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How Sustainability Could Be Included in The Inspections of Facilities Handling Hazardous Chemicals?

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The European Green Deal the EU Corporate Sustainability Reporting Directive (CSRD) requires all large (> 500 employees) and listed companies apart from SMEs to report on sustainability. The reporting is to be done according to European Sustainability reporting Standards. Before the new standards come into force, The Finnish Safety and Chemicals Agency wanted to map out how customers see sustainability issues. It was also intended to find out how sustainability should be dealt with in the future inspections. Currently sustainability is not included in the basic inspection criteria. Eleven facilities were chosen as pilot customers for the survey. The chosen facilities represented different industrial fields handling either hazardous chemicals, natural gas, or both. The results show that sustainability is at the heart of the companies surveyed, with particular emphasis on environmental responsibility, climate change, resource scarcity and human rights. Zero net-emissions and giving up fossil-based fuels and raw materials are the most significant sustainability targets. Suppliers are subject to ethical rules, and the Code of Conduct is used by several companies. Responsibility in the supply chain is related to the origin of raw materials, and decision-making follows, for example, supplier criteria. The qualifications and competence of subcontractors are ensured through inductions, work permits and audits. The suitability of the equipment is ensured by, among other things, management of change and accurate device descriptions. Supply chain disruptions are prepared for with alternative suppliers and spare parts warehouses. Risks caused by climate change are addressed by risk assessments, especially in the case of floods and high winds, although some operators have not identified any risks despite the assessment. Companies chemical waste handling and preparedness for Natech accidents will be included in the future inspections.

1. Introduction

Sustainability has been recognized as a vital part for improving human lives and protecting the environment (United Nations 2015). In the European Union this has been adopted recently into legislation as the EU Corporate Sustainability Reporting Directive (CSRD) entered into force on the 5th of January 2023 (European Commission 2022). The CRSD requires all large (> 500 employees) and listed companies apart from SMEs to report on sustainability. This helps investors, civil society organizations, consumers, and other stakeholders to evaluate the sustainability performance of companies. The new rules must be applied from the financial year 2024 in reports that are published in 2025. The reporting is to be done according to the European Sustainability reporting Standards (ESRS) that were published in July 2023 (European Commission 2023a). The discussion how to implement the CRSD directive and standards in the Finnish legislation is ongoing and it is currently not decided who will be the authority responsible for the supervision of the directive. Some of the responsibility could be implemented in the tasks of The Finnish Safety and Chemicals Agency (Tukes). Currently Tukes is responsible for supervising the sustainability of conflict minerals. In addition, the EU regulation concerning batteries and waste batteries (European Commission 2023b), that entered into force 17th of July 2023 will in the future include sustainability related supervision that will probably be the responsibility of Tukes. The new regulation will extend to cover the entire life cycle of all types of batteries and accumulators. A whole chapter has come into the regulation about taking due care, or so-called due diligence, in the acquisition of battery raw materials. In addition, after transition period the regulation concerning batteries and waste batteries will include following the carbon footprint of batteries.

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Tukes is a licensing and supervisory authority that promotes the safety and reliability of products, services, and industrial activities. One of the responsibilities of Tukes is inspections and permitting of large industrial facilities handling hazardous chemicals in Finland. The industrial facilities can be Seveso sites (European Commission 2012) or lower tier industrial facilities. The inspections are performed as on-site inspections according to inspection plan. Before the inspection, the facilities are sent a list of questions that help them to prepare for the inspection. Since Tukes will have sustainability related supervisory tasks, it was seen important that Tukes should be aware how the industrial sites see and handle sustainability in their business. Sustainability is also one of Tukes' strategic priorities, and one of the goals is to promote sustainability in companies. In the first stage, a questionnaire survey was chosen as the most effective way to study the level of sustainability knowledge in the industry. It was decided, that including the questionnaire survey into the inspection preparing questions would give a sufficient picture of sustainability in the Finnish industry. Based on answers Tukes will decide how sustainability should be handled in the future in the permitting and supervision of industrial sites handling hazardous chemicals. The results and experiences from the survey will also be used as a basis on how to implement sustainability in the other supervisory fields of Tukes, products and services.
Young (2016) stated that questionnaire surveys are a useful method to find out knowledge on the attitudes and thoughts of groups on a certain matter. Questionnaire surveys have been successfully used to study different aspects of safety in Seveso facilities. Krausmann (2010) used questionnaire survey to study Natech (Natural hazard triggered technological accident) risk reduction in EU member states. Others have studied the importance of safety culture in preventing major accidents (Berger, Slovackova 2022), safety culture and audit assessments (Duijm et al. 2005), organizational resiliency potential (Şengül et al. 2018) and the impact of the COVID-19 pandemic on safety (Bragatto et al. 2021).

