LIFE / FIT FOR REACH

Final report

Valsts reģionālās attīstības aģentūra

LIETUVOS RESPUBLIKOS APLINKOS MINISTERIJA

KLK KESKKONNAINVESTEERINGUTE KESKUS

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Valsts reģionālās attīstības aģentūra

LIETUVOS RESPUBLIKOS APLINKOS MINISTERIJA

KIK KESKKONNAINVESTEERINGUTE KESKUS

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To partner companies – “Epokate”, “Henkel Balti”, “Marijampolės pieno konservai”, “Mayeri Industries”, “Tenachem”, “Vakarų Metalgama”

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1 Preface

We wrote the LIFE proposal *'Fit for REACH'* in 2014. The environmental problem addressed by the project pinpointed the fact that *hazardous substances reach the environment, disturb ecosystem functions, have endocrine effects, accumulate and reach the human food chain.* We stated that, *although the effects are known, the concerned substances are still in use and are emitted by the industry. Regulations seem to have too little effect, although they are in place and prioritize substances of very high concern (SVHC).* We also pointed out the *lack of awareness at the industry, mainly at small and medium size companies (SMEs) downstream of the supply chain using substances and mixtures in production processes and being often unaware of what they contain.*

We illustrated the reasons why companies in the Baltic States were lagging behind those in the Nordic countries or Germany in their chemicals risk management, in being environmentally concerned and striving for being recognized as 'green': mainly because they were lacking not only the comprehensive picture of the chemicals risk management, but also the sheer amount of years of practice and experience.

Therefore, we offered in this project a full 'chemicals management package' to companies in the Baltic States including: capacity building, exercising chemicals inventories and basic chemicals risk management practices, guidance how to follow legal obligations on specific substances and proposals on how to implement the substitution of chemicals in their own products and processes, possibly also achieving resource efficiency gains.

We wanted to make Baltic SMEs *Fit for REACH* and demonstrate that substitution pays off economically and for the environment. Moreover, we wanted to demonstrate a number of cases of successful substitution and reach a large number of target group companies in the Baltic States.

After five intensive years in the project, we can state: the use of many hazardous substances has been reduced, mainly by substituting them with less hazardous chemical or technical alternatives, and, in particular, we have paved the road by changing the mind setting of companies and enabling them to do proper chemicals management by themselves after the project's end. We produced an enormous number of supporting tools, info materials, publications, and we can proudly say: we have reached the target group: there are not many companies in the Baltic States which have not heard about the LIFE *Fit for REACH* project.

We, the core group of project experts and all participating companies, have learned a lot, we have done a lot, and hereto we are trying to document it in a report for you, dear reader, and hope you find it interesting and useful. Best regards,

Heidrun Fammler

LIFE *Fit for REACH* project manager, Baltic Environmental Forum

2 Overview of the project

2.1 Project aim and objectives

The overall aim of the *Fit for REACH* project was to reduce emissions of hazardous substances, preferably by substituting these with less hazardous alternatives, thereby preventing damage to the environment and human health. As humans are deemed to be part of the environment, human health is considered a subject of protection and is a factor in all activities and considerations in the project.

- Four objectives were defined which were expected to contribute to the project's overall aim of risk reduction:
- Substitute hazardous substances, in particular substances of very high concern (SVHCs) with less hazardous alternatives, including chemicals, technologies or organizational measures.
- Reduce the use of hazardous substances in products and processes by resource efficiency measures and by eliminating the need to use these substances.
- Increase awareness and competences on chemicals risks in companies in order to improve their overall chemicals risk management performance in order to enable staff to perform the necessary tasks and to communicate their achievements to the customers and the general public.
- Influence markets to increase supply of and demand for products that are free from or contain comparably low amounts of hazardous substances.

2.2 Project approach

The main target group of the project were companies using chemicals in their production processes (downstream users). These were formulators of mixtures, users of substances and mixtures and producers of articles which either incorporate substances into these articles or use them as processing aids. The focus of all the project activities was to assist and support companies in improving their chemicals risk management, including substitution. The main support areas and methods applied by the project team consisted of:

Awareness raising (information provision) via direct consultation or in the frame of information events organized at the national level as well as in international seminars and various written materials.

Capacity building, raising competences and facilitating certain actions mainly via trainings and consultation.

Advice in decision making, including prioritizing action needs in chemicals risk management and/or research for information to evaluate (alternative) substances and mixtures.

Development of guidance and tools which were used in the consultations and trainings of the project but can also be applied by companies as such.

Research on and development of reports on specific issues, including literature research, shop visits and inspection of products, surveys and interviews.

The consultation of companies was based on the understanding that all companies make autonomous decisions. It had to be and it was indeed accepted by the team that the companies' decision criteria not only consisted of the chemical safety aspects, but also included considerations regarding legal requirements and sector standards, finances, markets, corporate strategies, technologies, supplier and customer relations, investment planning, and employment. This is important to note in particular in the evaluation of the cases of substitution, as not only environmental concerns were considered in the prioritization of substitution and the assessment of the suitability of alternatives, but many other factors were considered as well.

The project was also intended to widen the perspectives on the opportunities and benefits of chemicals risk management, provide good practice examples in order to motivate more companies to improve their chemicals risk management systems and, on top to that, to develop respective competences after the end of the project.

2.3 Project implementation

The project focused on several elements of chemicals (risk) management that are relevant for companies. These areas are described and discussed in the following chapters:

- Awareness, knowledge and skills on chemicals management;
- Compliance with legislation;
- Management systems and prioritization of action needs;
- Green markets and purchasing;
- Reduction of use via increasing resource efficiency;
- Reduction of use via substitution;
- The role of national authorities;
- Societal conditions and policy context.

2.4 Overview of activities

The LIFE *Fit for REACH* project involved many different activities contributing to the awareness of, knowledge of, competences in and implementation of concrete use reduction actions in the companies. In addition, surveys and particular research were done to get more information about the target group and some particular aspects of chemicals management, such as the way how safer products are promoted in the markets. In addition, a multitude of communication and dissemination actions were performed, among others, to anchor the project in the Baltic societies and public administrations, to raise awareness in the general public, and to give companies from other countries the opportunity to learn from the Baltic experience.

The following figure shows the complex structure of the project and indicates the different types of activities and to which level of chemicals risk management they contributed.

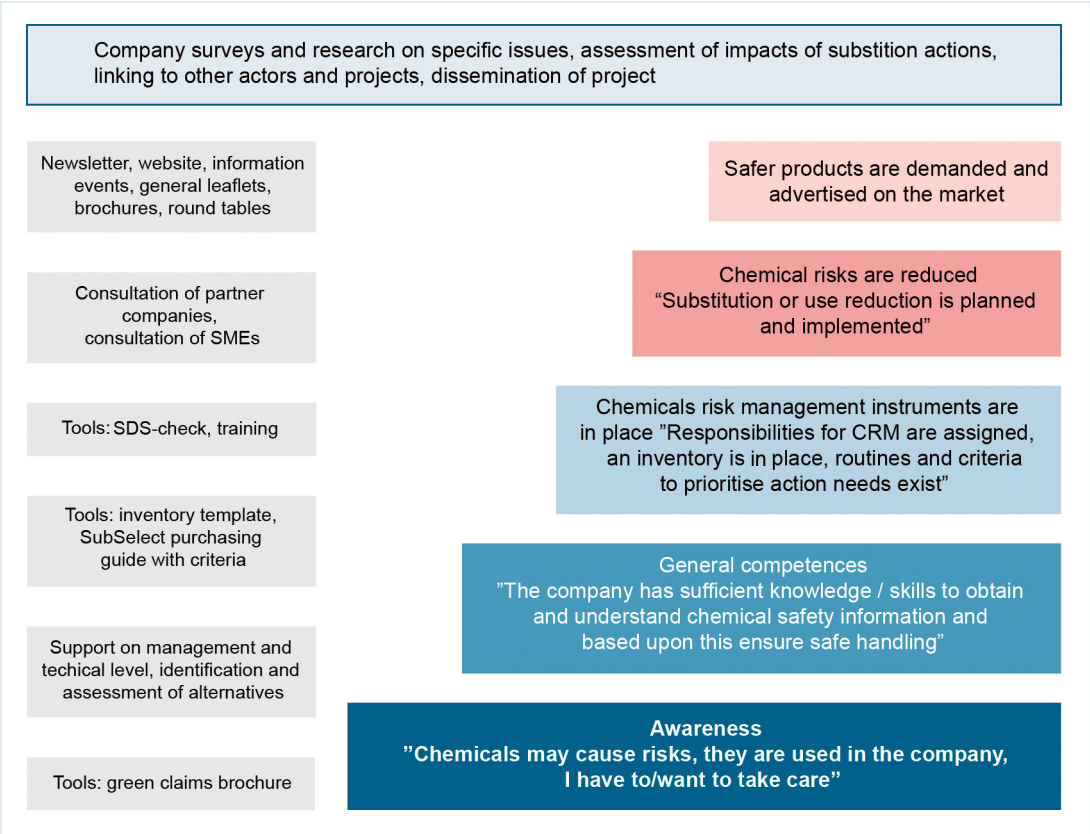


Figure 1: Overview of project activities and their contribution to chemicals risk management

2.4.1 Substitution cases in the partner companies

At the core of the work was the consultation of companies about substitution and chemicals risk management. Six companies which were partners of the project presented their substitution priorities as early as in the project application stage and implemented these changes over the entire duration of the project, including the identification and assessment of alternatives, purchase of the necessary equipment, testing the product performance after substitution, and, finally, upscaling of the production and firm integration of the new product design and recipe. The following table presents the basic information on the cases in the partner companies.

Table 1: Overview of cases of the partner companies

Company	Country	Sector/ Activity	Substance and hazardous properties	Case description
Substitution cases				
Epokate	EE	Construction Formulation of construction chemicals	4-Nonylphenol (NP) EDC on the candidate list Repro Cat. 2 (harmonized C&L)	Complete substitution of NP in a two-component epoxy resin for floor covering by several changes in the recipe
			Benzyl alcohol (BA) Harmful if swallowed or inhaled (self C&L); VOC	Substitution of BA as a thinner in various products and product components, amongst others, epoxy resin for floor covering
Henkel		Construction Formulation of construction products	Methylene chloride (MEC) Carc. Cat 2 (harmonized C&L), Irritant, Muta Cat 2, STOT and others (self C&L)	MEC was used as a cleaning agent and replaced with another agent requiring heating and offering slightly longer times of use
Mayeri		Formulation of household detergents and car care chemicals	Sodium perborate (SPB) Repro. 1B on the candidate list Eye damage, STOT, acute toxicity (self C&L)	Sodium perborate was replaced with enzymes in all recipes. A bleaching agent was used as an exemplary product
			Sodium percarbonate (SPC) Eye irritant Cat. 2 (harmonized C&L)	Sodium percarbonate was assessed but ultimately not replaced; the recipe was changed by adding enzymes

Com-pany	Country	Sector/ Activity	Substance and hazardous properties	Case description
Marijampolės pieno konservai	LT	Food processing Production of canned milk	Bisphenol A (BPA) EDC and Repro Cat. 1B on the candidate list Skin sensitizer (harmonized C&L) Chronic aquatic toxic (self C&L)	BPA was used in several parts of milk cans, including the sheet coating and the cap. For all areas of use, substitutes were identified and implemented, leading to a complete phase-out of the target substance
Vakarų Metalgama	LT	Ship building and repair Metal processing, metal coating	Xylene Acute toxic by inhalation and dermal contact, skin irritant (harmonized C&L); VOC 2-methoxypropanol Repr. Cat. 1B (self C&L); VOC	The amount of used Xylene was reduced, and 2-methoxypropanol was substituted in the thinners of the coating system. They were (partly) replaced with other solvents
Tenachem	LV	Construction Formulation of construction chemicals	Di-'isononyl' phthalate (DINP) No C&L, but restriction in toys and childcare articles	DINP was substituted with Diisononyl 1,2-cyclohexan-edicarboxylic acid (DINCH) in a sealant used for insu-lated glass units
			Dibutyltin dilaurate (DBTD) Repro 1B, Muta 2 and STOT RE1 (harmonized C&L) Acute and chronic aquatic toxicity, sensitization and acute toxicity (self C&L)	DBTD was used as a catalyst in a sealant and replaced with dioctyltin dilaurate
			Resource efficiency cases	
Henkel	EE	Construction Formulation of construction products	Reduced use of Methylene diphenyl diisocyanates (MDI), polyol blends and other sub-stances	Quality control of the input materials was improved thus enabling to halt the production of polyurethane earlier in the event of quality problems
Marijampolės pieno konservai	LT	Food processing Production of canned milk	Change of use of some basic chemicals	The disinfection process was changed, which also involved the change of chemicals, but all the replacements featured low toxicity profiles

2.4.2 Substitution cases in the partner companies

In total, 76 companies were consulted regarding their chemicals risk management, and, in particular, attention was focused on the possibilities and opportunities to substitute substances of concern in their products and processes. Originally, the activities were planned for small and medium size enterprises (SMEs) but it was later decided to also include large companies aiming to improve their performance in the work. The following figure shows the type of the participating companies according to their sectors and sizes.

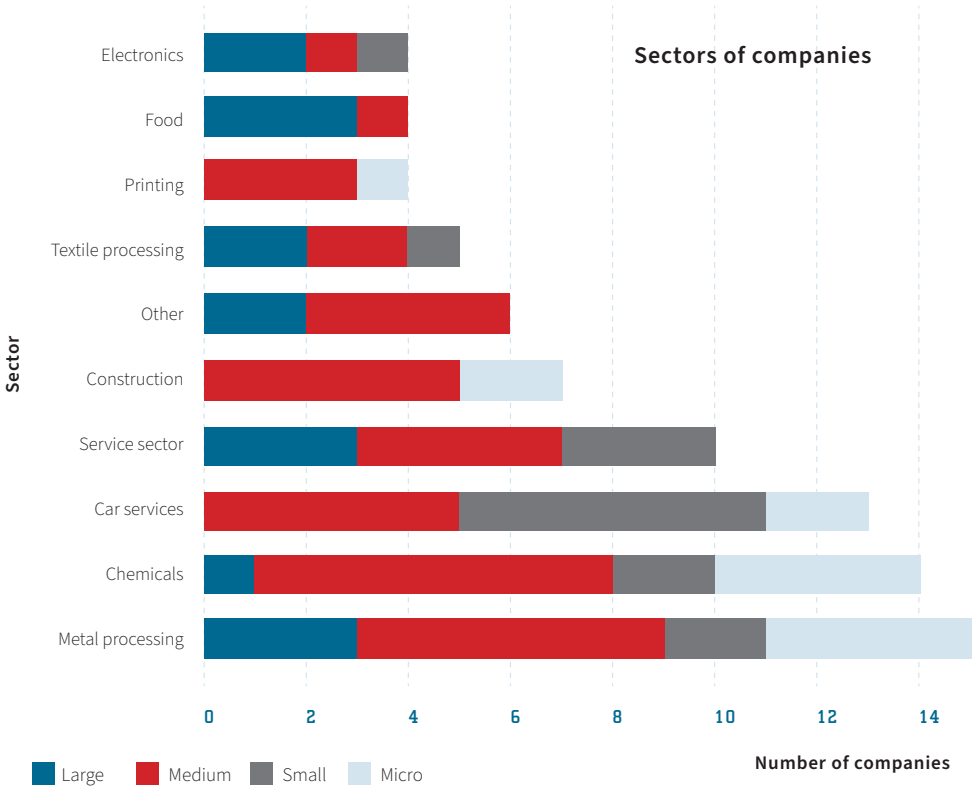


Figure 2: Overview of companies participating in the consultation activities

A large share of the work involved the identification of companies, finding a contact person in the company to talk to, and motivating them to participate. The information source for company identification included registers of the national competent authorities (helpdesks) and regional authorities, as well as internet search and information provided by other companies. The work flow consisted of an initial contact

by phone and information provision in writing (the project leaflet, reference to the website and relevant materials, potentially upcoming events, etc.). Usually, follow-up calls were made, and, whenever companies got interested, initial visits were agreed.

Depending on the state of chemicals risk management in the companies, the interests and priorities or known problems, the project experts defined the work areas for consultation by respecting both the aim of the project of enhancing substitution, and the companies' wishes for (partly) highly specific support. Some companies were consulted only once (and on a particular issue), while others were visited and consulted several times and on several topics.

The results from the consultation of companies are presented in various sub-sections of **Chapter 3**. A list of all cases with titles telling what was achieved is provided as **Annex 1** of this report.

2.4.3 Publications

A number of publications were developed within the scope of the project. Among these, there are four publications in journals:

- Oguzcan, Semih; Dvarioniene, Jolanta; Tugnoli, Alessandro; Kruopiene, Jolita. Environmental impact assessment model for substitution of hazardous substances by using life cycle approach // Environmental pollution. 2019, vol. 254, pt. A, art. No. 112945, p. [1-11]. DOI: **10.1016/j.envpol.2019.07.113**.
- Oguzdjan, Semih; Kruopienė, Jolita; Dvarionienė, Jolanta. Approaches to chemical alternatives assessment (CAA) for the substitution of hazardous substances in small- and medium-sized enterprises (SMEs) // Clean technologies and environmental policy. 2017, vol. 19, iss. 2, p. 361-378. DOI: **10.1007/s10098-016-1291-z**.
- Oguzdjan, Semih; Randė, Aušra; Dvarionienė, Jolanta; Kruopienė, Jolita. Comparative life cycle assessment of water-based and solvent-based primer paints for steel plate priming // Environmental research, engineering and management = Aplinkos tyrimai, inžinerija ir vadyba. 2016, vol. 72, iss. 2, p. 83-96. DOI: **10.5755/j01.erem.72.2.16236**.
- Reihlen, Antonia; Fammler, Heidrun; Jamtrot, Arne; Futter Martyn; Simanovska, Jana. Substitution requires all possible support // **elni review**. 2018, iss. 2, p. 39-46.
- Our reports from international seminars are published on the project website, including:
- **Seminar on indicators** to measure improvement in chemicals management and a **background paper**.
- Seminar **Enhance substitution and support better chemicals risk management**.
- **Summary of discussions from the Seminar on enforcement practices with regard to the REACH Regulation**.

The **indicator concept** developed to complement the LIFE programme's key performance indicators was published at the beginning of the project. It includes a description of the initial situation in the partner companies regarding their substitution cases.

In the research report "**Study on Environmental Responsibility of Small and Medium Enterprises**", the results of a survey involving 278 companies in Estonia, Lithuania and Latvia are presented. The companies were asked about their environmental policies, their motivation to be active in the field and their approaches towards risk management in general. Questions on substitution were also posed. The survey results are one of the information sources quoted in the further report on the findings from the project activities.

In order to deepen the understanding on the environmental responsibility of companies and to learn more about their experiences on green policies, 30 companies were interviewed. From each of the three Baltic countries, 10 companies were selected representing different sizes, sectors and supply chain roles. The results are summarized in a **report** which is quoted in the description of findings as 'qualitative interviews'.

A set of factsheets was produced to a) make documented substitution cases from other countries and sources which are better accessible to Baltic companies, and b) inform about the project and its particular activities (substitution). The experience of others is available on the **project website**. Some best practice examples about the substitution and reduction of the use of hazardous substances implemented in the project are published as practical examples on the project website.

From the consultation of companies, 9 cases were described and provided to the database of substitution cases hosted by *SubSport Plus*. **SubSport Plus** is an internet portal (originating from a former LIFE project) providing information, guidance and tools on substitution to companies. The case story database of the portal aims to inspire companies about substitution and make first-hand information on successful substitution available as well as give access to information on the alternatives. In this regard, the cases of the *Fit for REACH* project briefly outline why companies chose to substitute and the alternative they selected. The case stories also provide background information on the benefits and efforts of substitution.

2.4.4 Guidance and tools

Several guidance documents were developed either for use during the project activities or based on the findings from the project work:

- **Guidance on green claims**. The guide introduces the reader to various types of green claims and provides rules as to how these guidelines should be developed and substantiated in accordance with the rules to prevent unfair

competition; the guide gives some practical examples from do's and don'ts.

- **Guidance on chemicals-related purchasing criteria**: the guidance outlines principles for organizing purchases with regard to chemicals-related issues and gives examples of which types of criteria and checks could be implemented in companies.
- Guidance on classification and labeling: the ECHA guidance on classification and labeling was translated to the national languages for easier application: **CLP guidelines in EST**, **CLP guidelines in LV**, **CLP guidelines in LT**.
- **FAQs on Substitution**: this brochure gives answers to the questions most frequently asked by companies in the course of the project. They are grouped into several topics of chemicals risk management and provide links to further information sources.
- **Hazardous substances management – no big deal**: this comic style publication gives basic advice on chemicals risk management to those companies which have not yet implemented activities on a routine basis.

