: Fleet management (no. 27-41: 15 aspects)							
27	<ul style="list-style-type: none"> Use of police vehicles for the field works 	Use of fuels (i.e. diesel and gasoline)	<ol style="list-style-type: none"> Depletion of non-renewable resources for oil production Massive uses of electricity and water in oil production (indirect uses and environmental impacts) Similar impacts on use of energy and water 	5	4	9	Y
28	<ul style="list-style-type: none"> Use of police vehicles in supportive functions 	Emissions to air (i.e. CO2 and other pollutants)	<ol style="list-style-type: none"> Air pollution from burning the fuels Acidification effects Green House effect High global warming potential 	5	4	9	Y
29	<ul style="list-style-type: none"> Vehicle up-fitting, maintenances and repairs 	Replacement of vehicle parts (i.e. lamp, battery, brake pad, etc. as part of regular wear and tear)	<ol style="list-style-type: none"> Depletion of natural resources for productions of raw materials e.g. steel, rubber, glass, plastics, etc. Generation of various wastes: hazardous and non-hazardous Massive uses of electricity and water Similar impacts on use of energy and water 	5	4	9	Y
30		Modifications to police vehicles and parts	<ol style="list-style-type: none"> Similar impacts on the use of materials 	The significance of this aspect cannot be determined by numerical value but it is thought that this aspect is significant.			
31		Inconsistent pre-checking up of motor vehicles for patrolling at the beginning of each shift	<ol style="list-style-type: none"> Increasing chances of vehicle maintenance and repair Increasing chances of vehicle-related-accidents 				
32		Long idling hours (Heavier use of police vehicle engines in comparison to any private cars)	<ol style="list-style-type: none"> Fuel consumption Similar impacts on fuel consumption Emissions to air Similar impacts on emission to air Increasing rate of general wear and tear, vehicle maintenance and repairs Similar impacts on replacement of vehicle parts 	5	4	9	Y
33		Use of windshield washer fluid that includes ethanol	<ol style="list-style-type: none"> Increasing a chance to deplete natural resources from changing car parts because ethanol is corrosive. It could corrode parts i.e. paint, rubber, car wax, plastics. Increasing a chance of fire because ethanol is flammable. Loss of forests and wetlands to grow plants for ethanol productions (indirect action and environmental impacts) Intensive use of energy and water in ethanol productions (indirect action and environmental impacts) 	5	3	8	N
34		Use of brake fluid that is corrosive	<ol style="list-style-type: none"> Increasing a chance to deplete natural resources from changing car parts because brake fluid is corrosive. It could corrode parts i.e. paint, rubber, car wax, plastics. 	5	3	8	N

			<ol style="list-style-type: none"> Increasing a chance of fire because it is flammable. If not properly disposed by hazardous waste treatment center, it could contaminate soil and water with heavy metals and other solvents if leaked. 				
35		Use of Adblue liquid that is irritating to skin	Adblue liquid comprises of water and urea. Both are biodegradable and non-hazardous. However, it is irritating to sensitive skin, which is considered irritant for human health, but not to the environment.	5	1	6	N
36		Washing of vehicles inside the HPD's headquarters	<ol style="list-style-type: none"> Consumption of electricity, water and cleaning detergents Similar impacts on use of energy, water and chemicals 	5	2	7	N
37		Vehicle accidents	<ol style="list-style-type: none"> Increasing rate of vehicle maintenances and repairs; Increasing rate of replacement of vehicle parts Similar impacts on replacement of vehicle parts 	5	5	10	Y
38		Scheduled timetable for regular vehicle maintenances	<ol style="list-style-type: none"> Prevent unnecessary driving; use of fuel; emissions to airs; wear and tear; maintenance and repairs Minimum use of energy and water Minimum environmental impacts from energy and water consumptions 	4	1	5	N
39		Use of telecommunication devices and systems among the police vehicles and supportive functions		5	1	6	N
40		Use of in-house auto mechanics for small vehicle maintenance and repair works		5	2	7	N
41		Use of outsourced garages for small vehicle maintenance and repair works	<ol style="list-style-type: none"> Unnecessary driving; use of fuel; emissions to airs; wear and tear; maintenance and repairs Similar impacts on use of fuel; emissions to airs; and replacement of vehicle parts 	5	4	9	Y
Theme 8 (1): Most visible subcontractors: cleaning service from L&T (no. 42-46: 5 aspects)							
42	Cleaning services within the Helsinki Police Department headquarters buildings, provided by the company Lassila & Tikanoja (L&T)	Certification of ISO14001 awarded to L&T Company	Preventing or mitigating adverse environmental impacts in customers' properties by managing the cleaning operations in systematically environmentally-friendly manner	The significance of this aspect cannot be determined by numerical value but it is thought that this aspect is significant.			
43		Proper trainings to cleaning staff (i.e. basic and on-site trainings)	<ol style="list-style-type: none"> Preventing or mitigating adverse environmental impacts Reduce potential environmental or health hazard by keeping properties' spaces clean and organized 				
44		Use of eco-labelled detergents	Preventing or mitigating adverse environmental impacts to air, water and soil				