2. Materials and methods

The aim of the questionnaire survey was to find out how the industry sees sustainability and how sustainability should be handled as part of the site inspections in the future. The study was performed as a questionnaire survey to a chosen group of industrial facilities as a part of the on-site inspections during 2023. The number of facilities chosen for the study was 11. The facilities represented different industrial fields handling hazardous chemicals and/or natural gas. (Table 1).

Table 1: Summary of the companies included in the questionnaire survey

Companies handling chemicals and LNG	Companies handling only chemicals	Companies handling only natural gas
4	4	3

The chosen companies represented mainly facilities falling under the Seveso III Directive (European Council 2012), also lower tier companies were included in the survey. The companies were mainly from different industry fields. The questionnaire survey consisted of 12 open questions. The questions consisted of general questions on sustainability as well as more specific questions on subcontractors, waste handling and climate change effects on the safety of the sites. The questions covered all the current EU regulation reporting fields, namely environmental matters, social matters, respect for human rights, anti-corruption and bribery, diversity on company boards (in terms of age, gender, educational and professional background). However, the questions were focused on environmental sustainability as the facilities are handling hazardous chemicals and chemical wastes.
The survey questions were:

- Is sustainability discussed in the facility?
- What is meant by sustainability in your company?
- Which sustainability goals does your company have with respect to supply chain, product responsibility, production, employees, environmental responsibility, and social responsibility?
- How has the company determined constant developing of sustainability and setting targets including green transition, novel technologies, climate change, and overall situation in the World?
- How is the sustainability assured in the supply chain from production of chemicals, chemicals usage within the facility and disposal as waste chemicals?
- How is sustainability visual in decision making? Please provide an example.
- How does the company secure that the same demands apply to company's own employees apply also to subcontractors?
- How does the company ensure the subcontractor's references and skills for the work?

- How does the company secure that the equipment is appropriate for the purpose?
- How has the company considered various disturbances in the supply chain?
- How has the company considered the changing weather conditions caused by climate change in the handling and storage of hazardous chemicals?

The four first questions answer how sustainability is seen in the companies and what is their sustainability policy. The remaining seven questions concentrate sustainability in practice. The answers were analyzed as a qualitative analysis.

3. Results and discussion

The questionnaire survey included in the inspection questions proved to be a good way to perform the study. All the companies answered at least most of the questions. Often the main problem with questionnaire surveys is the low percentage of answers. Another advantage of the questionnaire survey included in the inspection agenda was, that the companies' answers could be specified by the inspector during the inspection. This brought some clarification to the answers provided by the companies. All the companies that participated in the survey were keen to talk about their sustainability issues and proud of their results in the sustainability issues. Many companies provided their sustainability reports either as an attachment or as a links. Many of the companies have certified their sustainability through either ISO 14001, ISO 45001, ISO 50001, and ISO 9001 certificates. Some of the companies use commercial programs for the follow-up of their success in handling sustainability.

3.1 Sustainability policies in the companies

The answers showed that sustainability plays a central role in all the companies that participated in the survey. Sustainability is important to the companies for their reputation and particularly their customers. Most of the companies release a public sustainability report annually. Environmental responsibility, carbon neutrality and climate change were mentioned in most of the answers. Also, the scarcity of natural resources, human rights, ethical rules/code of conduct, human rights, equality, financial responsibility, recycling, and renewability were mentioned. The answers did not directly include all the United Nations 17 sustainable goals (United Nations 2012). The UN sustainability goals: no poverty, zero hunger gender equality and peace, justice and strong institutions were not in the focus of this study. However, the questions covered most of the ESRS (European Commission 2023), namely Climate change, Pollution, Water and marine resources, Biodiversity and ecosystems, Resource use and circular economy, Own workforce, Workers in the value chain, Affected communities, Consumers and end-users, Business conduct (Table 2).