Three tools were developed to facilitate the implementation of chemicals risk management and substitution tasks:

- An example **template** for keeping the chemicals inventory: the template provides the option to compile information on chemicals in use in the form of a simple chemicals inventory. It is an *MS Excel*® sheet which contains several explanations of various information items.
- **A checklist:** safety data sheet quality: the safety data sheet (SDS) refers to a specific chemical and should provide sufficient information regarding safe handling and use. The checklist supports structured assessment of whether or not the supplier's information is complete and of sufficient quality. The checklist is provided as an *MS Excel*® file.
- **SubSelect**: SubSelect is an *MS Access*® based free tool supporting the screening and comparison of hazardous substances and mixtures with regard to their toxicity and some aspects of sustainability. It was developed by the *German Environment Agency* to provide assistance regarding particular chemicals to those users who have only basic knowledge of chemicals.

2.4.5 Events

Various types of events were conducted throughout the entire duration of the project:

- Information on chemicals risk management including information on legislation, substitution, inventories, classification and labeling and workers protection was provided, partly in cooperation with the national authorities/helpdesks. This included:

- **Information days:** 14 info days were organized at the beginning of the project for 828 participants to inform the companies about the project and the possibility for participation.
- **Seminars and trainings:** 45 seminars and trainings about chemicals risk management and substitution were held in three countries with the total number of 1581 participants.

- The project's tools were introduced to 204 participants during 13 events.
- The guidance on green claims as well as purchasing criteria was introduced to 1048 participants during 30 events.
- Some topics were introduced and discussed more in-depth, such as green claims, purchasing criteria or alternatives assessment (SubSelect) and substitution in the form of seminars and trainings.
- The national stakeholders were met at 12 round table meetings to inform about the project's progress, interim results and outcomes. The next steps were discussed and/or feedback was collected and help in the implementation of tasks was provided; in total, 182 stakeholders participated in these meetings.
- Press conferences were organized to make the project more widely known, and to disseminate the results at the national level.
- International seminars were conducted on the enforcement, enhancement of substitution and on measuring the success of substitution; (interim) results of the project were presented to a larger audience which was involved in the discussions, and the project was presented at the final conference.
- The project experience and examples were presented to EU members (e.g., Slovak and Polish stakeholders) as well as to countries outside the EU, for example in Serbia.
- The project team met regularly to discuss the project implementation.

3 Activities and outcomes of the project according to the focal areas of chemicals risk management in companies

The following presentation of findings from the project is based on the overall experience, observations and outcomes of the entire work of the project. The main information input is the contacts with the companies during consultations and events. In addition, surveys and interviews provided information on some issues. As different companies participated in different activities and some companies only answered to the survey but are not directly known to the team, it is difficult to generalize the obtained results. Nevertheless, viewing all the information together allows getting good general understanding of the current situation.

When reading the following chapters, it should be kept in mind that this is a collection of impressions and that, in most of the findings, a range exists rather than only one type of the 'average' situation and company is being discussed. Wherever possible, individual information sources from the project activities are referenced to, and the reader is given understanding of the representativeness of the statements. The information basis for the following findings ranges from 278 participating companies (SME survey) via the company consultations (82 evaluated cases) to the cases of partner companies (6 companies). Sometimes, individual cases are also quoted in order to illustrate a particular situation.

3.1 Awareness, knowledge and skills on chemicals management

Implementing chemicals risk management activities in companies requires that a company, including its top management, is aware of the chemicals risks and is dedicated to minimizing them. Awareness is understood as having basic understanding of what chemicals are, that they are used by the company and that they may have adverse effects on human health and the environment if they are emitted by the products and in the course of the processes.

The basic competences and skills needed for proper chemicals risk management are the understanding of the chemicals classification and labeling system and the tools to communicate on hazards and risks, namely, hazard (H) statements and precautionary (P) statements, hazard pictograms and warning words. Knowledge of how to read safety data sheets and use the information in the processes occurring

in the activity of the companies is also a core competence of chemicals risk management. As chemicals risk management involves activities of various departments in a company, e.g., those dealing with occupational health and safety, waste management, purchasing and product quality, as well as the level of the top management (the ultimate decision level), either several persons should have these competences, or (very) good cooperation should exist to ensure that the competences are shared across the company.

In addition, downstream users of chemicals should be able, among others, to implement risk assessments of chemical agents at workplaces, to establish and maintain a chemicals inventory, to classify wastes containing hazardous chemicals, to assess compliance with restrictions and other product related requirements.

3.1.1 Assumed or known deficits before the project started

Previous projects showed that competences on chemicals are steadily increasing in the Baltic States but can generally be considered as 'low'. As in other European countries in particular downstream users at the end of supply chains are often insufficiently aware of chemicals risk management or assign a low priority to chemicals risk management. This results in a lower level of the necessary competences and resources. Independently of their supply chain position, SMEs may regard chemicals risk management as important but still lack resources to implement actions and to assign the required resources to the responsible persons in the company.

The activities of all the stakeholders, including the continuous project work of the BEF in Estonia, Latvia and Lithuania over the past 20 years, have certainly improved the overall awareness level and the competences of the companies on chemicals risk management. Nevertheless, additional efforts are needed to further enlarge the number of aware companies that are able to handle and use chemicals (more) safely, to initiate actions beyond the legally required minimum, and to ultimately phase out substances of very high concern, as intended by chemicals legislation.

3.1.2 Project activities improving awareness and competences

All the activities of the project contributed to raising awareness and building capacities in the companies so that to manage chemicals risks. An important part of this goal was performed during direct consultations of companies. Further activities to raise awareness were information days, round tables and workshops as well as publications, including the project newsletter and website, news and information via local and social media and information leaflets on the substitution cases. The aim of capacity building was implemented by direct consultation and trainings as well as via the provided tools and guidance.

3.1.3 Findings on awareness and competences in the participating Baltic companies

Motivation to participate

The evaluation of the initial motivation of companies to participate in the project is represented in the following picture. It should be noted that the comparatively high share of companies with motivation to substitute was due to the project focus and the way how companies were approached. Furthermore, the initial motivation did not necessarily determine the work focus that was decided on in the further work process. The figures reflect only the main motivation. Several other reasons to participate may have existed as well, but they are not shown.

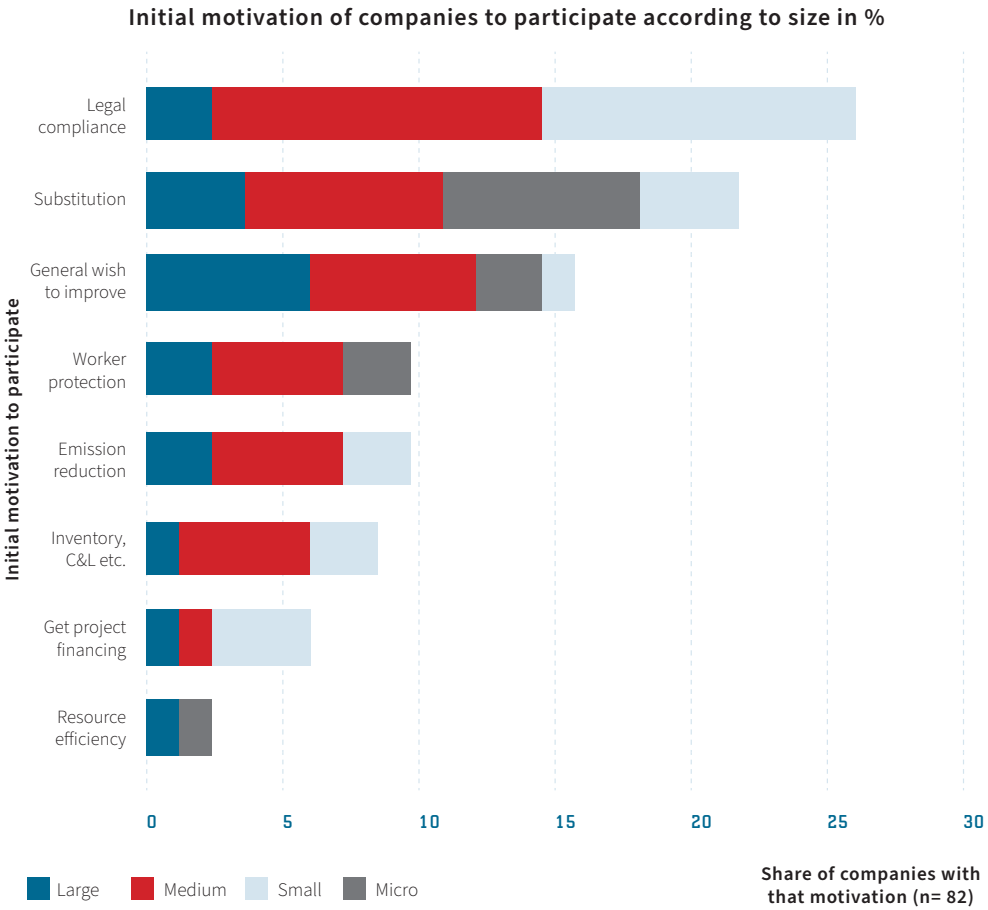


Figure 3: Motivation of companies to participate in the project according to the topic and size (source: evaluation of company cases, expert judgement)

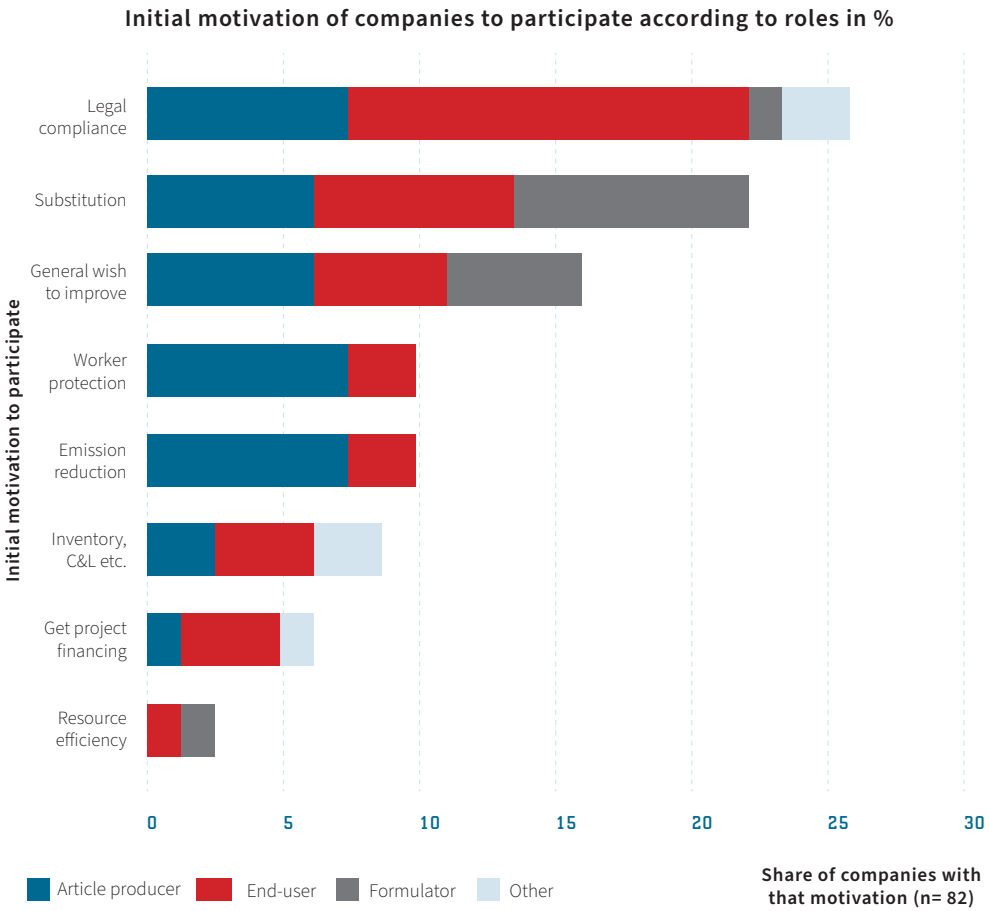


Figure 4: Motivation of companies to participate in the project according to the topic and role (source: evaluation of company cases, expert judgement)

Legal compliance was by far the most important motivation for the companies to participate in the project, followed by the aim to substitute, and a 'general wish to improve' the company's performance. The importance of legal compliance as motivation to act was also manifested in many other activities and is generally seen as a substitution driver. Most of the partner companies substituted hazardous substances due to the existing or expected legal obligations. Also, other consultation cases involved either regulated substances, such as PCBs[1], BPA[2] (restrictions), bo-

[1] Polychlorinated biphenyls are restricted according to the EU Regulation on Persistent Organic Pollutants, including in wastes.

[2] Bisphenol A is restricted under REACH as well as in food contact materials.

ric acid (authorization), MDI[3] (cosmetics regulation) or VOCs[4] (industrial emissions, permitting). Other companies wanted to avoid SVHCs on the candidate list. All the priority setting discussions on substitution included checking the currently existing or planned legislation.

The high motivation to substitute is not considered representative but is expected to be due to the offers of the project and its overall focus on substitution. The general wish to improve, which is also an important motivational factor, can be correlated to the findings of the SME survey and the qualitative interviews where environmental, ethical and social factors were stated to be of high relevance for the companies.

While workers protection only ranks fourth in the list, it should be mentioned that it was a motivation for almost all the companies participating in the project. This can be seen as indication that the workplace health is an important issue that is seen in clear relation to the management of chemicals and their substitution in general. Several companies managed to reduce or totally abandon the need to implement technical risk management measures (ventilation) or personal protective equipment (gloves, goggles) by their substitution activities, mainly where technological alternatives were chosen, but also cases were present where chemical alternatives were found.

The interest to get access to finances was a less important reason why companies decided to participate in the project, which correlates to the overall finding that human resources and advice tend to be more important in triggering substitution than the availability of funding.

State of awareness and competences

Overall, the industry work in the project confirmed that there are various levels of awareness in companies ranging from very low, i.e., not realizing that chemicals are used in the company, to very high, i.e., having differentiated management routines in place which are regularly checked, implemented and improved and which reach out beyond the legally required minimum activities. Deficits in awareness and competences were observed at all levels of the supply chain with a tendency to decrease along the supply chain and with company size, i.e., small downstream user companies are on average far less aware and competent than large companies formulating chemical mixtures.

Companies and authorities stated at the national round tables that the education system and professional trainings insufficiently provide information and competences on chemicals in general. New employees, including university graduates, were found to have too little knowledge on the practical management of chemicals

[3] The use of methylene diphenyl isocyanate is restricted in certain cosmetics applications due to its sensitizing properties.

[4] Volatile Organic Carbons are used as solvents in many industrial processes.

and the relevant legal requirements. Also, the awareness of the general public on chemicals risks was stated to be generally low.

The project team observed in all the activities that the awareness levels of many end-users and article producers (regarding their use of chemicals and their potential hazardousness) are low, which results in underestimation of the potential risks.

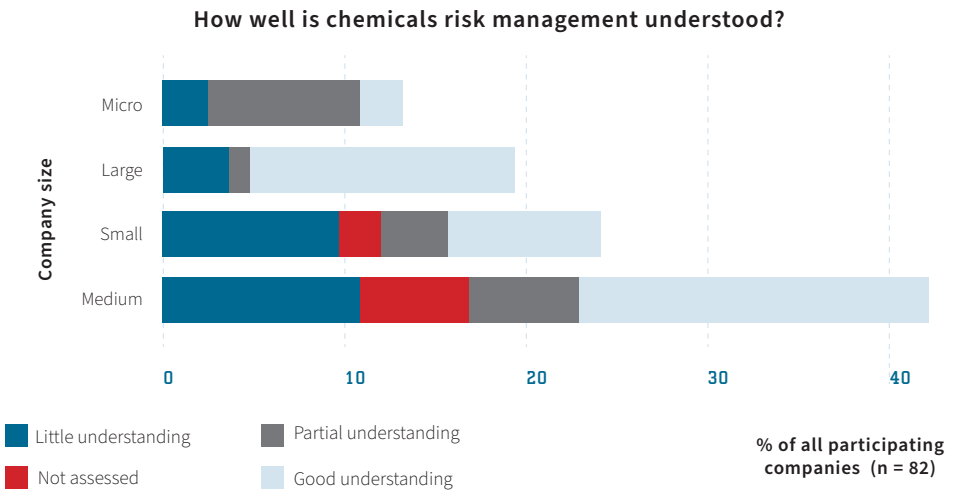


Figure 5: Share of companies and their basic chemicals risk management competences according to the company size (source: evaluation of company consultations; expert judgement)

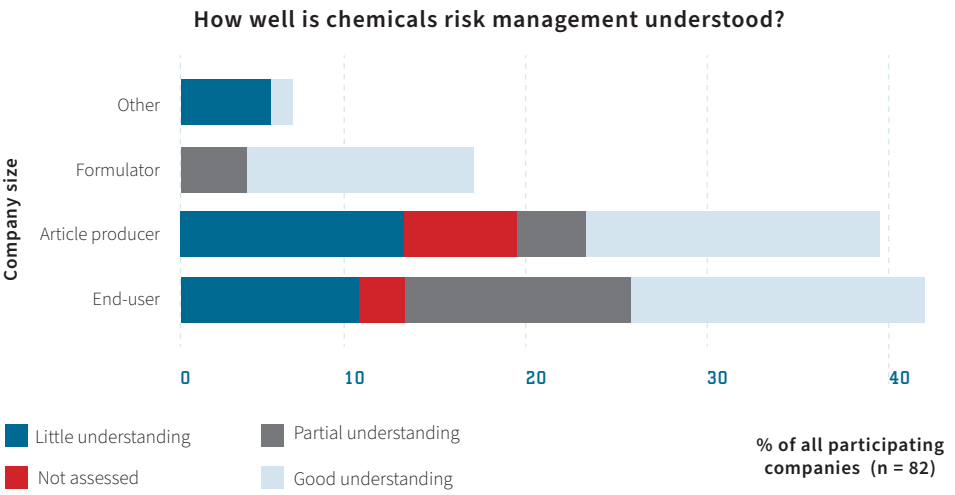


Figure 6: Level of basic chemicals risk management competences according to the supply chain role of the companies (source: evaluation of work with light case companies; expert judgement)

Those downstream users who were more aware still appeared to pay too little attention to their hazards because chemicals risk management is perceived as less important than other activities, or too costly to implement. The two following figures show the project team's evaluation of the basic chemicals risk management competences in companies according to company sizes and supply chain roles as summarized from the company consultations.

In some of the consultation cases, companies did not acknowledge any benefits of chemicals risk management but only focused on the costs, which resulted in a low priority given to the topic and lack of appreciation of the responsible person's work. The consultation of these companies tended to cease after a few discussions.

In general and according to the SME survey[5] and the qualitative interviews[6], companies evaluate their chemicals risk management skills, knowledge and abilities realistically. This facilitated the identification of and agreement on the deficits and support needs in the project.

The majority of companies in the qualitative interviews consider their in-house knowledge to be sufficient to understand and use information on chemicals and safety data sheets. Only 10% of them found their knowledge to be insufficient. Authorities and consultants in the project evaluate the companies' risk management competences slightly less well than the companies themselves.

Involvement of the top management

The work on chemicals risk management was implemented significantly better in the cases when the top managers had been convinced to act on chemicals safety in the company with a clear and well-argued problem description and solution proposal or when they had initiated the processes. The earlier was their involvement, the stronger was the commitment, and the more likely was the implementation success. In some cases, substitution had been prepared and regarded as necessary by the technical staff, but the company managers were still not convinced and stopped the activities.

Chemicals risk management responsibilities

According to the evaluation of company consultations, a number of companies did not clearly allocate the responsibility for chemicals risk management and/or did not allocate sufficient resources. Frequently, the responsible person(s) had not only this particular responsibility, but also other responsibilities and tasks, e.g., environmental or workers protection. It appears to be the exception that there is one per-

[5] Survey amoung 278 companies across the three Baltic countries via questionnaires.

[6] Qualitative interviews among ca. 30 companies in the three Baltic countries selected to be representative of different types of companies regarding their size, supply chain role, and sector.

son who is only responsible for chemicals management in a company. While this is generally not a problem, it may become critical if that person suffers from workload and needs to prioritize one's activities; in these cases, chemicals risk management is frequently ranked of low importance compared to other tasks and, hence, tends to remain ignored.

Companies with clearly allocated responsibility tend to perform better in chemicals risk management than those which do not allocate this responsibility appropriately.