45		Use of cleaning machines that are efficient in energy, water and chemical	Reducing adverse environmental impacts to air, water and soil from efficient consumption of energy, water and chemicals	5	2	7	N
46		Use of durably reusable cleaning clothes	1. Reducing amount of detergent or chemical doses for cleaning 2. Reducing depletion of natural resources from durability of the cleaning clothes	5	1	6	N
Theme 8 (2): Most visible subcontractors: lunch service from Eurest Restaurant (no. 47-54: 8 aspects)							
47	Catering services to the staff of Helsinki Police Department, crime suspects and prisoners on remand, provided by the company Eurest	Use of durably reusable kitchenware in the restaurant side	Reduce depletion of natural resources from durability of the kitchenware	5	1	6	N
48		Use of disposable dishware & utensils in the prison side	1. Generation of different kind of wastes, especially mixed wastes 2. Similar impacts on mixed waste to landfill	5	3	8	N
49		Use of bleached paper products (i.e. napkin, baking paper)	1. If the paper products are bleached by chlorine, this will increase toxicity to natural water bodies from releases of wastewater filled with chlorine-based organic compounds. 2. Increasing unnecessary use of chemicals and energy for bleaching process 3. Increasing unnecessary emissions to air; dissolved material; residual chemicals and wastewater from bleaching process	5	3	8	N
50		Use of ecological dishwashing detergents and rinsing aids	Preventing or mitigating adverse environmental impacts to air, water and soil	5	1	6	N
51		Energy-efficiency-practices	Reducing adverse environmental impacts from efficient consumption of energy, water and chemicals	5	2	7	N
52		Regular cleaning of kitchen machinery	Preventing unnecessary biowaste from avoidable food spoilage and waste	5	2	7	N
53		Zoning freezer rooms and cold rooms away from the heat-generating areas	Preventing unnecessary use of cooling energy to keep the food ingredients fresh	The significance of this aspect cannot be determined by numerical value but it is thought that this aspect is significant.			
54		In-house control plans for the Eurest Restaurant operation	Similar to the aspects 25 and 26				

