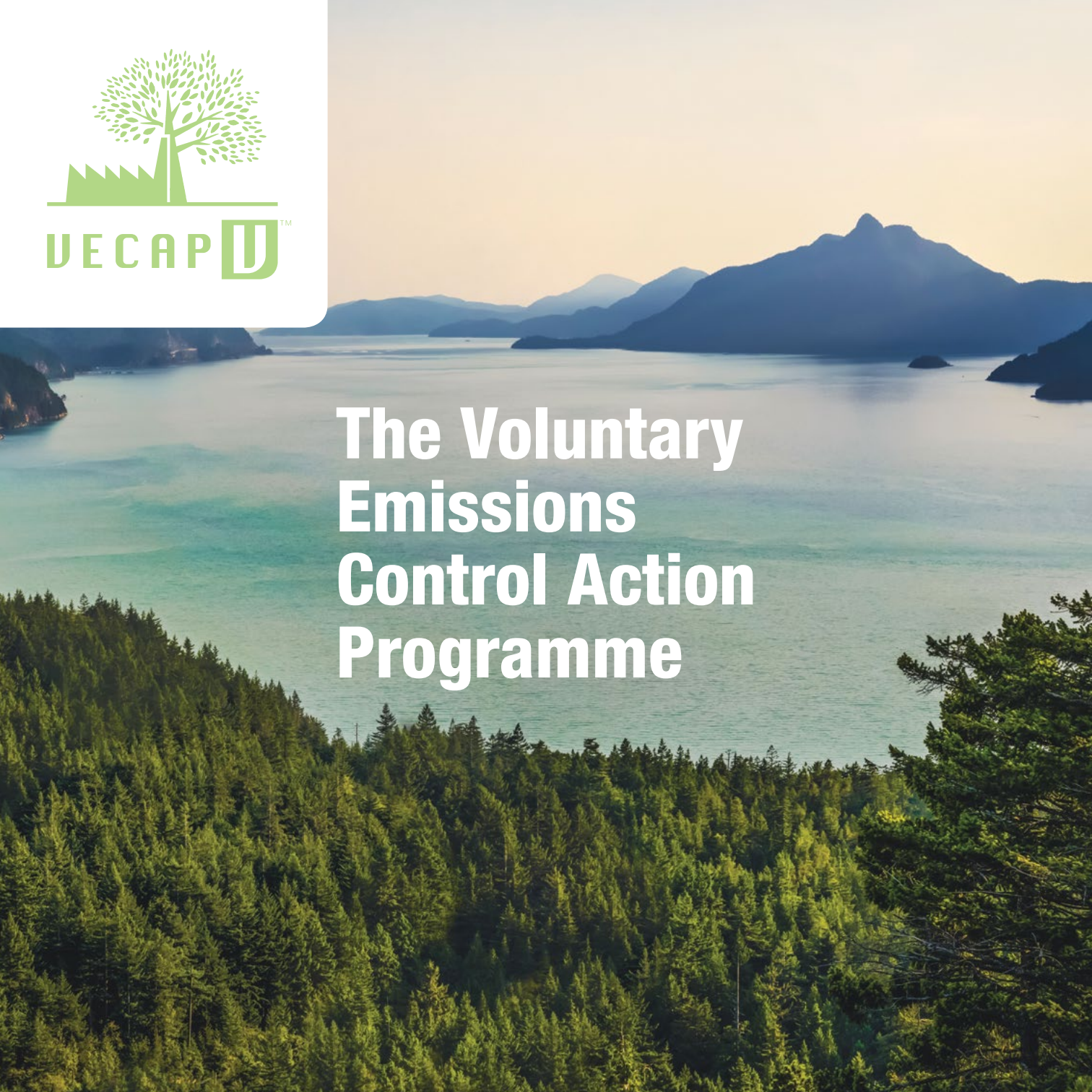
VECAP™

The Voluntary Emissions Control Action Programme



This report is designed to provide transparent and concise information on the progress of the Voluntary Emissions Control Action Programme (VECAP).
Any feedback or comments are welcome and will be considered for future editions.