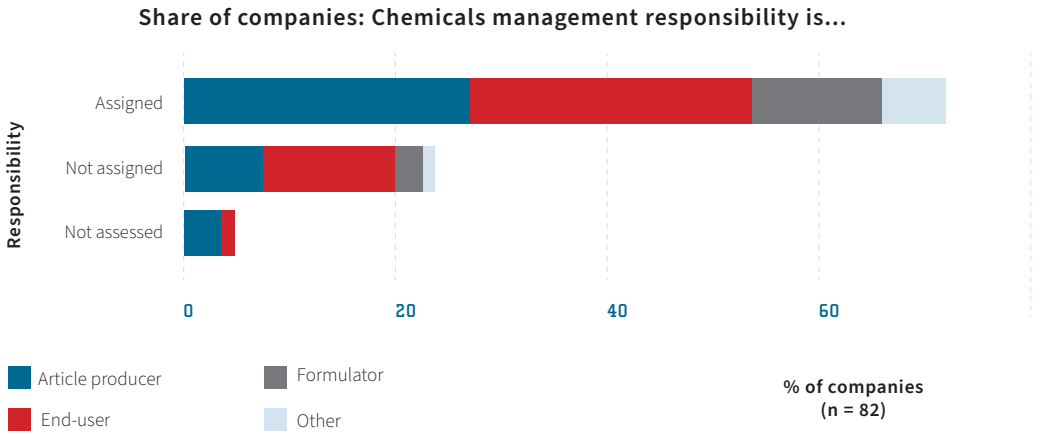


Figure 7: Assigned responsibilities for chemicals risk management in companies according to their supply chain role (source: evaluation of company consultations, expert judgement)

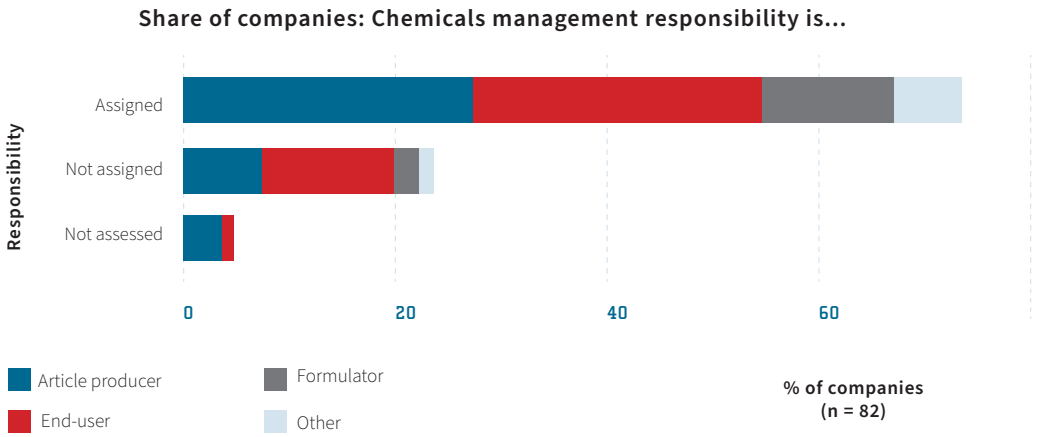


Figure 8: Assigned responsibilities for chemicals risk management in companies according to their sizes (source: evaluation of company consultations, expert judgement)

Hazard communication

It was observed throughout most of the project activities that many companies, in particular downstream users, are not sufficiently familiar with the classification and labeling system. While it is generally understood that chemicals may pose safety, health and environmental hazards, details of what types of effects they could have and how to protect oneself were not fully known. In addition, insufficient attention was being paid to product labels, even in the cases of severe hazards being involved, e.g., carcinogenicity. In a few (exceptional) cases, chemicals producing companies were unable to classify their products despite the legal obligation to do so.

In contrast to this, the warning symbols are generally well understood. During the project, some companies supported their workers with 'risk cards' at workplaces with brief and graphical information on the relevant hazards and protection measures from the safety data sheets.

Most of the consulted companies know their right to request and their obligation to have up-to-date safety data sheets of the chemicals they use. In the qualitative interviews, more than 90% of the companies see the safety data sheet (despite their generally acknowledged low quality) as an essential information tool for their work. However, they stated that it was impossible to use the entire amount of information due to the high workload of the responsible persons, as well as because of their partially insufficient qualification. This is reflected by impressions from company consultations where only the safety information was well understood and used (firefighting, first aid, PPE), whereas information on the product composition or its (eco-) toxicity was less frequently used. **Figure 9** and **Figure 10** show the degree to which the companies understand and have up-to-date safety data sheets, as evaluated by the project experts during company consultations.

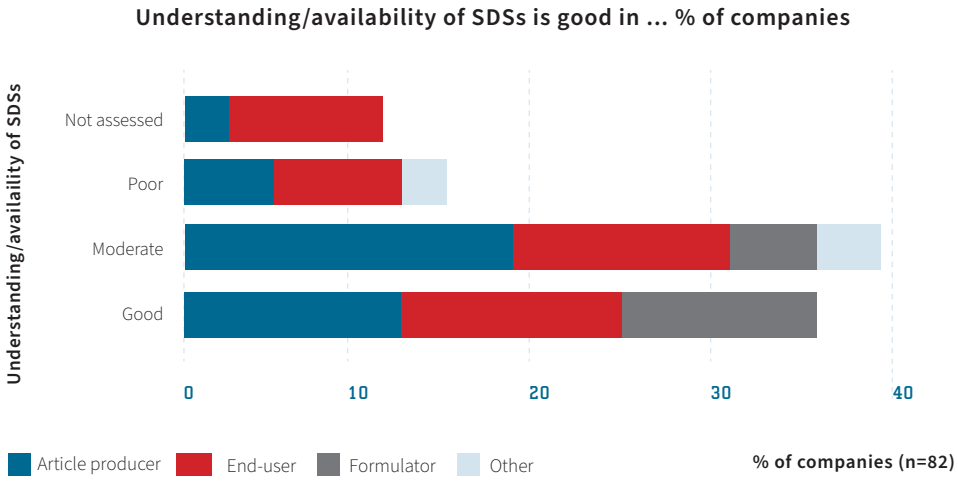


Figure 9: Competences on SDSs according to the role in the supply chain (source: evaluation of company consultations, expert judgement)

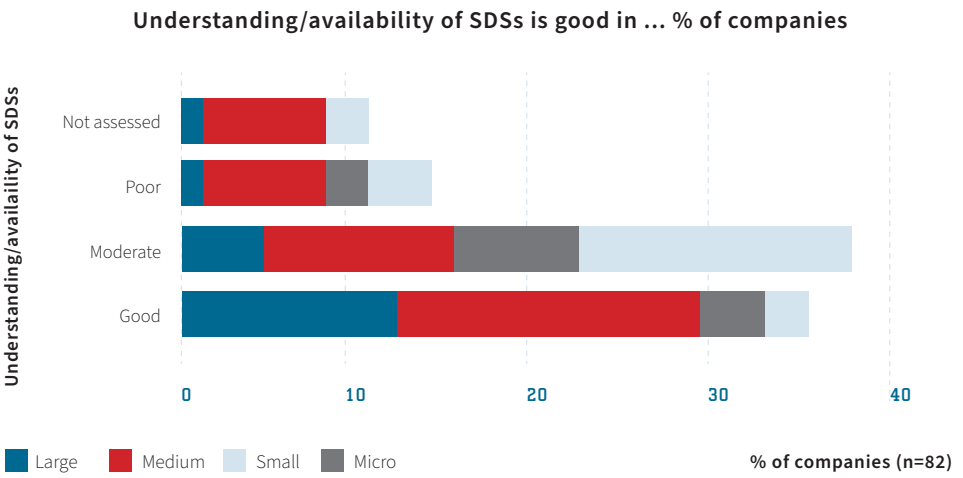


Figure 10: Competences on SDSs according to size (source: evaluation of company consultations, expert judgement)

According to the experiences from consulting companies as well as discussions during workshops and trainings, the most important sections of the SDSs are those with information on workers protection, including personal protective equipment, and on storage.

A view to the topics discussed during company consultations, which also indicates support needs and, hence, potential shortcomings in the chemicals risk management is provided in **Figure 11**. It is to be noted that, in many cases, more than one topic was being discussed, and, due to the project aim of initiating substitution, the topic of substitution was discussed with most of the companies (and partly worked on), unless they clearly indicated that more basic issues or more specific problems should be in the focus of work. The findings from evaluating the topics discussed with the companies do not represent the topics that Baltic companies normally work on in their chemicals management; the findings rather reflect the incentives set by the project.

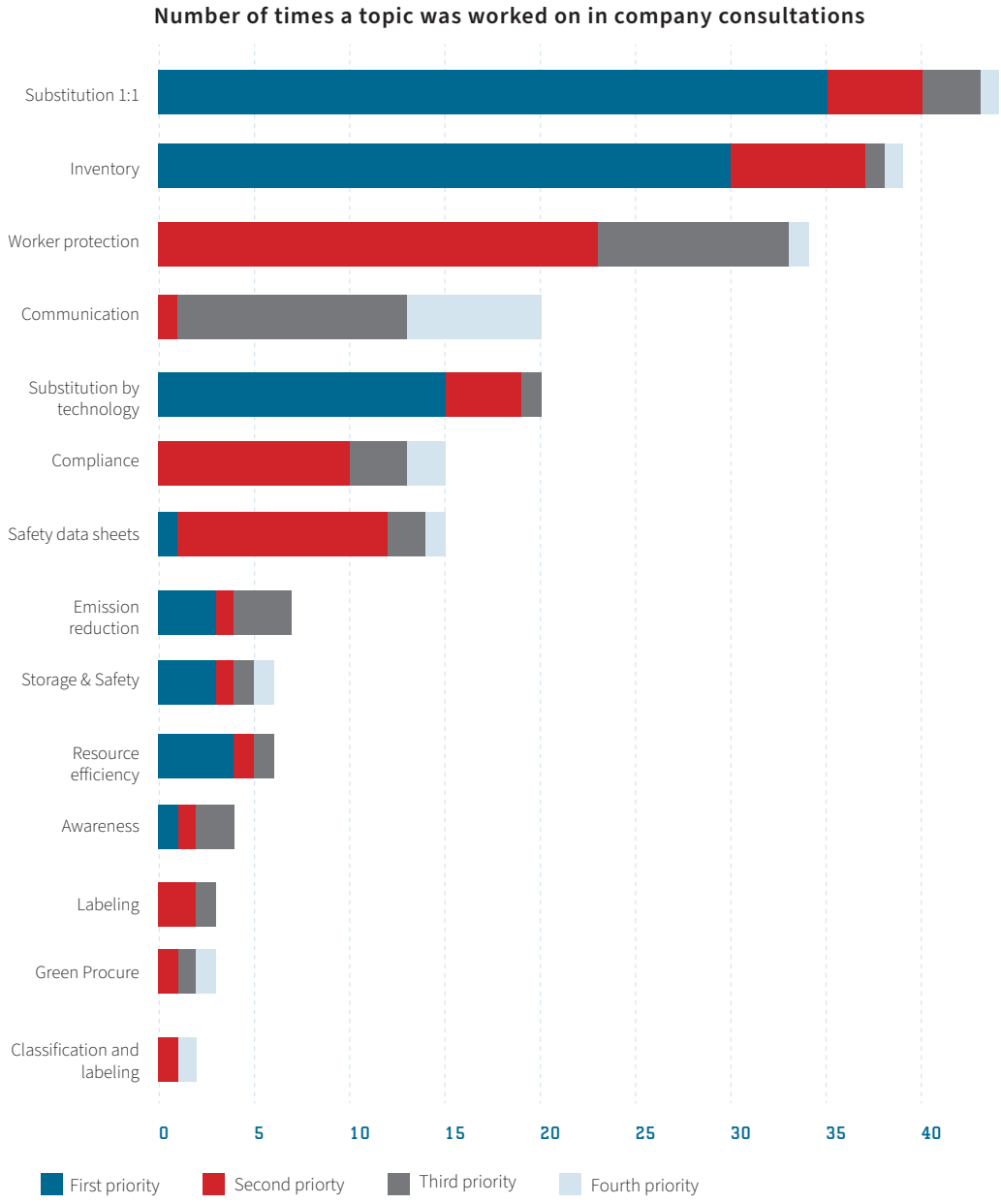


Figure 11: Overview of the topics discussed (and partly implemented) during the consultations[7] (source: evaluation of company consultations, expert judgement)

[7] A maximum of four topics was selected per participating company. In average, 2.7 topics were discussed per company. The selection of the topics was performed by the experts consulting the company, and it includes the aspects that were not being worked on in the practical case implementation.

Training, information events and (professional) education on chemicals risk management

The project team organized several types of trainings, workshops and information events to support companies in overcoming the identified deficits. Considerable efforts were invested to identify (new) companies and motivate them to come to these events. Many companies participated in various events. Ca. 30% of all the participants were not known to the team before the project and/or participated only once.

The personal contact to the company staff was crucial for motivating the participants to come: the project team could explain the benefits of the events, provide a specific context for the invited person(s) and build trust on both sides. In addition, the cooperation with the national authorities was found to be useful: the participation of authorities (as speakers) elevated the relevance and attractiveness of the events, in particular whenever regulatory topics were addressed.

Evaluation of all the events shows that regulatory topics are the most important and interesting to the companies. The technical parts of substitution as an 'isolated' topic were of much lower interest. This may be due to the general hesitation to substitute, the usually very specific support needs in an ongoing or planned substitution process (which can normally not be touched upon or dealt with in a seminar), as well as due to potential confidentiality concerns of the participating companies.

The companies that participated in project events for the first time mostly appeared in regional events. This is assumed to be a consequence of the considerably smaller amount of respective offers for companies in the regions as compared to the larger cities. It is assumed that representatives of companies in the countryside do not travel so much to participate in information events and training, and, hence, they took the opportunities of regional events offered by the project.

The cooperation with universities and chambers of commerce proved to be a good strategy to reach out to yet unknown companies and participants. In particular, universities might prove to be a good pathway in the future as the current students will enter companies and will benefit from chemicals risk management training and information.

It cannot be determined from the project activities to what extent the companies participating in the training and information events implemented new risk management activities afterwards because this was not monitored. However, based on the feedback and judging from the companies that were being accompanied for a longer time, it can be stated that information events and trainings did trigger improvements in chemicals risk management at place. Obviously, there are also other factors which determine what types of actions (if any) are implemented, including the commitment of the management, the availability of resources, or the *status quo* of the overall chemicals management in a company.

At a more general level, the companies and authorities stated that the education on chemicals (management) and chemicals legislation is not sufficient. It was claimed to be difficult to find competent staff (e.g., from university) with sufficient practical knowledge. Several stakeholders declared that even knowledge about safety data sheets is missing among new employees, even if they are professional chemists. The authorities stated that their contact persons in the companies frequently lack competences to understand their requests, which reflects this lack of competences from an outside point of view. Professional training on REACH and CLP for companies seems to be missing or is not used. Also, the downstream user industry associations appear not to provide such training as a service to their members.

University education in the Baltic States (as well as in other EU Member States) does not offer 'regulatory courses' or similar classes to teach basic legal requirements for companies and the ways how they can be fulfilled. Although chemicals are being handled practically (e.g., in chemistry studies at universities), safety data sheets appear to be rarely mentioned and used to show how students should protect themselves. Also, in the general education system, little time appears to be dedicated to chemistry and physics in general. Policy and legislation aspects would only be taught if the lecturers have their own interest in it, but it would not be part of the normal curricula. Hence, even direct consumers lack understanding of chemicals safety, which affects the overall societal environment for risk management, substitution and the demand for safer products.

3.1.4 Conclusions

Experience from the project activities basically confirmed that the awareness level in companies on chemicals risk management is low and/or chemicals are generally not a high priority, in particular in the downstream user companies. Correspondingly, the competences for proper chemicals risk management are lacking in many companies. However, there are also companies that do consider chemicals risk management to be important, regularly participate in information and training events and have a chemicals risk management system in place.

Similar to other EU countries, the awareness levels and competences vary across sectors, with those closely related to the chemicals industry generally being more aware than those at the end of the supply chain. The company size is one of the factors determining the possibilities of a company to take action (in terms of human and financial resources) as well as the position in the supply chain (customer demands).

The many improvements achieved in the awareness levels and competences in companies through the company activities can neither be quantified nor described in detail as they are as diverse as the companies themselves that participated in the project and the topics that were being covered. However, it can be generally concluded

that awareness raising and capacity building are still very important and still require much attention if the goals of chemicals risk management in general and the substitution of hazardous substances should be achieved in the medium term. Without the understanding of why this is important and how to understand the information on chemicals, the supply chains will need extensive time and resources to implement any required changes. *Vice versa*, respective investments are a necessity to enable substitution in the supply chains in the long term.

The project team concludes that the implementation of better chemicals risk management would largely benefit from further individual support and consultation of companies. Personal contacts and specific assessments of the needs and capabilities of the companies and their staff were the precondition to being accepted and being able to discuss, agree and incentivize work in the companies. Further discussions among all the stakeholders appear useful and necessary on how this support can be provided by industry associations, inspectors and companies themselves in the absence of the respective projects alike to the current one.

3.2 Compliance with legislation

The very basis of each company's economic operation is its compliance with the applicable legislation. This project focused on chemicals legislation, i.e., compliance with the REACH regulation, classification and labeling provisions as well as restrictions and other requirements in the applicable product legislation.

Compliance can only be ensured if the requirements applicable to a company are known and monitored on a regular basis, e.g., notes are taken of new restrictions or an update of the REACH candidate list. All the measures to implement the requirements need to be taken, and the success of the measures should be checked regularly, in particular if the production processes or product compositions change. Finally, companies must document and partly also report on the legal provisions.

In the Baltic States, all the companies must have a chemicals inventory. According to the legal requirements, inventories should include information on substances as such and if they are used in mixtures and known from the safety data sheets including their CAS and registration numbers. The national requirements in the Baltic States demand to include:

- Names of the substances;
- Names of the mixtures and names of the hazardous substances contained in mixtures
- CAS numbers and/or REACH registration numbers of all the substances included in the inventory (also if used only as an ingredient in mixtures);
- Used and stored amounts.

However, it is not required to include the concentrations of the ingredients or the classification of the ingredients in the inventory. Both information types are essential for the inventory to be useful for chemicals risk management in companies (i.e., to identify the used amounts and the relevant hazards).

3.2.1 Assumed or known deficits before the project started

Not only in the Baltic States, but also all across Europe, the provisions of REACH and the CLP regulation are still not sufficiently understood, in particular, by the end-users and article producers and in the smaller enterprises. Important but still often unknown REACH requirements include: registration of substances[8], development and use of (extended) safety data sheets, communicating on SVHCs in articles (REACH Art. 33) and substance (group)-specific restrictions (REACH Annex XVII).

It was assumed to be more likely that companies know the sector- or product-specific legislation applicable to them, such as the industrial emissions directive or the regulations on food contact materials or construction products, including the provisions on chemicals.

[8] This issue was not subject of the project work.

3.2.2 Project activities on legal compliance

All the project activities on awareness raising and capacity building contributed to improved understanding and implementation of chemicals legislation. The degree to which compliance was (explicitly) addressed during consultations depended on the companies, their risk management performance and work priorities in the project. For example, two companies wanted help in interpreting the legal provisions for chemicals storage and thereby defined the work focus. In other cases, the initial discussions with the company or work with the inventory revealed the need to improve compliance.

The training and information events frequently covered at least one, and frequently more, aspect(s) of implementing chemicals legislation. In addition, the SDS checking tool and the chemicals inventory template contribute to improved legal compliance. Finally, the international seminar on the enforcement of REACH focused on ensuring compliance.

3.2.3 Findings on legal compliance

The project experiences confirmed the initial assumption that many companies are not (fully) aware of their legal obligations from chemicals legislation. As compliance was not systematically checked during the company consultations, no representative statements can be made. However, the screening of the inventories and the discussions with the companies incidentally revealed cases of non-compliance.

Among the most frequent cases were infringements of restrictions (CMR in consumer mixtures) and the lack of a chemicals inventory. In addition, non-compliance of the supplier companies was observed as the participating companies did not receive compliant SDSs or were not informed about SVHCs in articles (REACH Art. 33). In a few cases, product labels were observed to be wrong. As also reported in the enforcement coordination group of the EU Member States (FORUM), the national inspectors found wrongly classified chemicals in the Baltic markets.

Chemicals inventories in companies

Although chemicals inventories are legally required in the Baltic States (cf. **Section 3.2.1**), the project team observed that they were partly missing, incomplete and/or not up to date. As shown in the following figures, the quality of inventories[9] correlates with the company size, but the trends are ambiguous as even micro companies were found to have good inventories in place while some large companies were identified without one. Not surprisingly, formulators showed to have the highest quality inventory, while the end-users and article producers showed a similar distribution between 'not existing' and 'good'. The overall share of missing and poor inventories (taken together, almost 40% of all companies) underlines the need for further work.

[9] No systematic assessment was conducted; thus the evaluation is based on the experts' impressions of what type of information is included in an inventory, how complete this information is and whether or not it is up to date.