Table 2: ESRS Sustainability goals of the companies

ESRS Sustainability goal	Number of companies
Climate change	11
Pollution	11
Water and Marine resources	5
Biodiversity and ecosystems	3
Circular economy	4
Own workforce	11
Workers in the value chain	11
Affected communities	2
Consumers and end users	2
Business conduct	11

The companies mentioned minimizing greenhouse gas emissions, water consumption and environmental effects as their goals for environmental responsibility. Zero emissions were mentioned in all answers. Some of the companies included pollution prevention, sustainable use of natural resources, and biomaterials as their environmental goals.

Zero accidents, overall occupational safety, and employee commitment got the greatest number of mentions as companies' sustainability goals with respect to employees. These issues are addressed in the Tukes inspections, however the occupational safety legislation in Finland is not supervised by Tukes, but another government authority. The companies reported that the same safety requirements apply both to their own employees as well as subcontractors.

The companies mentioned goals with respect to logistics, supply chain, traceability of raw materials and the efficiency of the use of raw materials, especially water and energy. Some of the companies use a sustainability

evaluation tool that they use and expect their suppliers to use as well. Several companies referred to their sustainability reports in the answers of the third question, which made the answers difficult to evaluate.
Continuous development of sustainability is generally part of the corporate strategy. Many companies also see this as part of investments in fossil-free production in the future. Based on the answers, responsibility is also of interest to companies' customers as well as other stakeholders and is therefore an essential part of companies' operations. The companies mention security off supply, energy and resource efficiency and carbon neutrality as important goals and their development is constantly measured and followed. End users of the products and investors are interested in the sustainability of the products and therefore developing the sustainability is a key to the companies' success.

3.2 Sustainability in practice

There were many ways to ensure responsibility in the supply chain primarily related to the origin of the raw materials. Many respondents have a code of ethics or a Code of Conduct for suppliers and suppliers that do not meet the terms, are not accepted. Some respondents have an approval process for the introduction of new chemicals, and companies actively seek to switch chemicals to less hazardous ones where possible. This can be emphasized as a good practice. The companies reported that waste chemicals are forwarded to a downstream processing company with the appropriate permits for waste processing. Waste chemical labeling or sharing information on the contents of the wastes was not described in the answers. Thus, the companies are not thoroughly following the sustainability of the whole supply chain. If the waste chemicals are not labeled there is a risk that the chemicals might be mixed further in the waste logistics chain which could result in unpredictable chemical reactions and accidents. It is evident, that the waste chemical issue should be raised in Tukes inspections in the future.
Examples of decision-making included the fact that suppliers are not used if they do not meet the subscriber's criteria (e.g. code of conduct). Some responses also mentioned rapid transitions from fossil fuels to biofuels. Several companies have a dedicated sustainability person or team. Investments must meet determined sustainability criteria such as energy efficiency or carbon neutrality.
The companies take care of compliance with the requirements of contractors/subcontractors through safety training, orientations and work permits, risk assessments, as well as commitment to the client's ethical rules. Often the risk assessment is included in the work permit. All the companies require contractor's obligations from their subcontractors. In all responding companies, the qualifications of the person performing the work are checked before ordering the work or granting a work permit. This can also be emphasized as a good practice. The expertise of subcontractors is ensured by checking references and auditing new operators. Many also rely on well-known subcontractors.
Suitability of the equipment was secured through management of change procedures, accurate device descriptions, standards, and legislation. The suitability of the equipment was considered mainly in the pre-engineering stage. The equipment must fulfill directives, and some of the companies use operability, quality and performance tests for the equipment. The plants have prepared for supply chain disruptions, for example, with the mapping of alternative suppliers and spare parts warehouses.
Natural hazard triggered technological accident (Natech) refers to a natural phenomenon such as a flood, forest fire or earthquake secondary to a hazardous substance accident at an industrial plant (OECD 2022). An accident can be, for example, a fire, an explosion, or a leak of a dangerous substance. The companies had mainly prepared for natural phenomena caused by climate change by carrying out a risk assessment. In particular, the identified risks were flooding and high winds. However, despite the assessment, the companies had not recognized natural hazards as a risk. The companies stated that they are not located in flooded areas, or they had made a contingency plan but had not performed any actions to set the plan into motion. Couple of companies had had flooding issues either at the plant site or in a nearby river. In recent years, heavy rain, flooding, extreme amounts of snow, cold and heat waves have become more frequent even in Finland. The companies should recognize these threats be prepared for these.