Appendix 7. Additional recommendations on fleet management

Recommended actions regarding consolidation and consumption reduction

Actions	Approaches: examples	Reasons
Consolidate	Decide right fleet size: choose measurable metrics, then measure them. Examples of the metrics are: "length of customer service phone call; key performance indicators; utilization rate by type of vehicle; departmental cost per vehicle; timeline from idea to implementation; depreciation; fuel cost and consumption; accident rates and costs; lifecycle cost" (Automotive Fleet, 2012; Interviewee 7).	To determine whether the HPD needs 227 motor vehicles or fewer; to determine the utilization rate, general fleet performance and to prevent unplanned vehicle downtime (Interviewee 7).
	Consider reducing the amount of vehicle brands to the minimum	There are now more than 10 vehicle brands. Fewer brands means fewer outsourced garages to utilize, fewer car parts coordination, less time spent on cooperating between responsible staff and garages.
	Share service: car sharing among non-police staff (sharing in this context means all the vehicles of non-police staff members are retitled as 'standby vehicles' and they are used as needed.). (Silverman, 2016; Interviewee 7)	Previously, when many of police units were in different small offices, own cars were essential. However, nowadays majority of these staff members work in the same building- the headquarters. For this reason, many small units do not need to have their own automobile anymore. Car sharing is a smarter choice that contribute to cut down on unnecessary car use (Interviewee 7).
	Civilianization: keeping fleet manager position among civilians, not by sworn officers (OOAG, 2007; Interviewee 7)	Because the sworn officers are not expert in auto maintenance and repair. Also, they might be promoted and move forwards within their line of career every few years. Sound fleet manager needs proper training and years of experience. (OOAG, 2007; Interviewee 7)
	Price consolidation for vehicle maintenance and repair services: standardized nationwide rates for all law enforcement agencies (if possible) (Interviewee 7).	To bargain the prices down to the same rates nationwide (economy of scale).
Reduce consumption	Better fuel efficiency policy and management plans: (1) setting goal to increase fuel efficiency with action plans that involve all responsible staff and perhaps drivers/ operators as well; (2) fuel efficiency solutions; (3) fuel optimization technologies; (4) policy 'only drive when needed' (Department of transport, 2005; OOAG, 2007; Botham and Barker, 2014; Owen, 2011)	All suggested approaches are meant to encourage the police officers and non-police staff to drive police vehicles less. Driving less naturally leads to less use of fuels. Improved fuel efficiency will reduce the level of emissions to air; the level of wear and tear; then less replacement of vehicle parts as chain reactions. Hopefully, all above mentioned actions will lead to less outsourcing of small vehicle maintenance and repair works.
	Increase use of fully integrated fleet management software: this would monitor actual vehicle usage, driving speed, fuel costs, idle time, preventative checkup routines simultaneously through Internet of Things (IoT). (The fleet management software should be cost-effective and convenient to use, to understand and to report facts) (Rastrac, n.d.)	
	Create enjoyable activities for patrol officers while patrolling: 'walking competition' or 'biking competition' or 'driver of the month' by using various measures (Lindroos, 2016)	
	More use of public transportation: incorporate use of train, tram, metro to patrol routes (still, they have access to supportive tools, i.e. strategically placed	

	vehicles, when needed) and encourage all staff to commute via public transportations more frequent outside working environment too	
	Consider patrolling less on vehicles where sufficient number of surveillance cameras fulfill that role (Heyer, 2016).	
	Remind driver/operator of the positive environmental impacts of eco-economic driving as often as possible (Energy Saving Trust, 2013; Interviewee 7).	
	Considering compensation to grey fleet used for policing work: reimbursing cash to employees using their own cars for some policing administrative work/tasks (OOAG, 2007)	
	Partnership with community more: 1) volunteer programs for various event: asking volunteer to surveil street during large events or gathering 2) inquiring for donated available parking spaces (for long term use) around Helsinki from other public institutions, non-profit organizations, schools, universities, association, parks, housing companies, etc.	<p>1) Municipal residents often want to be of service to their community, especially if their effort is used for safety and security reasons. If high number of volunteers can be summoned repeatedly, the police officers can focus on core policing works.</p> <p>2) There are many available parking spaces around Helsinki that are existing and could be donated if asked for. Inquiring in this context is a form of sponsorship.</p>