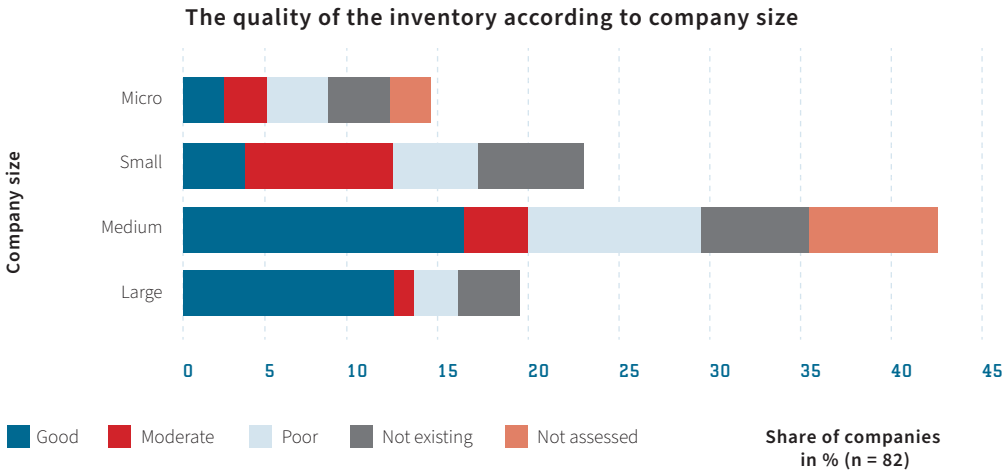


Figure 12: Quality of chemicals inventories according to the company size in percentage (source: evaluation of company consultations via expert judgement)

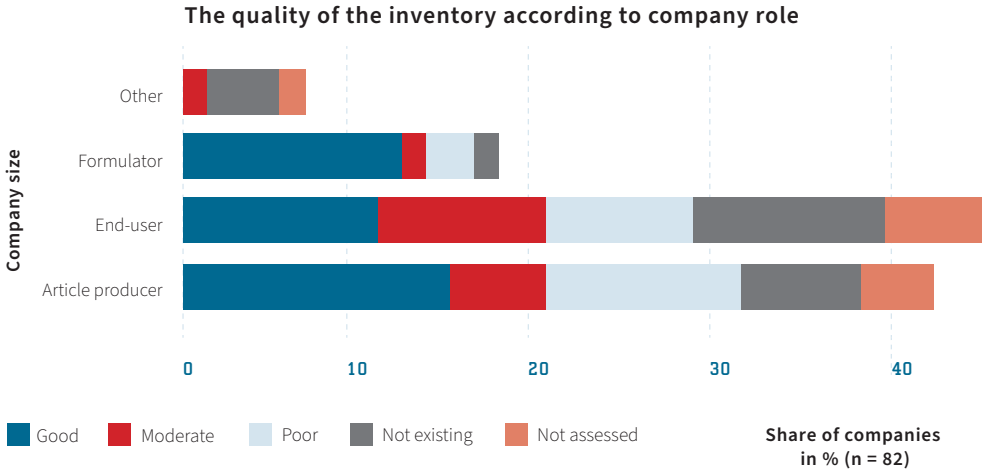


Figure 13: Quality of chemicals inventories according to the company role in percentage (source: evaluation of company consultations via expert judgement)

As the legally required content of the inventory is not regarded as sufficient to support good chemicals risk management, the project experts advised the companies to include additional information into the inventory, namely:

- Concentration (ranges) of the classified substances in mixtures, as far as known;
- Classification of all individual substances, i.e., also those contained in mixtures;
- Availability and date of the safety data sheet;

- Location of use in the company and the destiny of the substance (i.e., remainder in the product, or a processing auxiliary).

An inventory template was provided as a support tool to the companies either as guidance to improve their existing inventory list or as a starting point for establishing a new inventory where this inventory was missing. This template includes additional types of information that could further improve the data basis for risk management.

The company consultations showed that inventories (if existing at all) are seldom used to derive priorities for chemicals risk management, including the identification of candidates for substitution. This is partly due to them not being adequate for the task (lack of hazard information), but also due to the lack of systematic chemicals risk management approaches, lack of competences, and lack of motivation (cf. **Section 3.1**).

The project team used the inventories as an analytical tool to understand the situation in a company and to get an impression of the chemical 'hot spots' regarding the compliance and priority setting. By using the inventory for the initial discussions on improvement options, the companies were made aware of the benefits of inventories and the rationale behind the legal requirement to have one.

Communication on chemicals

Safety data sheets (SDSs) are the main means of information transfer on chemicals along the supply chain and, therefore, their correctness is essential. Compliance with SDSs was not analyzed in detail by the project team. Nevertheless, it became obvious that non-compliance mainly relates to SDSs being outdated and not being available in the national language.

In both cases, the suppliers and users of chemicals should take action. The legal obligation is clearly allocated to the suppliers to provide SDS updates in the correct language (REACH Art. 31.5). The downstream users understand the SDSs in English and/or are not making intense use of the information in the SDSs. Therefore, they feel little need to ask for compliant SDSs. Some companies did not want to 'bother' their suppliers and/or were afraid of spoiling business relationships, as they felt to be not 'important' clients for their suppliers. This shows that the use/claim of the right to obtain easily understandable chemicals information is not 'a standard or routine process' among the Baltic downstream user companies. In addition, communication is reduced because of the negative experiences in the past and the dependency on (and the resulting fear of losing) certain suppliers as perceived by the Baltic downstream user companies.

Another non-compliance of supplier companies was observed as the labels of some chemicals were not provided in the national language. This may significantly de-

crease the likelihood that the workers understand hazards and means to protect themselves. In the consultations, some companies were seen as failing to correctly label containers when refilling chemicals.

While the communication via safety data sheets has a long tradition, communication on SVHCs in articles is a comparably new topic, and it also concerns different actors in the supply chain, i.e., the article producers. During consultations, in only a few cases communication on SVHC was addressed. From these activities, it has been concluded that information on SVHCs in articles does not flow well along the article supply chains, although it is legally required. In one case, a company could not take the final decision on alternative articles due to the lack of SVHC information. Whether or not this situation is better or worse than in the other EU countries cannot be judged due to the unavailability of data.

According to the qualitative interviews, many article producers do not yet understand the REACH obligation well. For example, companies answered that the composition of their articles is a trade secret, and, therefore, information on SVHC would not be forwarded. Furthermore, it was said that SVHC information is only compiled after a customer request and not pro-actively so that an answer can be provided directly. In the interviews, the companies reported receiving only a few information requests both from private and commercial consumers.

3.2.4 Conclusions

Legislation is important for all the companies, and there was an obvious and strong wish among the participating companies to improve their legal compliance and/or implement measures that ensure legal compliance in the future. This is not only reflected by the topics selected for concrete work (cf. **Figure 11**) but also showed in the interest in the respective seminar topics and when companies set priorities. The lack of awareness (of legislation) and competences in chemicals risk management is observed as an important cause of non-compliance and, therefore, it is also the most important intervention point to improve the situation.

It is of concern that the basis for any chemicals risk management – the communication via safety data sheets as well as the direct contact with the suppliers and customers – is not functioning well. On the one hand, chemicals suppliers provide non-compliant information, whereas, on the other hand, Baltic companies do not feel to be in a good enough position to request the relevant information of high quality. Furthermore, negative past experience discourages investments into communication on both sides, which prevents an important opportunity to identify solutions for chemical challenges. Up to now, the market surveillance and enforcement of downstream user obligations have not been effective in ensuring that companies build up a sound information basis.

3.3 Management systems and prioritization of action needs

The companies implementing chemicals risk management systems define their goals as part of the company policy and identify options to achieve them. The potential goals could be to prevent the use of SVHCs. The type and ambition of the companies' chemicals policies and related goals depend on various factors, including the sector or the *status quo* of chemicals risk management. The instruments and routines to ensure continuous improvement at least consist of:

Defined responsibilities, work routines and clearly allocated resources (cf. **Section 3.1**);

A chemicals inventory with sufficient information to support strategic decision making on managing potential risks (cf. **Section 3.2**);

Chemicals-related criteria in the purchasing system (cf. **Section 3.4**);

A management routine for regular assessments of the (remaining) chemicals risk, management deficits, and the related decision making and implementation processes (prioritization criteria, ranking tools, action plans, etc.) and documentation routines;

Potentially, an investment plan which may be necessary for large scale changes in production processes.

3.3.1 Assumed or known deficits before the project started

Before starting the project, it was assumed that the level of chemicals risk management (systems) in Baltic companies varies more across the sectors and the supply chain steps than across the countries or the company sizes.

The six partner companies operate specific and elaborated chemicals risk management systems. Responsibilities are assigned, competent staff is present, and sufficient resources are assigned for the necessary tasks. These companies do not represent the average in the Baltic States.

The overall assumption at the beginning of the project was that most companies neither have a formalized nor do they have a non-standard chemicals risk management system in place. Hence, the companies were expected to lack a good overview of their chemicals use and substitution needs. It was expected to be more likely that the companies with less developed chemicals risk management would participate in the activities than those at the high end of the range.

The assessment of the alternatives and the development of the criteria to decide which alternative to select were assumed to be a major challenge for any actor, including the consultant team.

3.3.2 Project activities on systematic risk management and prioritization

During the qualitative interviews, around 60% of the interviewed companies[10] admitted not to have an active policy of excluding substances of (very high) concern from their production processes or products. In contrast, 30% claimed to have such a policy and to have already endeavored into one or several substitutions to achieve this goal. However, substitution was not always possible or successful, which was due to a variety of reasons which did not involve the company motivation.

Many company consultations started with the assessment of the status quo of chemicals management and the identification of deficits and possible solutions. These assessments revealed that most companies lacked a systematic (management) approach to assessing, prioritizing and preventing chemicals risks. Consequently, the first steps of implementing a chemicals risk management system were (partly) performed during the initial consultation phase by the project team and the company together: developing/improving the chemicals inventory and/or screening the currently existing one, assessing the availability and quality of the safety data sheets and listing the known chemicals-related (worker health) problems in order to get an overview of the potential work issues and to set the priorities.

The companies which approached the project team when already having a clear idea of what to work on more frequently either had a (chemicals risk or) environmental management system in place or had faced specific problems with the issue at hand. In both cases, the chemicals risk management system and basics were not explicitly taken note of by the project team.

The partner companies implemented their substitution cases with the support of the project experts. The six partners had already derived the substitution need; so, before the project started, they based the activity on their own internal priorities and needs. It was not foreseen to work on the chemicals risk management systems of these six partner companies.

The publications *Frequently Asked Questions on Chemicals Risk Management and Hazardous substances management – no big deal* summarize project experiences and findings on the chemicals risk management in an anonymized way. While the FAQs target more advanced companies and provide information on the specific aspects that were discussed with the consultant team several times, the comic brochure tells stories from the work with companies and aims to raise awareness of companies and encourage them to get active.

[10] Qualitative interviews were conducted with a total of 30 companies from all the three Baltic States. They represented all the REACH roles, different sectors and different company sizes.

3.3.3 Findings on systematic chemicals management and prioritization

Overall, chemicals are regarded as a 'topic to take care of' according to the SME survey[11], the qualitative interviews and the discussions with companies at events and during direct consultation. However, due to the generally low priority given to the topic, fewer systematic activities are seen and, more frequently, only the most urgent (legal) issues are dealt with on an *ad-hoc* basis, whenever necessary.

Not only in the Baltic countries, the integration of chemicals into the currently existing (environmental) management systems and standards does not take place, and separate systems for chemicals only exist in chemicals producing companies or in installations with high safety risks (e.g., SEVESO installations). In various contexts of the project, the stakeholders mentioned that simple and pragmatic approaches are missing, how chemicals could best be dealt with in an efficient, interconnected and useful way inside a company. Frequently, several environmental and safety issues are implemented by one single person (cf. **Section 3.1.3**), and might therefore be 'naturally' interlinked inside a company. However, as these persons frequently have too little resources for all of their tasks, and, due to the usually lower priority given to chemicals, the related tasks are frequently insufficiently addressed.

The observations from the project confirmed the assumption that systematic risk management of chemicals is uncommon in the Baltic companies. However, management systems in general are well-known and partly implemented, with ISO 14000 and ISO 9000 being more common than the European EMAS.

Similar to the findings on the awareness and competences as well as legal compliance, the company size and their supply chain roles indicate a likelihood of the existence of formalized, certified or informal management systems on chemicals: larger companies tend to have such systems more frequently than smaller companies. Furthermore, due to a higher availability of resources, large companies are more able to actually implement a system and assign a higher priority to chemicals as such. Of course, there are exceptions to this, in particular when small companies are located at the top of the supply chain, e.g., as the formulators of fine chemicals. Whether or not companies belong to corporate groups or have a 'mother company' in a Western EU Member State, this tends to indicate a higher level of chemicals awareness, although the chemicals risk management is not always centralized. If groups have a centralized system, it is not necessarily ensured that a company belonging to the group has sufficient resources, competences and capacities to implement the tasks according to the corporate guidelines.

[11] 278 companies responded to the online survey on the environmental responsibility of small and medium size enterprises and provided answers to a number of questions regarding their motivation for, priorities in and implementation of environmentally responsible activities.

In the SME survey, companies were asked whether or not they have environmental policies. More than 50% of the companies gave the positive answer, while 40% answered that they do not have one. A question about the existence of strategies to prevent damage to workers, consumers and the environment revealed that almost 70% of the companies answering to the question stated to have a policy for worker health and the environment. Less than 50% stated to have a strategy to prevent damage to consumers. This shows that overarching strategies or policies play a role in how companies act on chemical safety in general.

The benefits of systematic chemicals risk management are not obvious to Baltic companies, and good examples showing the relations between the efforts and costs, spending and savings are missing. However, companies do recognize benefits once they have started looking deeper into the subject and, for example, have assessed the substitution options. Hence, concrete actions are appropriate to give understanding of interlinks and impacts of the changed risk management and/or substitution and to illustrate that the costs may be outweighed by opportunities to gain (new) market share with safer products.

It was observed that companies are discouraged by the short-term resource investment needs for building up a chemicals risk management system. Also, the needs to maintain it or implement measures identified as necessary appear to be dissuasive, in particular, since the benefits are mostly manifested only in the longer term. Many companies expressed a wish for good practice examples with detailed costs and benefits figures in order to better understand the relation between the efforts and the desired outcomes so that to get a better view on whatever types of activities are needed.

3.3.4 Conclusions

Environmental and quality management systems are well known and implemented to a varying degree in the Baltic companies. Hence, the infrastructure of systematically addressing challenges does exist, but the topic of chemicals is not integrated into the policies, the implementation tools, and the reporting of results. As the awareness increases, the topic may be ranked higher, and more incentives may arise to address them in a systematic way. Linking environmental management systems more strongly to chemicals, i.e., integrating the topic into the respective standards and tools, could be a promising option to increase and improve chemicals risk management in general.

3.4 Green markets and purchasing

A stronger demand for and more transparency regarding safer products would be one option to foster substitution beyond the legally required minimum. In the project, the creation of green markets was addressed by implementing chemicals-related purchasing criteria (increasing the demand) and developing green claims (making safer products more visible).

Overall, the markets for safer/greener products are continuously growing, both for consumer products as well as for products traded between commercial entities. The latter is a natural consequence of the former, as the input materials frequently constitute the final product.

The purchasing criteria on the quality of all the input materials (e.g., chemical raw materials, semi-finished products, articles, but also fuels and processing auxiliaries) help consistent decision making on what to buy and what to refuse. Such criteria may be generally applicable, e.g., "All input materials shall be free of SVHCs," or they may apply only to specific input materials, e.g., "Dyes used in consumer products shall be free of skin sensitizers, while those used for industrial textiles shall be free of PBTs." Such criteria can prevent the unwanted content of hazardous substances in the products produced by the company and/or avoid emissions from the processes to air, water and waste.

Safer products which are free of (certain) hazardous substances can only be recognized in the market if this is made transparent and/or explicitly communicated, e.g., via eco-labels, environmental product declarations, or green claims. However, there is already a large amount of labels, many of which are with unclear criteria and controls, and green claims are not always well substantiated.

3.4.1 Assumed or known deficits before the project started

Before the project started, only little information was available on the existence of chemicals-related procurement systems and criteria or the use of green claims and eco-labels.

It was assumed that most companies do not have a purchasing routine in place that includes particular criteria on hazardous chemicals. With the decreasing size of companies, a decrease in the level of sophistication of the procurement systems was assumed. Formulators were considered to have more detailed and technical chemicals-related purchasing criteria, such as on the purity and functionality of a substance or a mixture than the end-users who were only expected to mainly focus on (avoiding) hazards and seeking more general performance aspects. Furthermore, it was expected that (large) companies at the end of supply chains might

influence the purchasing decisions upstream as they require the use of particular chemicals and/or achieving particular technical properties of the product.

Companies were known to be aware of eco-labels in general and that several types of eco-labeled products are available on the market, indicating (also) a higher chemicals-related quality of the labeled products. In addition, green claims that should inform about particular environmental benefits of a product were known to be used for products in the Baltic markets.

3.4.2 Project activities on the topic of green markets and purchasing

As the substitution of hazardous substances influences both the purchasing of raw materials (as it creates demand) and the resulting products (as it creates offer), all the substitution support activities also supported 'greening markets and industries'.

A guideline for companies on chemicals-related procurement was developed. It explains how to set up a respective purchasing system in the company and suggests various types of criteria that could be applied. The guidance was promoted during some of the project events. It was also applied in the company consultations if systematic procurement of safe(r) chemicals and articles was addressed and the companies were interested to fit this into their work priorities. Procurement was not discussed on a routine basis[12] but was also a natural part of the substitution cases.

Green public procurement was discussed with the authorities at the round tables and addressed in the SME survey.

A market survey and research on green claims was carried out to identify how green claims are used and whether or not the generally accepted standards and legislation on how they are to be worded, depicted and/or substantiated are fulfilled, with a particular focus on chemicals-related aspects. The findings from that research were used to develop targeted and simple guidance on how to develop sound, unambiguous and useful green claims. The guidance also briefly explains eco-labels and environmental product declarations and how they differ from green claims.

3.4.3 Findings on green markets and purchasing

In general, it was observed in the consultations that the Baltic companies' interest in the performance of their products and related communication is increasing. Compared to previous experience, companies tend to shift priorities from the low-end consumer prices to a higher product quality, partly resulting in higher prices.

[12] The topic was discussed explicitly in three cases; however, obviously, the purchase of alternatives to hazardous chemicals is also an activity of green procurement.

However, the type of the markets the companies supply and the related environmental quality demands were stated to partly drive the efforts in the Baltic companies. However, according to the qualitative interviews, only 25% of the companies pointed out that chemicals are an important area of the environmental management and performance of the company.

The SME survey showed that the main driver for activities beyond the legally required minimum is the wish to improve the workplace conditions, to protect the environment and/or to contribute to the implementation of human rights. While medium size companies also find that proactive approaches towards environmental responsibility helped them seize new markets, small and micro size enterprises argued that it would help them manage risks and improve their image of an environmentally friendly company.

More than a half of the companies participating in the qualitative interviews stated that they did not feel a strong market demand for safer products from their direct customers. However, they did consider green public procurement to be an important market force driving a phase-out of SVHCs and other hazardous substances.

The picture among the interviewed companies was mixed with regard to purchasing routines:

- Some companies have lists of substances that should not be contained in the raw materials,
- Other companies assess safety data sheets of new materials prior to purchasing them
- Some other companies do not assess the quality and hazardousness of new input materials at all prior to testing them in their processes.

Also, the consultation of companies gave a mixed picture with regard to the availability of purchasing routines and the consideration of chemicals-related criteria in them.

The market survey on green claims revealed that several of the claims made on products lack sufficient proof and are partly misleading or simply wrong ('greenwashing'). The requirements of the *Unfair Commercial Practices Directive*[13] are considered as not implemented in several of the products found with a green claim in the Baltic markets. This includes claims on chemicals which were partly not worded according to the generally accepted rules. For example, products are called 'natural' although many synthetic chemicals are contained. One example was found by the project experts in the context of company consultations: a product's name sounded like 'environmental friendliness', but the mixture contained a high percentage of a substance that is very toxic to aquatic life with long-term effects, despite being intended for uses with virtually complete environmental release.

[13] Directive 2005/29/EC of the European Parliament and of the Council of 11 May 2005 concerning unfair business-to-consumer commercial practices in the internal market.

According to the market survey, the use of eco-labels is more common for products in close consumer contact, such as household chemicals or textiles. Companies generally hesitate to apply for a label despite an expectation of potential additional market share, in particular if investments into new equipment and redesign of the end-product are needed to meet the labeling criteria. The SME companies participating in the consultations were mostly not interested in eco-labels at all. One case occurred in the consultations when a textile company was requested to have eco-labeled products so that to fulfill the requirements of the customer.