3.3 Main findings and proposals for action

Sustainability is currently not included the legislation supervised by Tukes except for conflict minerals. This means that sustainability questions deferred substantially from standard inspection questions.
All the participating companies answered to almost all the questions, which proves that a questionnaire survey coupled with the yearly site inspections is an effective way to get information on companies' insights on different matter. Similar surveys could be used for other fields as well. However, the sampling was rather small, and the companies represented mainly large companies that are Seveso sites. Most of the companies also belong to an international group. In the future, the questionnaire should be repeated to a larger pool of companies, including also lower tier sites. With a larger company pool, it might also be possible to see if there are differences

between industries and/or if the insights differ between large international and small domestic operating companies.
The answers proved to be quite long, which means that the companies were enthusiastic to talk about their sustainability work. It could also be seen that the questions should have been more precise. Many of the answers were in very general level and some of the companies seemed to answer a completely different question. However, the aim of the current study was to find out how the companies see sustainability and how it is incorporated into their daily activities. In this matter, the questionnaire survey was successful.
Based on the responses, the following issues are proposed to be raised in the future inspections:

- companies should develop the labelling of waste chemicals and information on them to the downstream handler to prevent accidents in further processing (producer responsibility)
- inspections and customer communications should emphasize preparedness for accidents caused by natural phenomena.

Based on the results and experiences of the 2023 questionnaire survey, a new survey has been implemented in 2024 inspections. The new survey handles the afore mentioned issues and the number of companies is being enlarged. The results of the second questionnaire will be reported to Tukes customers in the beginning of 2025. There is also ongoing work at Tukes to implement sustainability issues in the supervisory work of also other fields supervised by Tukes, products and services. Further handling of sustainability in site inspections depends on how the CRSD and EU regulation concerning batteries and waste batteries will be addressed in the national legislation.

4. Conclusions

The questionnaire survey incorporated into the inspection proved to be a good way to get information on a specific topic from the industrial facilities under Tukes supervision. All the companies answered to most of the questions. Responsibility is an important theme in companies and often written in their strategy. In addition to being fossil-free, responsibility has taken diversity and ethics into account. The answers given by the companies to the questions of sustainability were long and the companies were enthusiastic to discuss the theme. Sustainability also extended to the subcontracting chain and the origin of the materials. Chemical acceptance procedure that is in use in some companies is considered a good practice that would be preferable to spread across the industries handling hazardous chemicals.
The treatment of waste materials was not discussed more precisely in the answers. the companies merely stated that the waste is delivered to a further handler with proper permission. How accurately the contents of the waste fractions are reported to the downstream handler is not described in the answers. Nor was it described how to prevent mixing of different waste materials and reacting with each other with these questions.
The effects of natural phenomena on the chemical hazards of plants (Natech) had been investigated by several companies, but they were rarely identified. Not even though a couple of companies had had flood-related situations on the plant site or in its immediate vicinity.
The number of companies that the questionnaire survey was sent was limited and it consisted mainly of big companies that are used to sustainability reporting. In the future, a similar questionnaire survey should be sent to a larger number of companies including lower tier companies. This would give more information on how sustainability is seen in different company sizes and give information if there are differences between industries. Based on the results and learnings of this study, a new questionnaire survey is being included in the inspections of 2024 with a larger number of companies and more precise questions concerning waste chemicals handling and Natech related issues.

Nomenclatur

CRSD – The EU Corporate Sustainability Reporting Directive (CSRD)
ESRS – the European Sustainability reporting Standards
Natech – Natural hazard triggered technological accident
SME – Small and Medium size Enterprizes
Tukes – Finnish Safety and Chemicals Agency

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