01

VECAP IN A NUTSHELL

WHAT

The **Voluntary Emissions Control Action Programme** is a pioneering product stewardship scheme for the responsible management of chemicals throughout the value chain; run under the principles of Responsible Care®[1]. Initially, VECAP only applied to the brominated flame retardant Deca-BDE[2]; since 2004, the programme was expanded to include TBBPA[3] and HBCD[4] as well as EBP[5]. Recognising the remarkable impact the VECAP programme had in helping industries to manage chemicals responsibly and in an environmentally sound manner, in 2015 the programme took an additional step forward, and decided to extend its application to all powder brominated flame retardants produced by VECAP member companies.

1. Responsible Care® is the global chemical industry's unique initiative to improve health and environmental performance, enhance security, and to communicate with stakeholders about products and processes www.cefic.org/Responsible-Care. **2.** Decabromodiphenyl ether. **3.** Tetrabromobisphenol A. **4.** Hexabromocyclododecane. **5.** Ethane bis (pentabromophenyl).

WHO

The **flame retardants industry voluntarily developed VECAP** to take responsibility for the management of flame retardants at the production and manufacturing stage. VECAP was established by three of the main producers of flame retardants – all members[6] of the Bromine Science Environmental Forum (BSEF)[7] - together with the UK Textile Finishers association and run, in Europe, by the European Flame Retardants Association - EFRA[8]. The programme ensures the environmentally responsible management of chemicals in all elements of the value chain, by reducing the potential for emissions of chemicals during the production and manufacturing process.

6. Albemarle, Chemtura, ICL-IP www.albemarle.com, www.greatlakes.com, www.icl-ip.com. **7.** The Bromine Science Environmental Forum (www.bsef.com) is the organisation representing the bromine industry, committed to investing in scientific research on bromine and brominated flame retardants (BFRs).
8. EFRA is a sector group of the European Chemical Industry Council (CEFIC) www.flameretardants.eu.

WHERE

VECAP is a **globally recognised product stewardship scheme**, with more and more users in Europe and worldwide embracing the core values of the programme. Individual BSEF members have promoted and implemented VECAP in Europe, North America, Mexico, China, Japan, Singapore, Thailand, Indonesia, South Korea and Taiwan. In all these countries users show their commitment to the scheme by participating to the programme, responding to the survey questionnaire that underpins the progress reports, sharing experience and implementing the VECAP recommendations.