3.4.4 Conclusions

The experiences and findings from the project show that many of the Baltic companies consider their environmental performance as important and integrate the related policies and activities into their work. However, chemicals safety is not perceived or valued as an integral part of the environmental performance and management (cf. also **Section 3.3**). Therefore, the respective objectives are not included into company policies, and most companies lack respective management routines. Most end-user and article producing companies did not have chemicals-related purchasing criteria, but some companies started thinking about integrating them into their purchasing systems. Such a focus on chemicals in the purchasing process would create a higher market demand for safer products between businesses and also support the production of safer products to the end consumer markets if raw materials not fulfilling the chemicals-related criteria are substituted.

Companies were found to be careful about communicating their successes in environmental management and chemicals risk management, including the substitution of SVHCs in products. Here, information and guidance on how to use environmental claims could be a good compromise between communicating 'nothing' and taking the (high) effort of applying for an eco-label. Many companies see a market potential for 'greener/safer' products (in the future). Nevertheless, the motivation to gain the respective market share differs across the sectors and is generally (still) low. Here, it could be useful to support companies more and encourage them to use their achievements in the environmental performance in the market.

3.5 Use of reduction via increasing the resource efficiency

The efficient use of any resource is not only an environmental, but also an economic interest of companies. Therefore, minimizing the amount of production wastes and unnecessary emissions is beneficial in many regards. If less input materials containing hazardous substances are wasted, the used amounts are decreased, which has an impact on the releases up the supply chain. The amount of input materials needed to produce a particular output/product is an important indicator for a company to control their resource efficiency over time or compared to other companies. Resource efficiency can also be increased by reusing production wastes in the product again.

3.5.1 Assumed or known deficits before the project started

Before the project started, no overview was available on the efficiency with which Baltic companies use their resources and how this compares to companies in other countries. It was assumed that many companies optimize their processes as much as technically possible but do not monitor and calculate the ratio between the inputs to their processes and the outputs in terms of the produced products. However, waste amounts were expected to be available to fulfill the waste legislation.

3.5.2 Project activities on resource efficiency

No overarching work was performed on the topic of resource efficiency with a particular focus on chemicals. However, much of the consultation work as well as many information events and trainings touched the question of resource efficiency as one option to reduce chemical exposures.

Initially, the partner company *Henkel* aimed at increasing its resource efficiency by finding a market to sell their wastes from foam production as raw materials for use by other companies. However, despite considerable efforts, no customers could be identified, although the offered foams were very pure and of known composition. As a second approach, the company changed its quality control system for the production process. This enabled steering the production at an earlier stage than before, which resulted in a lower amount of wastes being generated (batches of low quality or wrong mixing were stopped early).

The partner company *Marijampolės pieno konservai* changed their disinfection process from a hot process to a cold one in order to reduce the use of energy for heating water. The process change also involved the change of basic chemicals (acids).

Also, during consultations of other companies, a few cases explicitly dealt with or resulted in increased resource efficiency as a side effect. For example, a construction company installed an automated dosage and mixing system, which resulted in reduced hazardous substance emissions and increased efficiency. Another example was a wood processing company which improved the mixing of resin components by increasing the size of mixing vessels (inhomogeneity of materials was avoided, which resulted in higher reaction ratios); also, improvement of the application technologies for applying glues to a more continuous process was achieved (fewer production stops with the need of cleaning equipment and generation of wastes). A car service shop reduced its wastes by switching to supplies in larger containers, while another company avoided the need to use hazardous cleaning agents serving to remove limestone from its equipment by softening the water in its steam production.

3.5.3 Findings on resource efficiency in companies

Company consultations showed that an increase of the resource efficiency can be a side effect of other activities and may also affect the emissions and waste amounts of hazardous substances, in particular whenever the production equipment is also modernized. Frequently, the quality of both processing and products can be improved, and some opportunities are obvious. Increased resource efficiency can be an (additional) driver supporting the substitution with new technologies.

3.5.4 Conclusions

There were some explicit activities in the project aiming to improve resource efficiency in companies. This is partly astounding because such activities should be attractive to companies due to their high potential in saving costs. The lack of activities can be explained by a different focus in operations (basic chemicals risk management and substitution) in the project.

3.6 Use reduction via substitution of hazardous substances

Substitution is generally defined as a process of replacing a hazardous chemical with a safer alternative, which could be chemical, technical or organizational. This means that drop-in solutions (1:1 replacement of a hazardous chemical with another chemical) are possible as well as the use of different materials, processes or changes involved in the process. Substitution should be a continuous task of all companies handling chemicals, which involves reviewing the use of all chemicals, prioritizing those which should and can be substituted, identifying and assessing alternatives, testing them in the production process and products, and implementing the use of an alternative if substitution is possible. The abilities to substitute do actually differ across companies and depend on many factors, including the supply chain position, the product sector, the type of the substance, production processes, customer demands, product standards, legislation, etc.

Priority setting considers the hazards of a substance/mixture in combination with the uses, potential exposures of humans and the environment, and the related risks, the legal landscape (i.e., if restrictions or other use limitations exist or are planned/expected), and the economic/market situation, including offers and demands from the supply chains.

Substitution may be 'easy', e.g., when processing auxiliaries are exchanged and/or when safe drop-in solutions are possible without changing the processing conditions. Substitution can also be very challenging, e.g., if the production technologies determine the need for certain chemicals (technology lock) or if the substances fulfill an essential technical function in a product for which no 'easy and safer' alternative exists. Also, customer demands or product (safety) standards may narrow down the possible substitution options.

Substitution of a hazardous chemical with an equally or even more hazardous one is called regrettable substitution. It could occur due to information gaps on alternative substances hindering a proper assessment, or if an insufficient or no assessment has been done by the company doing the substitution. Additionally, if there is high pressure to phase out the use of one (regulated) substance, but only similar (not (yet) regulated) substances are known alternatives, companies may use these similar substances.

3.6.1 Assumed or known deficits before the project started

In previous projects, Baltic companies were not highly interested in discussing the substitution of chemicals in their company. They rather looked for other solutions in order to avoid changing their processes and/or investing in new technologies.

However, it was observed that some downstream user sectors started being more aware of SVHCs and began increasingly requesting their avoidance from the suppliers. This correlated with increased consumer awareness on SVHCs in articles. Nevertheless, the hazardous chemicals in products and process were not expected to be a high priority for Baltic companies, and proactive substitution activities were the exception rather than the rule.

3.6.2 Project activities supporting substitution

Direct consultation on substitution was provided to these partner companies which were already included in the project application. The provided support included helping the overall management of the process in the company, providing advice on how to identify and assess alternatives, support in purchasing new equipment and evaluating the success of the substitution. The specific tasks of the project experts differed for the partner companies depending on their needs for support.

The consultation of other companies only started approximately 2 years after the beginning of the project; consultations began with a large initiative to identify the companies which were interested in participating. Work with these companies included assessment of their substitution priorities by analyzing the use of chemicals, support in identifying and assessing the possible alternatives, and accompanying their implementation.

The alternatives screening tool ***SubSelect*** was translated into the national languages and provided to support the assessment of alternatives. In addition, leaflets on cases of substitution for several different substances which were developed as examples of good practice were provided. In addition, companies not participating in the project may benefit from the publications about substitution learnings from the project (e.g., cases in the database ***SubSport*** and the FAQs document).

Other project activities indirectly contributed to substitution as they started 'paving the ground' by raising awareness, building competences and establishing routines on chemicals risk management (cf. the sections above).

An international workshop was organized to discuss how substitution could be supported (better) by integrating policies at the level of different instruments (legislation, enforcement, economic instruments and management systems). In addition, a working group at an EASME workshop was prepared, moderated and documented with the aim of discussing how substitution could be supported by the LIFE program.

The SME survey and qualitative interviews on environmental responsibility of Baltic companies did not aim to support substitution, but, among other objectives, assessed the companies' perceptions about the role of substitution in chemicals risk management as well as the substitution drivers and barriers in companies.

3.6.3 Findings on substitution

Involvement in substitution

According to the interview responses, ca. 80% of the companies had already been involved in substitution, either as the main player, as a supplier, or as a customer. All the six project partner companies implemented at least on substitution during the project, all of which were replacements of the target substances by one or several other substances or mixtures. In total, 49 substitutions were facilitated by the

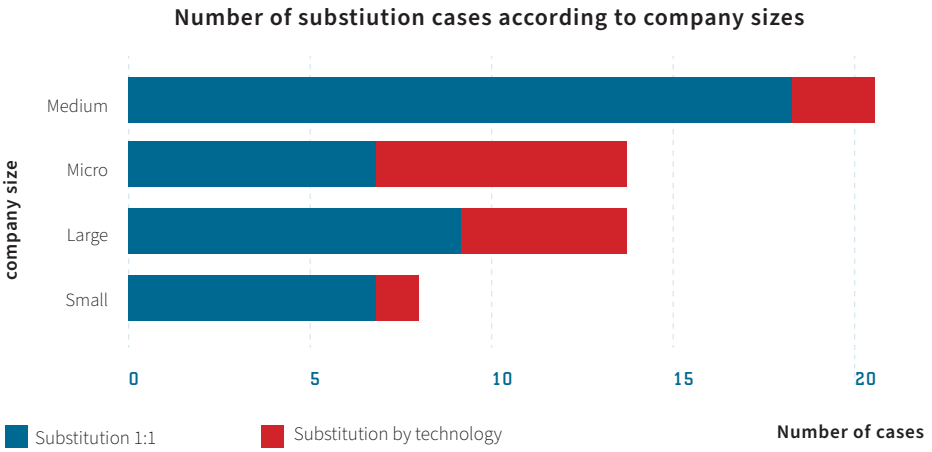


Figure 14: Number of substitution cases according to the type and the company role (source: assessment of all company cases, expert judgement)

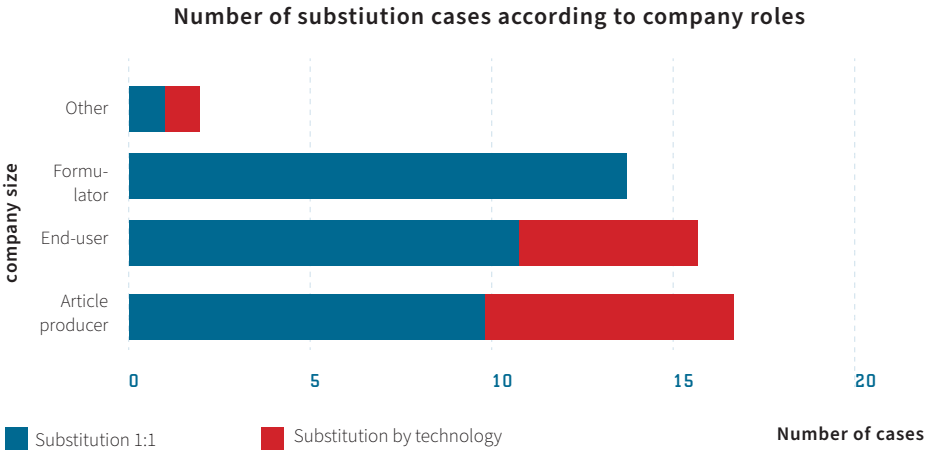


Figure 15: Number of substitution cases according to the type and the company size (source: assessment of all company cases, expert judgement)

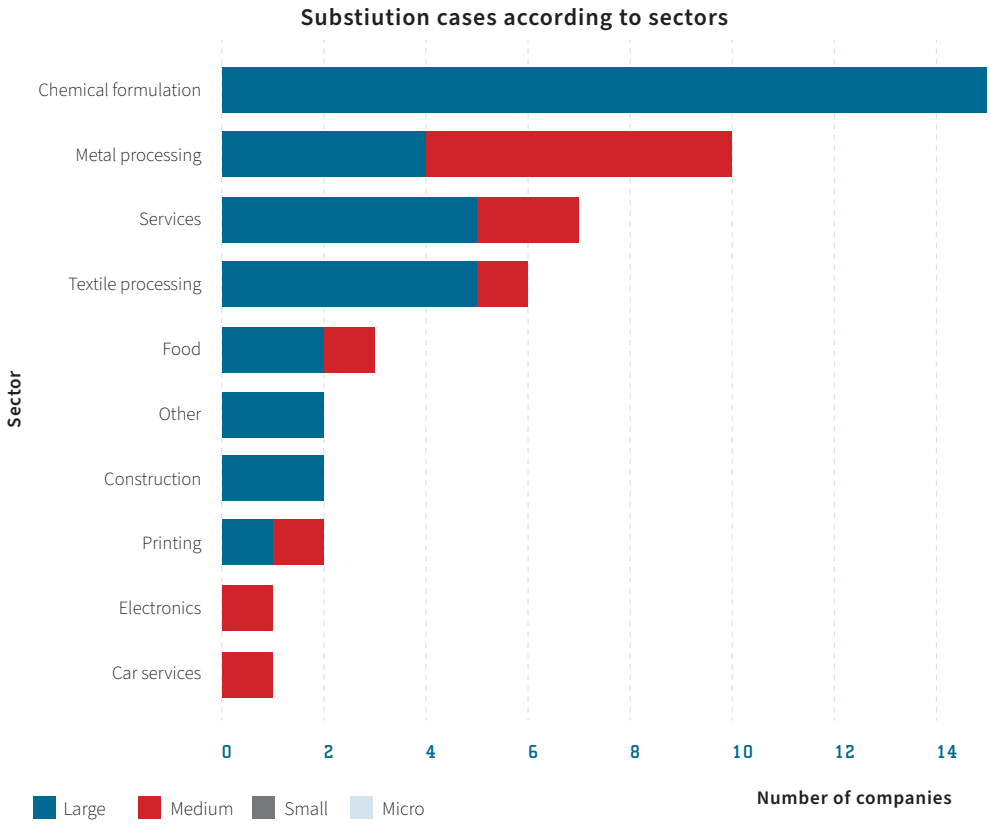


Figure 16: Number of substitutions according to the type and the company sector (source: assessment of all company cases, expert judgement)

project (including partner companies). Of these, 36 used alternative chemicals and 13 changed to an alternative technology, which, in many cases, also resulted in a change of chemicals to less hazardous ones. The following figures show how the cases distributed across sizes and supply chain positions of the companies.

Among the substituted substances, there were not only SHVCs and other substances of top concern, frequently CMRs, but also substances with less severe hazards. In the latter case, the motivation for substitution was frequently the protection of the workers' health or the avoidance of the need to classify a consumer mixture.

According to the company interviews on environmental responsibility, it is rather uncommon for Baltic companies to proactively suggest substitution of a hazardous substance to their customers in the supply chain. Unless there is a strong demand from the customers or the supply of a chemical is stopped, companies were said to prefer continuing production as established to substituting on their own initiative. These companies which stated that they had proactively substituted hazardous

chemicals admitted that they needed to discuss this with customers in order to get acceptance for new products and processes and ensure that these fit to those of the further supply chain actors. Some companies reported that they provided practical advice to their customers or even let them use their laboratories for testing.

Substitution drivers and barriers

Among the drivers of substitution named in the qualitative interviews were: improvement of workplace conditions, ensuring worker health and safety as well as improvement of the process or product performance. In addition, a company policy to actively avoid SVHCs, existing or future legislation applying to a substance or a substance group as well as expected price reductions were mentioned as important substitution triggers. Finally, the market demands and options to obtain a better market position were mentioned.

This list of substitution drivers matches well with the results of the SME survey on their perceptions of environmental responsibility. Here, the most important substitution drivers they mentioned were: environmental concerns, legislation, management policies, and worker protection. In the SME survey requirements from the supply chain, i.e., the offer by suppliers and customer demands were rated as the least important substitution drivers. Environmental concerns and legislation were viewed as extremely important by all the respondents of the survey, regardless of the company size. Similarly, no differences were observed across the sectors.

Among the main barriers to substitution mentioned in the qualitative interviews were: the lack of suitable alternatives and the challenges of finding alternatives and ensuring the performance of the (final) product. Costs were mentioned as a dissuasive factor mostly by those companies which had not yet been involved in a substitution process. In the SME survey, the lack of resources was mentioned as the most important substitution barrier, followed by uncertainties related to the market potential of alternatives and the products they were used in. Another barrier which rated high in the SME survey was the complexity of the regulation of the alternatives.

Substitution barriers identified during company consultations on substitution included the larger investments if no drop-in solution could be found, the lack of suitable alternatives (at a reasonable cost), and uncertainties about the performance of an alternative which is associated with risk of losing the market share and customers. The latter was observed, e.g., in the electronics sector where changes in the products appear to be more challenging as they may affect the functioning of the entire product.

The need for larger investments was encountered where technologies and equipment depend on the use of a particular (type of) chemical. Such ‘technology lock’ prevented substitution in several cases, e.g., for varnishes (incompatibility with the coating equipment; powder coating to avoid solvent use required a new technolo-

gy). In other cases, technology changes were possible, e.g., when required to phase out a hazardous printing ink for cable marking or to eliminate the use of lubricants in metal processing.

The costs were relevant decision criteria on substitution in the companies producing for low price segments of the market, for those with small profit margins (formulation) and/or for products in highly competitive markets (textiles). In one case, substitution would have resulted in the cancellation of a maintenance contract for large machinery by the service provider, which, understandably, was a 'no-go' for the company considering substitution.

It is difficult to judge in many cases whether or not any suitable alternatives are available because it was not always clear if the efforts to find one were sufficient. However, it can be said that, in many cases, high efforts were needed to identify alternatives, i.e., overall, alternatives are definitely not easy to find. This means that time is needed to look for alternatives, and competences required to judge about their suitability. Both aspects may be a significant challenge to the companies in the Baltic States, which may ultimately prevent the substitution.

Deficits in the internal organization can also be a barrier to substitution as observed in company consultations and in the qualitative interviews. Such organizational deficits may be regarded as lack of assigned responsibilities[14], lack of the top management support or lack of internal communication routines and cooperation structures. For example, companies reported difficulties with the involvement of purchasing departments when looking for alternatives due to missing communication routines with the HSE managers or challenges to overcome the traditional purchasing routines.

The consulted companies were encouraged to communicate with their suppliers about the possible alternatives with mixed results: some suppliers did not respond at all, some were reluctant to help (or had no alternatives), and some provided helpful advice, including advice on changing technologies. Other suppliers recommended alternatives with more severe hazards and/or provided information on technical solutions which would have resulted in a lower performance of the final product.

A number of companies attempting to phase out BPA found it very difficult to identify (suitable) alternatives. Alternatives appear to be missing although BPA has been discussed since long even despite it being regulated and identified as SVHC. The identification of suitable alternatives for very specific products, e.g., 3D printing inks, cleaning agents for very particular cleaning problems (wood adhesives),

[14] Management systems put strong emphasis that the responsibilities are defined and properly assigned. The observed deficits in the internal organisation system and communication could be improved by the implementation of a management system as the need to communicate and cooperate is universally based on clear tasks and responsibilities.

or impregnating agents for wood (technical problems) also proved to be a large challenge, or seemed to be outright impossible.

Whenever specific (technical or chemical) customer demands existed to the suppliers of products, the latter had limited options to identify alternatives. Such demands existed in cases from sectors with certification requirements or where chemicals fulfilled essential functions in the end-product. This was relevant for some construction products (certification) and the ship and vehicle production and repair sector (customer demands).

Apart from the challenges and difficulties, there were also several cases in the project where substitution was comparably 'easy' and could be achieved at a low cost.

Identification and assessment of alternatives

The partner companies defined their substitution projects already in the project application of the *LIFE Fit for REACH*. Based on their problem analysis and priorities, they identified the target substances for substitution. The work in the project therefore started with thorough process planning and the identification of the possible alternatives. These were then assessed with regard to legal compliance, technical performance, hazard profile and economic feasibility as well as whether or not they would fulfill the customer demands. Each partner company had specific criteria, based on which they selected the alternative to the target substance, and the project team supported the assessment. The final decision on the alternative was taken by the companies.

The substitution support needs of the other consulted companies were identified and discussed during the initial visits and were based on the information presented to the team. It was not always possible to get a 'complete picture' of the chemicals use as a basis to identify substitution options. As for the partner companies, the project team facilitated the identification and assessment of alternatives, while the final decision on which alternative to use was taken by the companies.

The IT tool *SubSelect* aims to support SME downstream user companies in making an initial (rough) comparison of the sustainability of several alternative chemicals. It was introduced in the project mainly for the benefit of the authorities which were interested in recommending it to companies. In Latvia, training on ***SubSelect*** was also provided to ca. 40 companies. The consultants used the tool to assess the alternatives in some of the substitution cases. The tool proved to be well-applicable and useful to show, in an intuitive way, which options are most sustainable.

The qualitative interviews showed that the majority of companies were familiar with at least one substitution tool. The main information sources which were used to implement a substitution were the ECHA website and safety data sheets. Additional sources named by the companies were classification and labeling information as well as discussions with suppliers.