Recommended actions regarding modifications to police vehicles and parts

Action	Approaches: examples	Reasons
Engage stakeholder	Include stakeholders especially vehicle operators or fleet maintenance staff to be a part of designing the next generation patrol vehicle: Example, competition – proposal of most practical next generation patrol vehicle. The winner (individual or team) is rewarded. The prize/reward does not need to be very expensive.	This may yield a few benefits for the HPD: (1) could prevent future accidents because the vehicles would be carefully selected, space could be well utilized and the rear-view mirror is not blocked; (2) Their viewpoints may help the decision maker to buy right vehicles for right police assignments with minimum modifications to the vehicles. This could reduce potential costs that come with modifications to police vehicles and parts. (3) would help the HPD to save cost on maintenance and repair in the long term if these vehicles are practical and efficient; (4) could create positive bond between the operators and vehicle and the operators may handle their vehicles with better care. This is similar to how the mounted police officers well care for the police horses.
Prioritize effective few internal changes at a time	Consider adding life cycle costing analysis when buying new vehicles (Wales Audit Office, 2013)	Each replacement of manual transmission system for a normal sedan cost roughly 6,000 €. Which one is cheaper per one life cycle cost analysis between a same model of car with (1) automatic transmission or (2) manual transmission system? The answer will come from life cycle costing calculation (Interviewee 7).
	Consider buying only vehicles with automatic transmission system	
	Concerning vehicle accident, consider creating verification system in monitoring proper driving practices: e.g. handling the vehicle, to prevent driving with complacency (Interviewee 7)	This idea is based on approach 'Trust, but verify'. To ensure compliance with own police vehicle handling standards (Daly 2016; Interviewee 7).

	Combine quantitative and qualitative measurements to measure efficiency and effectiveness. e.g. ease of vehicle uses or operators' opinion concerning practicality of vehicle design, etc. should be considered together with other statistical measurements.	Quantitative measurable indicators are not the only signs of efficiency and effectiveness. Sometimes, combining the two types of measures or indicators give deeper information.
	Consider introducing joint sustainable fleet vehicle policy for law enforcement use, i.e. develop common policy with other law enforcement partners e.g. defense forces, customs or rescue department (Interviewee 7)	Joined resources to create better and integrated system (Interviewee 7)

Recommended actions regarding vehicle accidents

Action	Approaches: examples	Reasons
Engage stakeholder	Consider organizing seminar among relevant staff and police officers to discuss and find constructive solutions on how to prevent unavoidable accident, few times a year: a seminar that has effective communication and constructive dialogue	As mentioned earlier that some accidents could be preventable. Probable future costs from accidents and perhaps repairs could be avoided as well if accident rate is lessened.
	Organize enjoyable activities concerning fleet maintenance: e.g. free car basic maintenance session (Lindroos, 2016)	It is believed that a portion of the avoidable accidents could be diminished through an effort to change some of drivers' mind-sets and behavior. For example, if a driver causes an accident and it is proved that the accident is caused by complacency or carelessness, a consequence will follow. It could be e.g. a fine to pay, so that the same lesson will not repeated easily again.
	Incentivize: incentives can be used to motivate people to do something for reward or to avoid certain actions from potential punishment (Interviewees 3 and 7)	
Prioritize effective few internal changes at a time	Change organization climate before changing organization culture: based on joint three concepts: (1) Total Organizational Change (TOC); (2) Total Quality Management (TQM); and (3) four key climate dimensions; specifically: the nature of interpersonal relationships, the nature of the hierarchy, the nature of work and the focus of support and rewards Example: at Ritz-Carlton Hotels, each employee is part of a team whose members are empowered to do whatever to satisfy a customer. These employees are guided by "Gold Standards," that specifies desired behaviors. More importantly, there are policies, practices, procedures, and routines designed to support and reward employees engaging in the desired behaviors (Schneider, Brief and Guzzo, 1996).	This conception supports that solid founding of sustainable change within an organization starting from a robust working climate. The climate of an organization is the overall emotion or feeling that members of that organization have, for instance, challenging, innovative, dull, etc. Such climate is inferred from the organization's policies, practices, procedures, goals and rewards systems. The organization that does not have encouraging climate often has weak working culture as well, because it cannot articulate the values that it wishes its working members to believe, not to mention committing to them. To establish a real change, the top managements of the organization should take the mentioned three concept into account. (Schneider, Brief and Guzzo, 1996).
	Consider add accountability as a key performance indicator (Lawler, 2014)	This is means for preventing avoidable accident. If someone does it with complacency and negligence, that person should be held accountable with some consequence. For example, in Finnish defense force, if a military officer cause vehicle accident with complacency and carelessness, that person will pay some fine as a part of cost of vehicle reparation (Interviewee 7).