WHY

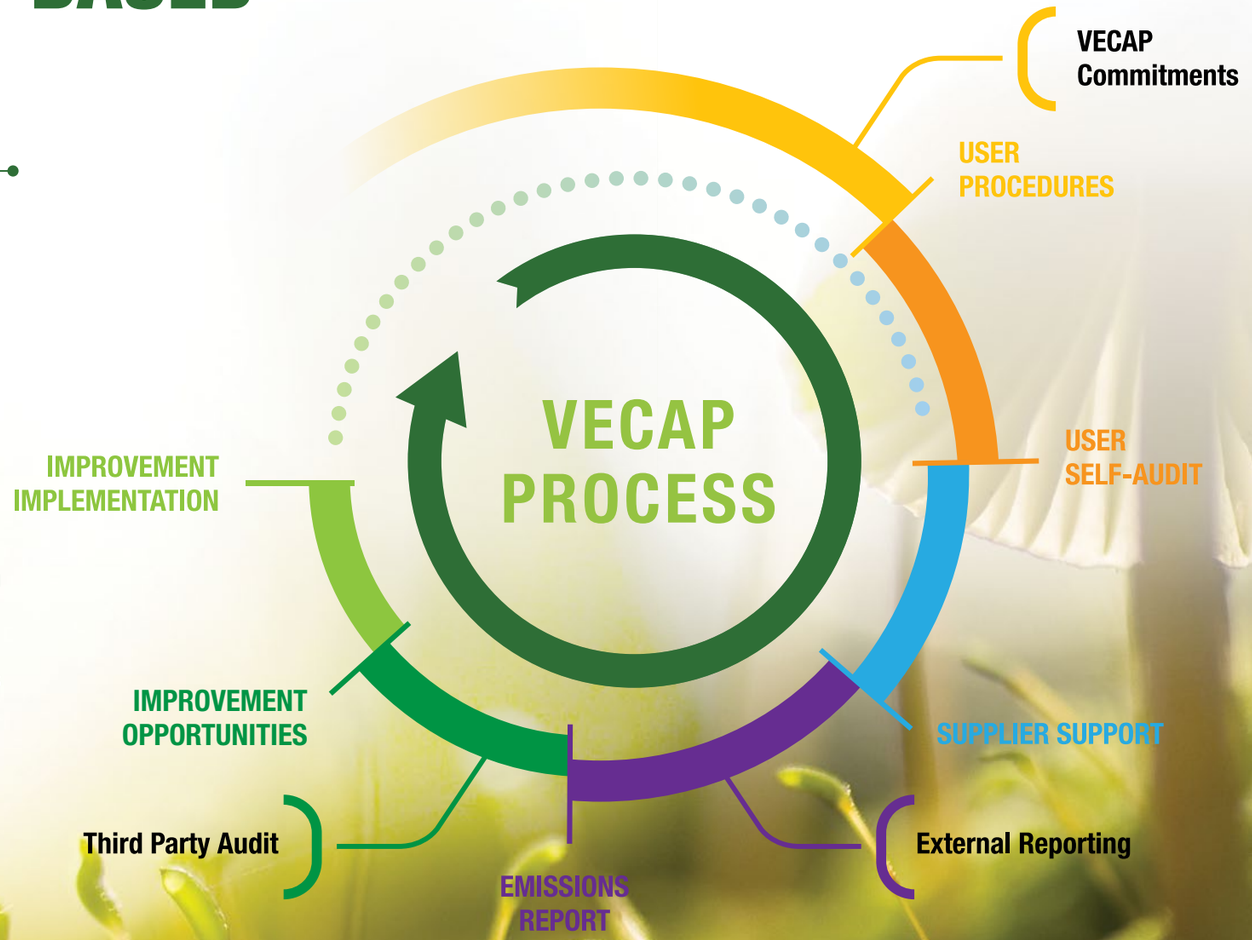
VECAP is founded on the commitment of the flame retardant industry to sustainably manage polymer additives throughout the value chain. The programme has been tailored to provide support and guideline to participating companies on how to control and reduce potential emissions of chemicals into the environment for the handling of polymer additives in the production phase of the value chain. The **simple-to-implement best practices**[9] help producers and downstream users to control, reduce and continuously improve their potential emissions of flame retardants to the environment. Even though industry practices for processing all types of chemicals differ between applications, VECAP best practices can apply across the board.

9. For more information on VECAP best practices, please see the last chapter of this brochure, or visit the VECAP web page.

AN EXPERIENCE-BASED APPROACH

VECAP is founded on the philosophy of continuous improvement with the development of new best practices based on experience. Information gathered through the survey is reviewed and analysed with the aim to systematically develop recommended best practices that meet new challenges and needs highlighted by member companies through the survey.

VECAP includes different phases through which participating companies are provided with support and guidelines on how to control and reduce potential emissions of polymer additives into the environment. Concrete and practical support to participants throughout all different phases is a central pillar of the programme. Informative material and guidelines are provided to users, ensuring that all necessary measures for environmental protection are taken through the implementation of the recommended best practices.



VECAP COMMITMENTS

Member companies voluntarily commit to VECAP's easy-to implement best practices with the aim to responsibly manage chemicals throughout all the different phases of the value chain. The VECAP team continuously tests its best practices against members' first-hand experience during the production and manufacturing process. The VECAP team encourages companies to implement the Industry's Code of Good Practices, which is regularly updated and includes Best Available Techniques (BAT) guidance documents useful for all VECAP participants.