3.6.4 Conclusions

Overall, the activities in the project confirmed that there were valid reasons of a broad range why a company may consider substitution and whether or not to actually implement it. Similarly as in other EU Member States, legislation is a strong driver for substitution, e.g., regarding worker protection and the general aim to improve the environmental performance. The main substitution barriers differed, among others, in relation to the sector, the supply chain position and the company size.

It is concluded that the direct consultation and (non-bureaucratic financial) support offered by the project were facilitating substitution in the consulted companies but were usually not decisive. The most helpful activities from the project perspective were the **prioritization of candidates for substitution** (by using the inventories), support in **identification and assessment of** the available **alternatives** and support within the **internal organization** (communication and cooperation with other departments).

The implemented cases show that substitution is possible and that even modest funding may be helpful to support that process. A surprisingly high number of cases involved substitution with a change in technologies thus showing that this is also a viable option for many companies. The cases also show that the technical challenges of substitution, including testing an alternative, adapting technologies and potentially changing product compositions, can be very well managed by companies at any position in the supply chain and by companies of any size.

3.7 The role of national authorities

As the chemicals legislation is defined at the EU level almost exclusively in the form of regulations[15], the role of national authorities mainly consists of its national implementation. While the policy makers focus on measures to support companies and organize the national contributions at the EU level, the inspections and the REACH helpdesks are in close and direct contact with the companies. The REACH (and CLP) helpdesks have the task of supporting companies regarding the legal implementation by supporting the interpretation of legal requirements and providing practical advice about national issues. In the three Baltic States, the REACH helpdesk is operated by the competent authority for REACH.

The national inspections should enforce legal compliance with chemicals legislation. As chemicals are a cross-cutting issue, a variety of authorities may be involved in this, e.g.:

- REACH: registration, restrictions and authorization, communication according to Article 33 and development and communication of safety data sheets;
- CLP: classification of substances and mixtures, their labeling and packaging;
- Worker protection: availability of risk assessments at workplaces regarding chemical agents and implementation of exposure limit values, wherever these exist;
- Installation safety: proper storage conditions, emergency plans according to the *SEVESO Directive*;
- Industrial emissions/waste: adequate consideration of chemicals in the permit, classification of (production) wastes, proper waste disposal and documentation, emission and waste reporting;
- Product legislation (Toys, RoHs…): compliance with potentially existing restrictions and/or communication requirements.

In the Baltic States, inspections have changed the enforcement approach from primarily sanctioning non-compliance to a more supportive strategy, i.e., first advising on how to achieve compliance, and punishing only if the company does not implement the required changes.

The national competent authorities may report experiences, needs and recommendations from their countries to the EU level. In this regard, they are addressees of the project recommendations rather than active participants in the project.

[15] This is different for environmental, workers, product and installation-related legislation. As this legislation is not in the focus of the project, it is not further discussed in the present document.

3.7.1 Assumed or known deficits before the project started

Previous projects in the Baltic States revealed that the communication between companies and inspections is not always functioning well. Amongst others, the reasons include that companies do not know whom to contact and fear being prosecuted if they fail to comply with legislation or have significant implementation deficits. Another reason is that some companies do not feel that the authorities are competent to support them.

As compared to the early work of the BEF in the Baltic States, cooperation and communication between and across inspectorates, authorities and ministries has substantially improved. However, in particular in Estonia, improvement options in the cooperation at the ministerial level are still substantial. Furthermore, the three Baltic countries have established good cross-country cooperation at all levels, among others in the framework of the previous projects of BEF in the Baltic States.

It was known prior to the start of the project that the competent authorities in Lithuania and Latvia have produced at least some overview[16] of the companies that use (specific) hazardous substances (SVHCs), while the respective registry does not exist in Estonia at all. In Latvia and Estonia, the competent authorities were project partners thus ensuring good access to them in the course of the project. The Lithuanian authorities also closely cooperated with the project team, however, without any contractual basis.

3.7.2 Project activities concerning enforcement and authority support

There were several activities in the *Fit for REACH* project specifically addressing the national authorities:

The national round tables[17]: Four round tables were organized per country informing about the project activities and progress, collecting feedback on the implemented actions and ideas for the next steps and reflecting on the overall situation in the countries.

- *SubSelect* Trainings were organized for the national authorities on *SubSelect* to support them in recommending the tool to companies and assist in its use.
- An international seminar on enforcement was organized to discuss related strategies in a wider context.
- The project recommendations were discussed with the national authorities.

[16] It was also assumed that the reporting obligations are not always implemented by the companies; hence, the overview was expected to concern mainly large volume chemicals being imported and/or produced.

[17] Also, industry associations took part in the round tables.

The national competent authorities participated either as project partners or associated partners in a number of activities, including information days, trainings, seminars and other activities addressed to companies. They also participated in the international events.

The national authorities contributed to improved chemicals risk management in the companies by publishing a completely new translation of ECHA's CLP guidance. As classification and labeling is key to the identification and communication of chemical hazards, this support document is essential for companies implementing chemicals risk management.

The project team benefited much from the knowledge and experience of the authorities, in particular in the scope of organizing and identifying participants for information days and training events.

3.7.3 Findings about the work of national authorities

Opinions and views of the national authorities

In the round table discussions, several project findings were confirmed, including the observed lack of awareness on chemicals risks in companies, the resulting underestimation of dangers by the companies as well as the low priority given to chemicals risk management in general.

Several of the round tables in all the three countries mentioned that awareness raising and knowledge building on chemicals and chemicals risks is missing but should be started as early as in school education. This would ensure that the general public better understands chemicals risks and demands (more and) safer products. Students and trainees in companies would start with at least basic knowledge on chemicals. It was mentioned that even university students lack practical information about chemicals risk management and the related legislation.

The need to implement green public procurement as a market force demanding more environmentally friendly and safer products was also discussed at the round tables. Green public procurement was generally evaluated as an important driver of the development of safer/greener products. However, chemicals-smart procurement criteria appear to be insufficiently addressed in the procurement guidelines of the public administration. Procurement in companies was found to be important for corporate chemicals risk management, among others, as it would increase the supply chain communication and, potentially, trigger substitution.

The round table discussions confirmed the project team's impression that authorities were increasingly supporting companies during their enforcement and implementation actions on chemicals legislation. The Lithuanian REACH helpdesk operated by the Environmental Protection Agency reported 2,000 company consultations per year.

All the national round tables identified a need for continuous (professional) training on chemicals in the companies. As these institutions also lack chemicals risk management competences, this need was also seen to be relevant for consultants and universities providing services to companies.

Importers were identified as an important group of actors in Estonia since they are the entry points for hazardous chemicals, but were found to possess insufficient competences and capacity to ensure provision of good quality information on chemicals by the exporting companies.

The project partners and surveyed stakeholders stressed that communication among national authorities could be improved, in particular in Estonia: during the last 20 years, it has not been possible for the Ministries to agree on the chemicals policies, and the ***Ministry of Social Affairs of the Republic of Estonia*** was found not to take proper responsibility for coordinating chemicals management work. In the other countries, the roles, responsibilities and cooperation among the relevant authorities were seen as 'in place'.

Needs for support in companies

In the qualitative interviews, companies expressed wishes for authority support on substitution in principle via two ways: providing financial support and developing policies which would stimulate substitution and/or a change in consumer/client awareness so that the market for safer products is increased (willingness to pay higher prices for better products). Direct consultation by inspectors or the REACH helpdesk were not mentioned as important needs by the participating companies.

Overall, and also according to the discussions at the national round tables, awareness raising is needed to improve chemicals risk management and legislation. This awareness raising could be implemented, among other means, by the competent authorities and helpdesks as well as the inspectors during their company visits. At present, the authorities in all the three Baltic States organize information events, make written information available; support to companies regarding their specific questions via the helpdesks and during inspections is also offered. However, the possibilities to help are limited to these companies which the authorities are aware of and/or to the companies which have actively sought the authorities' help.

While some information is available on companies using chemicals in the national registers (LT/LV), it is still unclear if all the relevant companies are reached, and which ones (if any) are missing. This problem also exists in other Member States, and it was acknowledged by the business associations participating in the round tables. The project team generated information on additional companies by specific research so that to identify the companies that have not yet been approached before. Although considerable efforts were invested in order to identify 'new' companies, it was frequently not possible to motivate them to participate in the project.

Seminars and workshops were found to be an efficient way to inform companies about chemicals risk management, current and upcoming legal requirements, and options to comply with them. The participation of authority representatives as a speaker increased the attractiveness of the events for companies. This indicates a high interest in getting 'first-hand information' and being in contact with the authorities. The impacts of seminars and trainings can be increased if, after the events, the companies are visited or called by phone or e-mail about the follow-up activities. It appears to be not feasible that the national authorities or inspectors implement similar activities as those implemented by the project team in the light of the needed resources and the (still) limited trust and openness of companies towards them.

In the light of discussions with companies, the helpdesks are, to some extent, not well-known or valued as an important contact point for companies. This could be due to the generally low awareness on chemicals in companies as well as the disappointment with the helpdesks' answers. The latter concerned the level of detail and the practicality of the answers. Overall, the existence and the role of the helpdesks should be made better known, and the expectations about the type of help they can provide should be clarified – the helpdesks are deemed useless if no direct and practical hands-on advice is available.

The project showed that the substitution and risk management support tools are only used if they are either applied together with a trainer, or if specific training is provided. Companies and authorities commented that tools should serve a clear need and be simple and easy to use. It is yet to be discussed to what extent the development of implementation tools can be a task of the national authorities or if other stakeholders should do this, e.g., industry associations or universities.

What concerns the main substitution support needs identified in the project (prioritization, assessment of alternatives and organization of the process), they cannot be accommodated well by the state authorities.

Costs were mentioned as a substitution barrier. Hence, it appears natural that the national authorities should consider making funding available, e.g., in the form of research grants, investment money, or other relevant options. At the Lithuanian round table, it was mentioned that the two 'eco-innovation funding programs' had not been used much to finance substitution actions by the companies. One of the named reasons was the high bureaucratic efforts to apply for the funding, which would be challenging for large companies, not to mention the smaller ones. The latter companies would also lack knowledge about these funding options. With regard to Estonia, more active use of the national funding instruments was reported for resource efficiency work. According to the SME survey, companies have access to funding sources (including private investment capital), and ca. 20% of the participating companies reported to use that money for developing new products and/or services. There appears to

be agreement among the companies that reducing the administrative burdens for obtaining (and documenting the use) of state money would be useful to make such funding opportunities more attractive.

Another issue was encountered during various activities in the project: ECHA's website was found to contain a lot of useful information, however, most companies and, partly, also the project team found the website difficult to use, and the information was not always easily accessible. This would be due to the complexity of the website (too many hierarchical levels) and a non-intuitive structure. Many SMEs did not know ECHA's website or were unaware of what information is provided there. Finally, ECHA partly refers to non-public documents[18].

3.7.4 Conclusions

The views of the national authorities – ministries, competent authorities and inspectors – mostly coincided with the views of the project team and confirmed that, generally, basic awareness, competences and skills as well as structured approaches (management systems) are missing in many of the companies in the Baltic States. Nevertheless, progress is also witnessed by authority representatives, and several activities are ongoing with the objective to improve the situation.

The roles and responsibilities defined by the chemicals legislation are generally respected in the Baltic States. The authorities support companies in the implementation of chemicals legislation, among others, via the helpdesks, information events, information on websites and other channels, including social media. The authorities are well aware of the many challenges faced by the companies.

Improving the basic chemicals risk management skills in Baltic companies is given a high priority by the authorities, and resources are invested in supporting the understanding and implementation of the classification and labeling provisions as well as safety data sheets, among a number of examples. The need for such activities is high, and continuation of these activities is regarded important by all the stakeholders.

Companies have a number of support needs that the national authorities cannot or do not want to address, including priority setting on which substances to substitute, or assessment of alternatives. Here, other stakeholders could fill the gap, in particular, industry associations and consultants.

Important instruments not yet used to the full extent appear to be the funding instruments (excessively bureaucratic procedures to obtain the funding, lack of clarity if substitution can be covered, etc.), and awareness raising in commercial/public consumers about safer products so that to create markets for products with less hazardous substances.

[18] At least one link to the CIRCA ABC database was not accessible to the project team.

3.8 Societal conditions and the policy context

The Baltic States, as a part of the European Union, act in an environment that is changing with regard not only to the legal situation, but also to the overall mindset towards chemicals. In the course of the project, the discussion on substitution at the EU level won new impetus from the *EU Green Deal* and its *Zero Pollution Ambition* as well as the *Circular Economy Action Plan* and the conclusions from the *7th Environmental Action Plan* (EAP) feeding into the preparation of the 8th EAP. Additionally, the *Chemicals Strategy for Sustainability* increased the relevance of substitution for achieving the policy goal of 'zero pollution' and the 'non-toxic environment', respectively. The project activities did not directly relate to the ongoing discussions at the EU level, with the exception of the international workshops.

The Baltic society has become more aware of chemicals hazards and risks. According to the *Eurobarometer Study on Chemicals*[19], more than 60% of the respondents in the Baltic States feel concerned about being exposed to hazardous chemicals[20]. In all the three countries, only about 50% of the citizens specified that they feel "well informed about chemicals" in the survey and that they trust in that the products on their national markets are safe with regard to chemicals[21].

At the beginning of the project, the corporate landscape was characterized with a view to how substitution would fit into the overall situation and to what extent the Baltic companies differ from the overall EU situation. A 'Baltic factor' was developed, which should represent the Member States' progress towards greater competitiveness. It was evaluated by using three indicators of labor productivity, exports and innovation (during the past five years): the competitiveness level of the Baltic States falls in the group of the countries with *modest but improving competitiveness* being successful in improving their performance and narrowing the gap with the stronger Member States, however, still performing relatively poorly on productivity and innovation (EC, 2014:7). While Estonia and Lithuania are assessed as *moderate innovators*, Latvia falls into the group of *modest innovators* with the innovation performance well below that of the EU average (Innovation Union Scoreboard, 2015).

Additional indicators about the chemicals and the processing industry, SMEs and innovations, economic effects and consumer perception on chemical substances and products containing chemical substances were developed. It is concluded that the processing industry plays a prominent role in the Baltic economies by contributing a gross value added (GVA) between 14% and 21% to the manufacturing sector. How-

[19] European Commission (2017): Special Eurobarometer 456. Report. Chemical Safety. Brussels.

[20] Estonia: 61–68%, Latvia 69–76%, Lithuania 77–100% of the respondents.

[21] Estonia is an exception; here, less than 50% of the respondents have trust in the products on the national market.

ever, as businesses are generally 'low-tech', they score low in the development of the business sector, but with a positive trend. The comparably low investments into innovation show that changing products and processes is rather uncommon in the Baltic States. Consequently, R&D expenditures are lower than the average in the EU.

3.8.1 Assumed or known deficits before the project started

With regard to the above described situation and based on observations from previous projects, the overall context of business activities is a cautious one. Companies are assumed to rather invest in maintaining and securing the current market than changing products and processes so that to innovate for more environmentally friendly products. The risk of using new input materials and the related testing of product and process performance adds to hesitations regarding investments into substitution.

Despite a number of consumers being concerned about chemicals and mistrusting product safety, costs were observed to be an even more important purchasing criterion on the consumer's side. Furthermore, consumer choices, the same way as all over the EU, are also driven by aesthetic considerations as well as traditions and resistance against trying out new products. Finally, the challenges faced by consumers to (easily) obtain and understand information on chemicals in products contribute to the gap between the existing concern and the (partial) lack of changed behavior.

The current consumer behavior and the focus on low prices makes many companies weigh low end-consumer prices higher instead of gaining new market shares from an improved chemical composition of products. Additionally, economic assessments of substitution frequently take a short-term and narrow perspective towards investments and product or process costs (i.e., savings in waste treatment or worker protection are disregarded). This may distort the actual relation between the costs and benefits of substitution.

With regard to the practical implementation of the project, it was expected that the EU policy would not significantly affect the practical, every-day work in the companies, except for compliance with specific legal requirements.

3.8.2 Project activities related to the societal conditions and policy development

The core addressees of the *LIFE Fit for REACH* project were the companies and their everyday chemicals risk management work. (National) authorities were partly project partners, and they participated in the activities, but they did not belong to the main target group of the project.

One of the aims was to support the implementation of EU (as well as national) legislation on chemicals. Hence, the EU legal framework was the basis of the work,

including the dynamic changes due to, e.g., the candidate list for authorization under REACH. Hence, it was not the aim to discuss, change or challenge EU legislation, but rather to improve its implementation, among other factors, by fostering substitution, which is only an indirect requirement or consequence of some of the EU provisions.

During the project, several discussions took place on the EU chemicals legislation and policies, all of which had minor impact on the project activities. These discussions addressed several aspects of chemicals risk management in companies:

Discussions about the future EU policy principles, namely the *Green Deal (Zero Pollution, Non-Toxic Environment*) and the *Chemicals Strategy of Sustainability* Despite much discussion about the new strategy, no concrete impact of the EU discussion on future policies was observed in the project, even despite increased attention being paid to chemicals in these companies which are already aware and follow the discussions at EU level.

- Discussion about implementation deficits of EU legislation and developing policy approaches, including legislation and guidance to improve them. The last (and the second last) REACH review identified several issues for improvement, such as the quality of registration data, the frequency of dossier updates, communication in the supply chain, the legal interfaces of REACH with other legislation or the simplification of legal requirements and the efficiency of the authorities' work in the REACH processes, such as restrictions and authorization. The activities by the EU Commission, the ECHA and the Member States on these aspects were mostly not relevant for the project and its activities because the majority of the participating companies were formulators and end-users. Supply chain communication, which was also identified as 'deficient' in the project and where improvement would have a significant impact on the companies' abilities to implement chemicals legislation was not (yet) addressed at the EU level, although it was highlighted in both REACH reviews as being of high importance. Consequently, also in this context, the EU legal frame did not affect the implementation of the project work.
- Providing support to the implementation of legislation Guidance documents and the databases by ECHA were improved in the recent years, and substitution was included into ECHA's work areas (its own section on the website, sector and supply chain discussions, etc.). Some of the project activities aimed to complement the EU implementation support and/or fill the existing gaps. The concerned aspects were, e.g., the translation of ECHA's CLP guidance into the national languages, advice to companies in checking SDSs and communicating with the suppliers if SDSs were not compliant or understandable. Overall, it was observed that the national support to the implementation of (chemicals) legislation is much more important to the companies than any guidance or activity at the EU level.

In conclusion, the discussions and activities at the EU level on the development, implementation and company support regarding chemicals legislation did not provide any direct incentive for the project to work on, with the exception of updating the *Candidate List for Authorisation* or restricting substances.

Vice versa, the project conducted three international seminars (*Enforcement* (2016), *Policy Integration* (2017) and *Substitution* (2019)) in order to discuss the findings of the project in the international context. Recommendations were derived from the discussions and reports published in the conference proceedings and outcomes.

Finally, one of the project objectives was to derive recommendations to the authorities at the national and EU level from the practical, hands-on work with the companies about how policies could be designed and implemented with a stronger focus on the company needs and capabilities (cf. **Section 5**).

3.8.3 Findings on societal conditions and the policy context

Chemicals risks management is only one of the several issues that companies have to take into account. However, it is a cross-cutting issue, and it affects many departments and processes in a company. This is a challenge because chemicals are addressed in many different pieces of legislation and tools. It is also an opportunity, as better chemicals risk management may also leverage improvements in many other areas. During the work in the *LIFE Fit for REACH*, several aspects regarding the integration of chemicals management policies were observed.

Chemicals risk management is not sufficiently considered in environmental management systems (EMAS, ISO 14000, corporate sustainability reporting, etc.). This is obvious from the lack of the respective implementation guidance as well as from the fact that many companies which operate such a system do not cover chemicals therein. Companies reported lack of criteria and specific guidance how to integrate chemicals into their systems and policies.

Improved chemicals risk management and substitution frequently involves reduction in hazardous wastes. This interlink and the potential benefits and cost savings from better chemicals management in the waste treatment are not always obvious for companies. This is partly due to the general hesitation to consider substitution and the resulting lack of assessing the related consequences. This synergy is not obvious to companies, nor is it addressed in legislation, management standards or implementation guidance. In addition, and in the context of the circular economy action plan, the amount of recycled materials should be increased while preventing the event of hazardous substances entering a second service life where they could cause further risks. This may be an additional incentive to a changed product design, including substitution of the substances of concern.

Worker protection was found to be a strong driver for improvement and substitution in companies. Explicit legislation on chemical agents at workplaces is available, and the processes at the EU level have been harmonized by moving the responsibility for deriving occupational exposure limit values to the *Risk Assessment Committee*. Synergies at the company level from implementing workers-related and chemicals-related legislation are partly obvious to companies. Implementing stricter requirements under workers legislation regarding the substitution of hazardous substances, e.g., by including reprotoxicants into the *Carcinogens and Mutagens Directive* might be an option to foster substitution, as measures to protect workers might be more acceptable than the case if these were implemented, for example, in environmental legislation.