USER PROCEDURES: HANDLING AND TREATING CHEMICALS

The participating sites implement VECAP best practices throughout all different phases covered by the programme, cautious of the fact that flame retardant emissions may occur at different points of the manufacturing process - for instance during the handling of the packaging waste containing residues, or due to dust released during unloading and feeding operations.

USER SELF-AUDIT: THE SURVEY TOOL

User and producers receive an annual questionnaire, which is either sent or discussed during an onsite visit. This questionnaire considers every step of the user's manufacturing process, in order to get an accurate understanding of the practices applied at every potential emissions point.

Users are required to carefully fill in the questionnaire in order for the VECAP team to be able to identify critical points, and to continuously develop best practices to successfully achieve zero or near-zero potential emissions while handling and treating chemicals.

SUPPLIER SUPPORT: THE VECAP PRODUCT STEWARDSHIP TEAM

In order to develop the best practices on which the programme is based, a group of product stewardship professionals identifies the steps in the production and manufacturing processes that might lead to environmental emissions. This is possible thanks to the cooperation along the value chain, the VECAP team's experience and knowledge and the results gathered through the users' survey tool.

On this basis, the VECAP team members provide users and producers with feedback, highlighting sources of potential emissions, and developing best practice recommendations. In addition, the team develops the practical and communication tools needed to track progress and promote participation in VECAP.

EXTERNAL REPORTING: EMISSIONS DATA COLLECTION & REPORTING

Each supplier collates questionnaires and registers the information in a dedicated database. The answers are then compiled and analysed, in a strictly confidential way, by the European Chemical Industry Council[10] (Cefic)'s Statistical Services. Since the first reporting period, the amount of substances handled according to VECAP best practices have been reported based on a per tonnes potential emissions calculation.

2015 marks a turning point in the development of the programme. Strengthening their commitment to the sustainable management of chemicals throughout the value chain, VECAP member companies extended the application of VECAP best practices to all powder brominated flame retardants produced - including proprietary and company specific substances. In line with this expansion in the remit of the programme the VECAP reporting methodology has been adapted following competition and anti-trust rules, which require that supplier anonymity is maintained. Therefore, as of 2015, reporting will focus on the total percentage of volume sold that has been treated according to VECAP best practices.

10. European Chemical Industry Council (Cefic) is the forum and the voice of the chemical industry in Europe, http://www.cefic.org/

THIRD PARTY AUDIT: VECAP CERTIFICATION

VECAP certification allows participating producers and users to verify their commitment and improvements through a third party auditor, attesting the environmentally responsible management of chemicals in the production and manufacturing process. In 2009, a certification scheme was launched based on the principles of ISO 9000/14001. The VECAP certification process was developed in collaboration with independent environmental auditors.

IMPROVEMENT OPPORTUNITIES

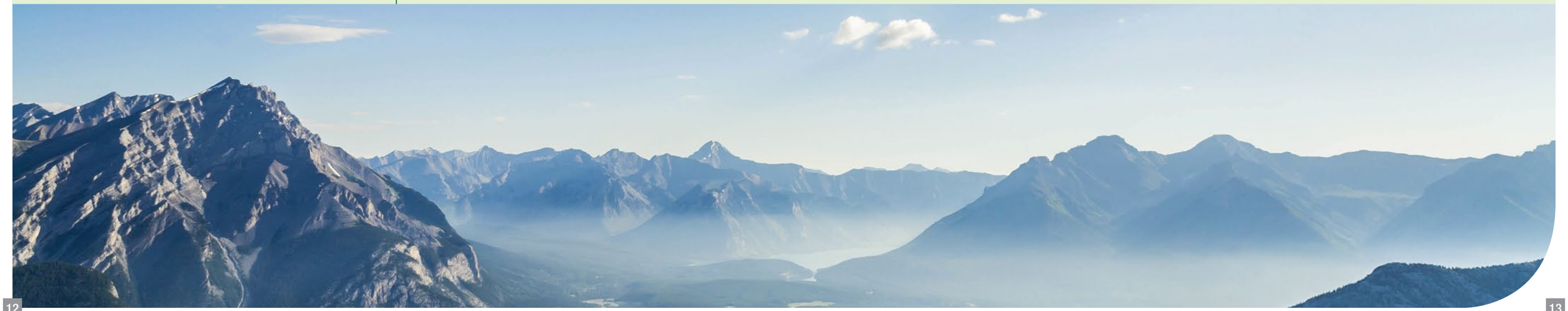
Central to the success of VECAP is its process of continuous improvement. Each year the VECAP team reviews through a survey how companies apply VECAP best practices on the ground to systematically evaluate the effectiveness of the programme. The programme is continuously adapted to better address new challenges as well as to translate companies' experiences into new best practice recommendations.