3.8.4 Conclusions

Overall, the practical implementation of chemicals legislation is detached from the EU policy debates, and the Baltic companies mostly rely on the national authorities with regard to practical implementation and respective support. The issues that would have an important impact, such as the improvement of the supply chain communication (documents), have not been sufficiently addressed by the EU Commission even after the latest reviews.

While companies partly integrate various legal requirements and implementation needs in their environmental management systems, legislation, standards, and implementation guidance appear less interlinked, which may result in lower potentials to create a good environment for substitution and chemicals risk management in general.

3.9 Assessment of the project impact

Chemicals risks management should lead to improvements in the human health and the environment and contribute to an overall societal well-being. However, measuring whether or not this is actually the case was not simple in the *LIFE Fit for REACH* project because many of the implemented activities did not cause any immediate material changes. For example, there were many capacity building actions which were important so that to enable companies to manage chemicals risks, but they did not always result in, for example, reduced emissions of hazardous substances. Similarly, the development of guidance and tools aimed to facilitate (routine) tasks in the companies and support companies to manage chemicals risks on their own. However, the type of improvement that may be implemented through the use of guidance and tools, and the way and extent to which this might lead to a decrease of adverse effects from chemicals cannot be estimated.

3.9.1 Methodology of impact assessment

The basis of the impact assessment is the key performance indicators suggested by the LIFE program which are the used and the emitted amounts of chemicals. In addition to these, three more types of indicators were defined: the change in risk characterization ratios and the change in life cycle category impacts and costs, as well as benefits brought by the substitution and/or resources efficiency measures implemented.

The reasons for developing the additional indicators were, among other aspects, that the used and emitted amounts of chemicals were found to be insufficient indicators of the environmental impact. After emissions, the behavior of substances in the environment and the influence of the environment on these substances are not considered by these indicators. Hence, the actual environmental impact may not be correctly addressed in terms of (eco-)toxic effects. For example, if a small amount of a persistent, bioaccumulative and toxic substance (PBT) is emitted, this may appear less relevant than the emission of a large amount of a readily degradable carcinogen when using only the KPIs. However, if the exposure levels and potential risks are considered, it may be found that the carcinogen is very quickly degraded without causing any harm, whereas the PBT might significantly damage the ecosystems for a very long time.

In addition and with the use of the change of risk characterization ratios, the project team hoped to develop a simple methodology to assess substitution impacts that could also be used by companies to prepare their decision(s) on possible alternatives, also in the cases if these are mixtures.

The life cycle impacts related to the substitution were included in the indicator set in order to check if a reduced (eco-)toxic risk results in increased impacts on,

e.g., climate gas emissions or eutrophication. From the scientific perspective, it was intended to check the usefulness of LCAs for the assessment of substitution and compare whether or not they complement or contradict the results of the changes in risk characterization ratios (Δ RCR).

It was the original idea to derive a Δ RCR for worker health, consumer health and the environment using substance use amounts from the companies, collecting safe threshold values (DNELs and PNECs) from ECHA's database and putting them into the ECETOC TRA to derive RCRs. These RCRs should be aggregated for all the substances changed due to the substitution, and the change in the overall risk should be determined by comparing the values before and after substitution.

For LCA assessment, it was intended to use the IT tool *SimaPro* and the *EcoInvent Database* in order to identify the impacts of the substances and the changes in the inputs and outputs in the companies due to substitution according to the standard impact categories. The comparison of the sum of impacts before and after substitution should show whether or not – as substitution impact – it is beneficial for the environment, and to what extent improvements have been made.

In addition to the environmental impact assessment, the economic impacts of the substitution and resource efficiency cases were assessed. For this, the change in annual costs of the companies and the benefits for the companies and for society at large that are related to a reduction of impacts on human health and environment were calculated. Moreover, based on various assumptions, the impacts identified as an outcome of the cases of substitution and resource efficiency in the partner companies were extrapolated to all the Baltic States showing hypothetical benefits of substitution or reduction of the usage of hazardous chemicals.

3.9.2 Project activities on impact assessment

As most of the project activities did not have measurable material consequences, the impact assessment was focused on the activities implemented in the partner companies (9 substitution cases and 2 resource efficiency cases) as well as a selection of substitution cases implemented during the consultation of other companies. Among the implemented activities, there were:

- Development of the indicator concept so that to measure project impacts, including a methodology for their derivation;
- Development of the methodology for Socio-economic Impact Assessment of the pilot cases;
- Assessment of changes due to substitution and/or resource efficiency cases in the partner companies;
- Assessment of changes due to substitution or resource efficiency cases in the non-partner companies;

- Assessment of the societal context and means to monetize benefits and substitution costs;
- Identification of consultation cases for qualitative assessment of the impact;
- Collection of information on all the substances, the use of which was changed as a result of the substitution processes in the partner companies, i.e., the targeted substance/mixture and the alternative;
- Collection of economic data in the companies that were related to or affected by the changes from substitution and resource efficiency actions;
- Development of indicators for each case of substitution based on information from the companies and ECHA's registration database;
- Development of an ex-post report about the environmental impacts of the project;
- Development of a report on socio-economic impacts of substitution and use reduction in the project.

3.9.3 Findings of the impact assessment

The development of specific indicators to measure activity and project success proved to be cumbersome in particular with regard to the need to gather specific data which relates to a particular process or product by the companies implementing risk reduction measures. In addition, the approaches chosen to measure success showed to be applicable to the area of chemicals risk reduction, however, with some systematic challenges and limitations. Among others, the following issues were identified:

- **Challenges on hazards**

Some data on physical-chemical properties, e.g., water solubility and vapor pressure are not available. If these values are needed to enable calculations by ECETOC TRA[22], it is unclear which 'default' to choose.

Frequently, no comparable DNELs and PNECs were available in the ECHA's database as they were derived for various exposure routes and durations across the substances (e.g., missing if no hazard assessment is required, due to data waiving, etc.). Therefore, the number of comparable RCRs was low.

As DNELs are derived from the most sensitive endpoints, DNELs for different substances may address different (human health) effects, and, hence, are not comparable. For the assessed substances, most DNELs were derived from the repeated dose toxicity, which was good from the perspective of comparing. However, when substitution included CMRs, PBT/vPvBs and endocrine disrupting chemicals (EDCs), the

[22] This IT tool was used to calculate the RCRs

actual risks were insufficiently reflected (no threshold exists, or the effect is manifested not at the most sensitive endpoint).

The information in safety data sheets and the ECHA's database is not always the same.

UVCBs and substances with particular activity profiles or behaviors in the (natural) environment could be assessed as ECETOC TRA is only a rough tool not allowing the assessment of such substances.

- **Challenges related to the exposure assessment**

The current legal obligations on SDSs allow (and also enable) formulators (only) to specify the concentration ranges of the classified substances that exceed the thresholds for the identification in a mixture. Therefore, the used amounts of substances (in mixtures) could not be unambiguously identified.

Emissions, exposures and risks were identified by using ECETOC TRA and the integrated 'emission models (categories)'[23]. These models are conservative worst case assumptions; therefore, they result in very high emitted amounts. They only roughly differentiate between substances with different mobilities. While the calculated risk levels are very unrealistic, in the comparison of substances, the uncertainties and 'roughness' of the assessment is the same for both. However, the lack of differentiation leads to overestimated or underestimated changes in risk.

The derivation of workplace exposure levels using ECETOC TRA cannot be logically followed as the model is based on measurements. This commonly known deficit of the tool prevents proper interpretation of the assessment results, which was particularly regrettable in the cases where the results appeared to be disproportionate when only qualitatively looking at the used amounts and the mobility of the substances compared in the assessment.

As ECETOC TRA is a rough assessment tool which is designed to estimate the safe use of 'standard' substances with low hazards, specific aspects cannot be assessed, such as the activity of enzymes and their behavior in the environment.

- **Challenges of LCAs**

The substitution in the partner companies not only resulted in the change of substances but also in changes in the use of water, energy and other input materials. The collection of information from the companies proved challenging because the used amounts are not normally allocated to particular products and/or processes. Furthermore, it was not always possible to allocate the extent of a changed resource use to a particular change in the use of chemicals.

[23] For the assessment of risks to workers, the Processing Categories (PROCs), for the risks to consumers, the Product Categories (PCs), and for risks to the environment, the (specific) Environmental Release Categories (sp)ERCs were used.

The more relevant challenge was, however, that, for many substances that were assessed in the substitution cases, no lifecycle data is available in the *EcoInvent* database. Therefore, it was not possible to make an LCA for these particular substances. It is unlikely that this information gap will be closed in the near future.

The assessment of resource efficiency cases by using LCAs was possible as, in this particular case, no substance-specific data was needed.

- **Challenges related to the use of both types of indicators**

There are five impact categories from LCAs which address the eco-toxic impacts of the use of hazardous substances: terrestrial ecotoxicity, freshwater ecotoxicity, marine ecotoxicity, human carcinogenic toxicity, and human non-carcinogenic toxicity. The changes in these impact categories not always fully corresponded to the changes in risk characterization ratios.

The reasons for these differences are that the impact categories in the LCA are mainly due to the emissions of toxic substances from energy production and the use of natural resources. The impact of the toxicity of the used substances is frequently not significant if compared to that resulting from combustion processes (energy production) or from mining wastes (e.g., aluminum production). Therefore, it is necessary to explain the LCA results with a view to the established RCR changes.

However, as it is the intention to reduce the overall risk, an increase in human toxicity due to a significant increase of energy use stemming from a substitution may indicate loss of environmental quality. In this sense, the two indicators complement each other. However, with a view to the overall policy goals of the EU, the phase-out of substances of very high concern should be prioritized.

The following table summarizes the assessments of environmental impacts of the partner company cases.

Table 2: Evaluation of cases of the partner companies

Company	Substance/case	Δ RCR	LCA	Overall evaluation
Marijampolės pieno konservai LT Food processing	BPA Was substituted in several parts of milk cans, including the sheet coating, lining and cap.	Workers ⇓ Consumers⇓ Neighbours ⇓ Env⇓	All categories ⇓	Unambiguous success. Risk characterization ratios and life cycle impacts decreased as well as overall VOC emissions.
Vakarų metalgama LT Ship building and repair	The used amount of Xylene was reduced, and 2-methoxypropanol was substituted in the thinners of the coating system. They were (partly) replaced with other solvents.	Workers ⇓ Consumers not relevant Neighbours⇓ Env ⇓⇑	Nearly all categories ⇓	Unambiguous success.
Tenachem LV Formulation of construction products	DINP was substituted with Diisononyl 1,2-cyclohexanedicarboxylic acid (DINCH) in a sealant used for insulated glass units.	Workers ⇓⇑ Consumers not relevant Neighbours not relevant Env no PNECs	No data for LCA	Ambiguous – RCR inhalation decreases, RCR dermal increases; no LCA impact could be determined.
	Dibutyltin dilaurate was used as a catalyst in a sealant and replaced with dioctyltin dilaurate.	Workers no comparable DNELs Consumers not relevant Neighbours no comparable DNELs Env ⇑	No data for LCA	Qualitative: ambiguous – mutagenic hazard eliminated, but reprotoxic remains; Quantitative: only env possible, increase in risks.

Company	Substance/case	Δ RCR	LCA	Overall evaluation
Epokate EE Formulation of construction products	Complete substitution of Nonylphenol in a two-component epoxy resin for floor covering by several changes in the recipe.	Workers ⇓⇑ Consumers ⇓ Neighbours⇓ Env ⇓⇑	All categories ⇑; however, dataset largely incomplete	Positive –SVHC was phased out. The substances in the alternative recipe cause (lower) risks to humans and the environment. The LCA is not considered reliable due to lack of data.
	Benzyl alcohol was substituted as a thinner in various products and product components, amongst other, epoxy resin for floor covering.	Workers ⇓⇑ Consumers ⇓ Neighbours⇓ Env ⇓⇑	All categories ⇓ except 1; however, dataset largely incomplete	Positive – almost all RCRs for human health and the environment decreased. The LCA is not considered reliable due to lack of data.
Henkel Balti EE Formulation of construction products	Methylene chloride was used as a cleaning agent and replaced with a mixture which requires heating and slightly longer use times.	Workers ⇓⇑ Neighbours⇓ Env ⇓⇑	Categories ⇓⇑ but most relevant ones ⇓	Success: some increases in RCRs and LCA impact categories, but these occur for less severe risks (short term/ dermal) and impact categories of low relevance after normalization.
Mayeri EE Household detergents and car care chemicals	Sodium perborate was replaced with enzymes in all recipes. A bleaching agent was used as an exemplary product.	Workers – not possible due to incomparability Env ⇓⇑ (freshwater ⇑)	Most categories ⇓	Qualitative: success, as SVHC is replaced with a safer alternative; freshwater impact may be overestimated[24].
	Sodium percarbonate was assessed but ultimately not replaced; the recipe was changed by adding enzymes.	Workers ⇑ Consumers ⇑ Env ⇓⇑	Categories ⇓⇑	Qualitative: unclear, new hazards are introduced; however, control is ensured. LCA is ambiguous.

[24] Alternatives are enzymes whose activity decreases significantly after the washing process; this is thought to be not sufficiently addressed in the standard models.

4 Summary and conclusions

4.1 Chemical awareness and risk management competences in companies

The work with companies showed versatility of awareness levels and competences ranging from very low, i.e., not realizing that chemicals are used in a company, to very high, i.e., having differentiated routines and risk controls in place beyond the legally required minimum. Awareness levels and chemicals risk management competences tend to decrease along the supply chain. As observed in other countries, the company size is not decisive, but it can be an indicator with small companies on average being less aware than the large ones. Low awareness was found to correlate with lack of teaching the topic in, e.g., the general education system, professional training, and the presence of the issue in the media.

Among the more specific findings are:

- Many companies at the end of the supply chain are not aware they use (hazardous) chemicals. Other companies know thereof, but do not consider managing the related risk a priority.
- Many companies lack clear allocation of chemicals risk management responsibilities and resources designated for conducting the necessary work. Companies with assigned responsibilities frequently manage chemicals risks better than those without assigned responsibilities.
- Companies partly lack the very basic knowledge on and skills in the chemicals risk management, including classification and labeling (C&L), safety data sheets (SDSs) and basic rules for practical chemicals handling and storage.
- Many companies use only parts of SDS information, usually that on workers protection (**Section 8**) and storage (**Section 7.2**).
- Direct contacts to companies are key to getting them involved in chemicals risk management. Activities in the regions and cooperation with universities and chambers of commerce proved helpful in reaching companies that had been missed before and/or were unaware of the issue.
- There is high demand for information on the legal requirements and how they are interpreted and implemented, in particular, on behalf of the national authorities.

4.2 Legal compliance

The project showed that many companies are not (fully) aware of and therefore also not (fully) comply with the legal requirements on chemicals or related to hazardous substances in products (restrictions). This applies more to the companies at the end of the supply chain than to chemicals producers and more to small than to large companies.

- Legislation was found to be an important substitution trigger, in particular, the candidate list, marketing and use restrictions, but also other legislation, such as on food contact materials or VOCs. Already, the announcement of regulatory activities is perceived as a signal, and it is included in risk management considerations.
- Although chemicals inventories are legally required in the Baltic States, some companies either do not have one at all, have incomplete ones, or do not update it. They are not systematically used to ensure legal compliance with (any other relevant) legislation.
- Many safety data sheets were found to be non-compliant (e.g., not in the national language, not updated, incomplete or wrong regarding hazard information). As downstream users do not systematically check SDSs and as they make use only of some of the information, non-compliant SDSs are not always noted by the downstream users.
- Downstream users having noted non-compliance of SDSs or those who have problems understanding them frequently do not communicate with their suppliers, e.g., in an attempt to request compliant safety data sheets or explanation. Communication with suppliers is generally not understood as means to receive or improve chemicals information or to get help.

4.3 Implementation of substitution and other risk management measures

Overall, the safe use of hazardous substances was not always found to be ensured in the Baltic companies. It is a great success that, despite this fact, not only the partner companies but also several others substituted hazardous substances from their products and processes. This shows that substitution is also possible for small and medium size companies. The observed deficits include:

- Many companies lack a structured and systematic approach (based on a chemicals inventory) in order to prioritize their action needs in chemicals risk management, including substitution needs.
- As legislation is not always sufficiently known, substitution of restricted substances (in mixtures) is not started (early enough), which leads to non-compliance.
- The observed substitution barriers include needs for larger investments (technology lock), lack of alternatives, costs of alternatives, and uncertainties about the product performance after substitution as well as deficits in the companies' internal organization. Furthermore, customer demands, certification needs and industrial standards limit the types of possible alternatives.
- Some chemicals can be substituted at a comparably low cost, in particular if these are processing auxiliaries or if one mixture can be exchanged with another. Substitution of hazardous substances in formulations requires more effort, similarly to the substitution of substances that are included in articles.
- Direct benefits of chemicals risk management are not obvious for the companies regarding potential savings of risk management costs and/or reduced sick leaves of workers, potential market gains and/or reduced fees and charges on hazardous wastes or emission controls. Substitution examples outlining these cost savings are widely missing. In addition, the quantification of benefits for the environment is a complex task (see below, on measuring risk management success).

4.4 Corporate image and 'green' markets

In general, Baltic companies are being increasingly interested in and aim at good environmental performance and related communication of improvements to consumers. In practice, the companies' ambitions regarding the environmental (and, particularly, chemical) performance largely vary. Regarding the corporate image and activities to improve the environmental performance, the following issues were observed:

- Being environmentally friendly is generally of a high value for companies.
- Many companies use environmental claims without sufficient proof; the eagerness to apply for eco-labels varies across sectors. It was high for household chemicals and textiles.
- Despite acknowledging that the (EU) market for environmentally friendly (with low chemical hazards/risks) products is increasing, companies frequently refuse to invest in improving their products, e.g., in order to fulfill the ecolabel criteria.
- Most companies have some type of a procurement system, but, normally, this does not include criteria on chemicals, or else it is insufficiently implemented. Similarly, public authorities have green public procurement rules, but, usually, they lack chemicals-related criteria and/or competences to implement them.

4.5 Support infrastructure for companies

Companies need various types of support to substitution and/or contribute to improved chemicals risk management. Support can be highly effective if provided directly and specifically to the companies. The following issues were observed during the project with regard to the (needed) support infrastructure:

- Seminars and workshops are an efficient means to inform companies, but are even better if followed up on an individual basis.
- Companies are not always aware whom they can ask for help or are disappointed by the support received in the past, e.g., by REACH helpdesks. They frequently do not make renewed attempts and tend to stop actions instead of persisting with their requests.
- Companies need guidance and/or training on how to use chemicals risk management tools, even if they are simple and practical. Guidance and tools published on websites are hardly tried out on the company's own initiative. They are best accepted if used in a common work process related to the company's specific tasks and problems.
- Many companies have sufficient technological knowledge for substitution but lack competences in prioritization of action needs, evaluating alternatives, and organizing substitution inside the organization.
- Companies perceive application and documentation processes for external funds as inadequately bureaucratic, and some stated that, therefore, they do not make use of them.
- Information on ECHA's webpage is good, but too difficult to find and access.

4.6 Measuring chemicals risk management success

The development of specific indicators to measure activity and project success proved to be cumbersome in particular regarding the need to gather specific data on processes or products inside the companies. In addition, hazard and exposure data to develop risk characterization ratios or LCAs is frequently not available or not comparable to each other. Among others, specific challenges in measuring substitution success included:

- Hazard data on chemicals, in particular on DNELs and PNECs, is either not available or is available but derived from different (eco-toxic) effects and/or for different exposure pathways and durations. Therefore, RCRs can either not be derived at all, or they relate to different endpoints (and are hence not comparable).
- RCRs for substances of very high concern could frequently not be established either due to lack of no effect thresholds and/or because these effects were not the most sensitive endpoints, i.e., DNELs/PNECs referred to other endpoints. Although, in these cases, RCRs could be derived, they do not reflect well the substitution success.
- ECETOC TRA is comparatively simple to use and based on limited data needs. However, as its use frequently resulted in unrealistically high RCRs, the results can hardly be communicated to a wider public without extensive explanation. Amongst others, this is due to the fact that it is designed for a different purpose under REACH, and, therefore, it uses conservative emission models (ERCs/spERCs) which are poorly differentiated according to the mobility of substances. Furthermore, the lack of transparency of exposure calculations for workers and consumers hinders proper interpretation of the results. Finally, the model is not designed for assessing SVHCs and cannot consider particularities of substances related to their activity and/or composition.
- LCAs on chemicals are frequently not possible due to lack of information on individual substances in the LCA databases.

4.7 Policy integration

During the work in the *LIFE Fit for REACH*, several aspects regarding the integration of chemicals management policies were observed:

- The EU chemicals legislation guides decision making in the national authorities and companies; however, its implementation and the related support activities differ across the Baltic States and are based on specific national implementation, infrastructures and traditions.
- Chemicals risk management is not sufficiently considered in the environmental management systems (EMAS, ISO 14000, corporate sustainability reporting, etc.).
- Improved chemicals risk management and substitution frequently involves reduction of hazardous waste amounts; this interlink and potential savings in waste treatment costs are not always obvious for company representatives.
- Worker protection is a strong driver for improvement in companies; here, some synergies between legislation exist.

5 Recommendations

In order to properly manage chemicals, (Baltic) downstream users need to:

- Be aware of chemicals risks and make the topic a high priority in their company;
- Have access to high quality information about the chemicals they use or intend to use (substitution intentions);
- Be able to understand that information and make use of it in implementing risk management measures, including substitution;
- Be rewarded for respective efforts either via savings in operational costs or by an increase in the market share;
- Have access to support in the form of advice and finances.

As the project mainly worked with end-users of mixtures, article producers and partly also formulators of mixtures[25], the recommendations focus on the measures that apply to this group of companies. Complementarily, measures are also needed on the side of the chemical suppliers, e.g., regarding the quality of safety data sheets, the attitudes towards communication with customers, and the abilities to offer alternatives for hazardous substances.

5.1 Increase of efforts in awareness raising and capacity building in the companies

- Policy makers should find ways to include the topic of chemicals into the curricula at the different levels of the education systems (schools, universities, professional training, etc.).
- Policy makers should consider making the existence of a chemical safety officer obligatory in each company handling chemicals and require at least this person to regularly participate in trainings supporting the understanding and implementation of the safe use of chemicals.
- Competent authorities and industry associations should regularly offer information events about chemicals legislation, how to implement it, and where to get the respective support.

[25] Formulators belong to the group of chemical suppliers. The project work did not focus on the aspects of classifying and labeling the mixtures of formulators and/or how to develop a safety data sheet but rather addressed issues that are relevant for them as users of chemicals and from the perspective of substitution.

- National enforcement authorities should step up their efforts in (also) enforcing the downstream requirements of chemicals legislation using a supportive approach with using sanctions only if a company does not show adequate efforts to change. This may involve development of new enforcement strategies taking into account key deficits observed in this project.
- Professional training institutions and industry associations should offer more training opportunities which are accessible and affordable for all the types of downstream user companies on the basics of chemicals risk management, including (understanding) classification and labeling, SDSs, establishing and making use of chemicals inventories and prioritizing action needs on chemicals. Specific, potentially in-house, training should be provided on the assessment of alternatives, substitution, supply chain communication and advertising benefits of and efforts in providing chemically-safe products.
- Downstream users should allocate responsibilities for chemicals risk management and provide sufficient resources so that to ensure that their staff is sufficiently trained and competent to carry out its tasks. They should include chemicals risk management as a priority into their company policy and integrate it into their management systems.

5.2 Improvement of the supply chain communication

- Competent authorities and REACH helpdesks should regularly inform downstream users about their rights to request compliant safety data sheets (SDSs). They should encourage downstream users to communicate if SDSs are not provided or to clarify chemicals risk management issues with them.
- Industry associations should support companies in their communication efforts, facilitate networking of downstream users in this regard and enhance communication efforts to important (common) suppliers if needed.
- Substance manufacturers and formulators should provide all the information necessary for safe use in the main body of the SDS in a concise and understandable way and in the national language. A contact person should be indicated in the SDS who is competent, motivated, and has sufficient resources to get involved in customer communication.
- Downstream users should ensure that the staff communicating with the suppliers is competent and makes clear requests for the needed information or advice. They should emphasize that information is part of the purchased chemicals and also demand high quality regarding the technical performance.

5.3 Extent and quality of information from REACH registrations

- All the stakeholders should start a review process on the information requirements for substance registration from the perspective of 'what is needed to support substitution decisions'. This may include extending information requirements for low volume substances, disabling data waiving for essential endpoints, defining DNELs and PNECs that must always be derived and including a requirement to derive DNELs for SVHC properties where a threshold exists for these effects. A respective initiative has already been started by the EU Commission.
- ECHA should include information in the 'brief profiles' on the last dossier update, develop an easy-to-understand indicator of the uncertainties related to DNEL/PNEC (e.g., based on the applied safety factors or the number of studies available for the endpoint underlying the calculations).
- From the perspective of the project and the finding that changes in the classification of substances occurred during the project, and, in two cases, significantly changed the urgency of substitution, ECHA should continue with the compliance checks with high priority. The initiative to increase the share of dossiers for checking is supported by the project findings.
- Registrants must ensure a high quality of their registration data by providing compliant information and regularly reviewing the available information followed by dossier updates, wherever relevant, or at least according to the (newly implemented) requirements in legislation.
- Downstream users using ECHA's databases should communicate directly with the registrants if they discover inconsistent, wrong or missing information and give feedback to ECHA on the usability of these databases.

5.4 Chemicals management procedures and inventories

- The International Standardization Organization (ISO) should develop guidance on how chemicals risk management can be integrated into the ISO 14000 procedures, including provision of guidance on differences and commonalities with environmental management and referring to the relevant implementation tools. This also includes training of auditors on the topic.
- All the companies should assess their management approaches and routines and integrate chemicals issues into them by starting from a clear goal in the company policy and the respective objectives on the avoidance and safe use of hazardous chemicals, the respective purchasing criteria, substitution plans, internal communication and cooperation routines, measures at workplaces and regarding environmental and consumer protection, marketing, as well as monitoring success.
- EU policy makers should consider making a chemicals inventory obligatory in order to incentivize more demand for good information and ensure that a sound basis for chemicals risk management is available in all companies.
- Policy makers in the Baltic States should review their legal requirements on chemicals inventories and their content so that to ensure that they are useful for the downstream users to implement, amongst others, systematic compliance monitoring, priority setting on chemicals risk management action needs and other tasks. Legislation may need to be revised accordingly.
- Competent authorities, REACH helpdesks and industry associations should provide specific training on establishing and using chemicals inventories as a key element of chemicals risk management, thus highlighting the benefit of good information and how it can be used.
- Enforcement authorities should enforce the implementation of chemicals inventories and provide respective support.
- Downstream users should build up and use chemicals inventories and make them an essential element of their (chemicals) management systems.

5.5 Enhancement of substitution

- EU and national funding programs should specifically target substitution of the substances of concern; this may include measures ranging from demanding that large research consortia include SMEs in their activities via respective funding requirements or establishing small-scale grant programs with easy application and documentation procedures for the targeted substitution cases.
- EU legislation, in particular the ***Candidate List for Authorisation*** and restrictions, is important substitution triggers. Member States and the ECHA should therefore continue and increase their efforts to identify SVHCs and restrict the substances in use which are causing unacceptable risks. In order to prevent regrettable substitution, grouping approaches should be used as much as possible.
- National competent authorities and/or helpdesks as well as industry associations should increase competences to advise companies how to apply for funding to support substitution.
- All stakeholders should invest in developing 'substitution centers' so that to support companies in substitution. In order to enable access also for companies with scant resources, these substitution centers should be independently funded, e.g., by substance manufacturers (via fees).
- Industry associations, consultants and training institutions should assess the existing priority setting and alternatives assessment tool, in particular with regard to their applicability to mixtures and revise/newly develop approaches that are actually used and provide targeted, accessible and affordable training on substitution, including in-house training, in order to enable specific discussions and avoid confidentiality concerns.
- EU industry associations, ECHA, Member States and NGOs should consider increasing the efforts to develop alternatives, in particular to SVHS, and make their availability known to all stakeholders considering substitution.
- Downstream users should dedicate sufficient resources and staff to build capacity on substitution. It is important that all persons involved in a potential substitution, including purchasers, health and safety managers, production technologies and sales persons, cooperate in this in order to facilitate information collection and decision making on substitution.

5.6 Creating markets for safer products

- Policy makers at the EU and national levels need to communicate the goal of a toxic-free environment and promote 'green purchasing' as an important tool to achieve it.
- The measures for the increased transparency on the content of chemicals in products for consumers envisaged in the *Chemicals Strategy for Sustainability* as well as via ECHA's database on *Substances of Concern In Produts* should be strictly implemented.
- All stakeholders should continuously communicate about the benefits of safer products for human health and the environment in general, as well as the opportunities for innovation and product development in substitution. They should encourage transparent communication on the 'chemical quality', among others, by the use of eco-labels, of well substantiated green claims, or of environmental product declarations.
- At the national level, authorities, consumer protection and environmental NGOs, the media and companies should get involved in communication to consumers about the chemical product safety with the aim to raise awareness and create 'green markets' and provide information on how to distinguish 'safer' from 'less safe' products.
- Market surveillance inspectors should check green claims and contact companies suspected of green washing to prevent unfair competition, and thus ensure consumer trust in product information.
- Public authorities should include (more and more stringent) criteria into their green public procurement rules (and implement them) so that to create a significant market demand for products free from or only involving a low content of hazardous substances.

5.7 Access to companies

- National authorities should consider establishing or improving (in the Baltic States) reporting requirements on the use of (hazardous) chemicals for all the companies so that registers can be built which would support targeted contacting of companies. The information to be reported may include: roles under REACH, types of products, use of SVHC, a contact person (to be kept up-to-date), interest in information on chemicals, etc.
- All stakeholders should consider building up a network for advertising chemicals related (training) events, into which also universities (in particular, those with chemicals-related studies), chambers of commerce and other institutions are included. Companies, after having participated in an event, should, in the optimal case scenario, get a follow-up reminder to offer further support and get feedback on the offer.

Apendix 1. List of company cases

The following list of cases includes a number of cases which were started but where the involved companies stopped cooperation after a short time. The bold cases at the end are the cases implemented by the partner companies.

Title	Sector	Country	Size
A food industry company improves storage conditions for hazardous chemicals	Food	EE	Medium
A car and motor vehicle repair shop develops its chemicals management further	Car services	EE	Medium
A logistics company improves storage conditions for car chemistry products	Logistics	EE	Medium
A car service company updates its chemicals management system	Car services	EE	Medium
An electronics company improves chemicals management	Electronics	EE	Small
A car service company improves its chemicals management system	Car services	EE	Medium
A metal processing company improves its chemicals literacy and learns how to read and check safety data sheets	Metal processing	EE	Medium
A company improves its chemicals inventory and risk assessment at work places to improve the protection of workers	Electronics	EE	Medium
Identification of potential emission sources of hazardous substances in discharged wastewater	Construction	EE	Small
A company implements first steps in establishing a good chemicals management system	Construction	EE	Medium
A retail company establishes inventory and improves labeling of chemicals	Chemicals distribution	EE	Medium
An electronics producer avoids toxic substances by technological changes in production	Electronics	EE	Large
An air service company establishes chemicals inventory and assesses chemicals-related work place risks	Transport	EE	Large
A car service company starts its chemicals inventory and requests better safety information from suppliers	Car services	EE	Small

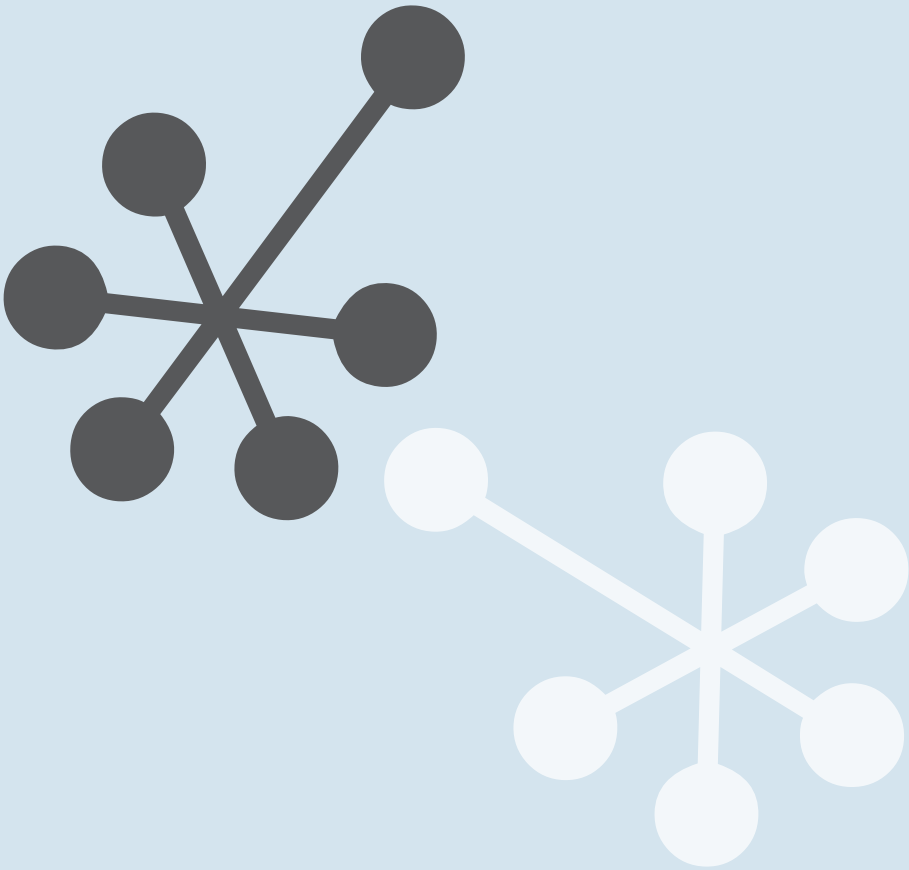
Title	Sector	Country	Size
A construction company establishes inventory, revises use of chemicals and improves safety datasheets so that to conquer Nordic markets	Construction	EE	Medium
A metal processing company makes a fundamental review of its chemicals management system	Metal processing	EE	Large
A car service company implements its first steps in establishing a chemicals management system	Car services	EE	Small
A producer of 3D printing inks reformulates products to avoid consumer exposure to sensitizing substances	Chemicals formulation	LT	Micro
Investigating possibilities to replace a neurotoxic solvent with a safer alternative	Metal processing	LT	Large
A company phases out PCB containing transformer oils	Textile processing	LT	Medium
A textile company refuses acetone for washing contaminated machine parts	Textile processing	LT	Medium
A textile company ceases use of skin sensitizers and dyes which are hazardous to the aquatic environment	Textile processing	LT	Medium
An energy provider motivated to improve procurement of chemicals fails to overcome internal resistance but may involve external advisors	Services – non producing	LT	Large
A construction company reduces its use and emission of styrene after the automatization of a process	Construction	LT	Small
Substituting tetrahydrofuran in a packing and printing company	Printing	LT	Medium
Substitution of chemicals in the furniture industry to improve health and environmental safety	Manufacture of wood articles	LT	Large
Ecological products for cleaning services	Services – non producing	LT	Medium
Substitution of biocide borax in a textile company	Textile processing	LT	Large
Meat industry implements innovative disinfection and reduces the use of hazardous cleaning agents	Food	LT	Large
A textile company improves chemicals management and implements a chemicals inventory	Textile processing	LT	Medium

Title	Sector	Country	Size
A dry cleaner of fur products implements its chemicals inventory to improve its chemicals management system	Services – non producing	LT	Small
A fur producer considered substitution but refrained from implementation	Textile processing	LT	Small
Reduction of antimony in sports wear	Textile processing	LT	Large
A formulator of chemical products goes for a natural preservative	Consumer chemicals	LT	Micro
An industrial detergents producer identifies safe alternative options but reformulation takes time	Chemicals formulation	LT	Small
A dry cleaning company identified the need for substitution but decided not to implement	Services – non producing	LT	Medium
Consultation on product classification and alternative machine oils	Chemicals manufacturing	LT	Large
A printing house improves its chemicals inventory and considers reducing VOC-related risks	Printing	LT	Medium
A cosmetics and detergents producer substitutes hazardous substances and thereby improves product safety	Chemicals formulation	LT	Medium
A ferry company assesses alternatives to hazardous biocide-based antifouling paints	Services – non producing	LT	Medium
A formulator of detergents assesses substitution options	Chemicals formulation	LT	Small
Search for safer alternatives to hazardous construction coatings	Metal processing	LT	Medium
A metal processing company reduces VOC emissions by changing coatings	Metal processing	LT	Large
A restaurant ceases the use of detergents that are toxic to the aquatic environment	Services – non producing	LT	Small
Improving chemical management in a printing house	Printing	LT	Medium
Inventory and HS reduction in a jeweler's workshop	Inorganics	LT	Micro
A metal processing company changes its cleaning technology and eliminates the need to use hazardous cleaning agents	Metal processing	LV	Micro

Title	Sector	Country	Size
A metal processing company changes polishing technologies and significantly reduces its use of hazardous emulsions	Metal processing	LV	Micro
Producers of metal products decide to have its chemicals management improved by an external consultant at a larger scale	Metal processing	LV	Medium
Riga central market replaces freons in freezing systems	Services – non producing	LV	Medium
A metal processing company reduces the use of hazardous substances in coatings by recirculating paints	Metal processing	LV	Small
A metal processor changes its surface polishing technology and replaces chemical emulsions	Metal processing	LV	Small
Replacement of sulphuric acid as a process neutralization chemical with carbon dioxide for superior waste water plant performance so that to decrease the caustic consumption in biogas scrubber for hydrogen sulphide capturing.	Paper production	EE	Medium
A car servicing company updates its chemicals management system	Car services	EE	Small
A car servicing company updates its chemicals management system	Car services	EE	Small
A modular houses company improves its chemicals management at the workplace	Construction	EE	Small
A plastic foil producer assesses VOC emissions from the printing line but does not identify optimization potential	Plastics processing	EE	Medium
Updating on the chemicals management system in a car service company	Car services	EE	Small
Updating on the chemicals management system in a car service company	Car services	EE	Small
An electronic equipment producer updates chemical inventory and looks for potential substitution	Electronics	EE	Large
A cosmetics company ensures compliance with accident prevention	Cosmetics	EE	Medium
A metal processor gets certainty about (upcoming) legal requirements by updating its chemicals inventory	Metal processing	EE	Medium

Title	Sector	Country	Size
Think before doing: seeking environmentally friendly car care products	Car services	EE	Micro
A car servicing company updates its chemicals management system	Car services	EE	Medium
A veneer plates producer updates its chemical inventory and resource efficiency	Manufacture of wood articles	EE	Medium
A metal construction producer minimizes VOC emissions and updates its chemicals inventory	Metal processing	EE	Medium
A company tests a more environmentally friendly antifouling paint for ships	Transport	LV	Small
Metal surface cleaning with an abrasive	Metal processing	LV	Micro
Improving chemical management in auto repair service	Car services	LT	Medium
A metal engineering company updates its chemicals inventory and looks for potential substitution	Metal processing	EE	Small
A company replaces a VOC-containing roof covering system with water-based solutions and reduces its VOC emissions and energy use	Construction	LV	Small
Finding alternatives for disinfection means with a high functional profile	Pharmaceuticals	LV	Large
A theatre starts using accumulators instead of batteries and reduces the burden from battery recycling	Services – non producing	LV	Large
A company substitutes a sensitizing preservative in consumer products	Consumer chemicals	LV	Medium
Change of anti-corrosion treatment helps to reduce workplace risks stemming from the use of hazardous substances	Metal processing	LV	Micro
Renewable materials can be an alternative for phthalates in flooring materials	Construction	LV	Small
A new technology of 3D scan allows omitting the use of hazardous substances	Engineering	LV	Micro
Cleaning diesel particulate filters without hazardous substances	Car services	LV	Micro
A metal processing company assessed the use of powder coatings to reduce the use of hazardous substances	Metal processing	LV	Micro

Title	Sector	Country	Size
Easy way – substitution of EDTA containing cleaners by already used alternatives in the company	Food	LV	Large
Substitution of printing inks used in the large format printing process by providing more environmentally friendly printing in the future	Printing	LV	Micro
A food processing company substitutes BPA	**Food**	**LT**	**Large**
A food processing company changes disinfection process	**Food**	**LT**	**Large**
A ship repair company substitutes a hazardous thinner in the coating system	**Metal processing**	**LT**	**Medium**
A construction chemicals formulator substitutes phthalate in sealants	**Chemicals formulation**	**LV**	**Medium**
A construction chemicals formulator substitutes a hazardous catalyst	**Chemicals formulation**	**LV**	**Medium**
A construction chemicals formulator substitutes nonylphenol in floor coating	**Chemicals formulation**	**EE**	**Micro**
A construction chemicals formulator substitutes benzyl alcohol in epoxy resin	**Chemicals formulation**	**EE**	**Micro**
A construction chemicals formulator substitutes a very hazardous cleaning agent	**Chemicals formulation**	**EE**	**Medium**
A construction chemicals formulator increases resource efficiency by improved quality control	**Chemicals formulation**	**EE**	**Medium**
A formulator of household chemicals substitutes sodium perborate in bleacher	**Chemicals formulation**	**EE**	**Medium**
A formulator of household chemicals substitutes a bleaching agent in laundry detergents	**Chemicals formulation**	**EE**	**Medium**



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