An example on how this process works in practice comes from a new VECAP recommendation that was added to the existing best practices on the recycling of paper empty packaging, which was identified as a potential source of emissions to the environment by previous surveys, especially from Southern European regions.

IMPROVEMENT IMPLEMENTATION: APPLYING BEST PRACTICES

Producers and downstream users are provided with best practices, tailored on members' first-hand experience. At this point, participating companies are well equipped to apply these recommendations in order to successfully achieve zero or near-zero potential emissions of flame retardants to the environment while handling and treating chemicals.

The VECAP team also encourages companies to implement the Industry's Code of Good Practices, which is regularly updated and includes Best Available Techniques (BAT) guidance documents useful for all VECAP participants.



03

VECAP FROM ITS START TO TODAY

The VECAP product stewardship programme originated from EFRA member companies and the UK Textile Finishers Association (TFA), who in 2004 initiated a code of good practices calling on the UK textiles industry to audit their processes and take action to reduce emissions to the environment of the flame retardant Deca-BDE. In 2014, the programme celebrated its 10th anniversary, reiterating its voluntary commitment to taking responsibility for the environmentally sound management of chemicals. At present, VECAP is an integral part of the responsible environmental management for all companies involved. Participation in the scheme is high and the programme continues to improve based on experience and to expand to new regions.

Since its launch, the programme has seen the active involvement of more than 100 professionals, including sales operators, trained distributors, customers and industry representatives and up to 300 total downstream users.

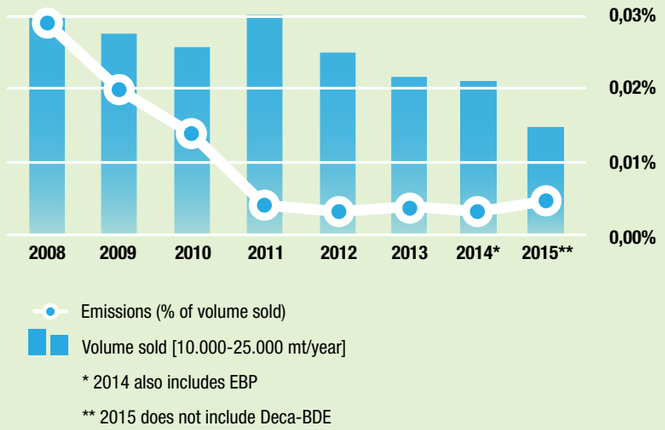
Two years after its launch the programme was expanded to include European, North American and Canadian participating downstream users in the textile and plastic industry. The following year, VECAP was being promoted in Japan while individual companies have taken VECAP to Mexico, China, South Korea and Taiwan.

2009 marked the start of an independent certification system of participating users based on ISO 9000/14001 principles. The scheme development relied on environmental audits carried out by independent auditors, and was designed to be easy to implement and encourage new users' participation.

The VECAP programme achieved great results as for Deca-BDE, HBCD, TBBA and EBP in Europe. By 2015, VECAP had significantly reduced the total potential emissions per tonne sold of these flame retardants over the years (Figure 1). Moreover, VECAP engaged more and more downstream users, supporting and spreading the responsible management of chemicals throughout the value chain.

FIGURE 1

Summary of potential emissions of Deca-BDE, HBCD, TBBA and EBP in Europe (2008 = index year)



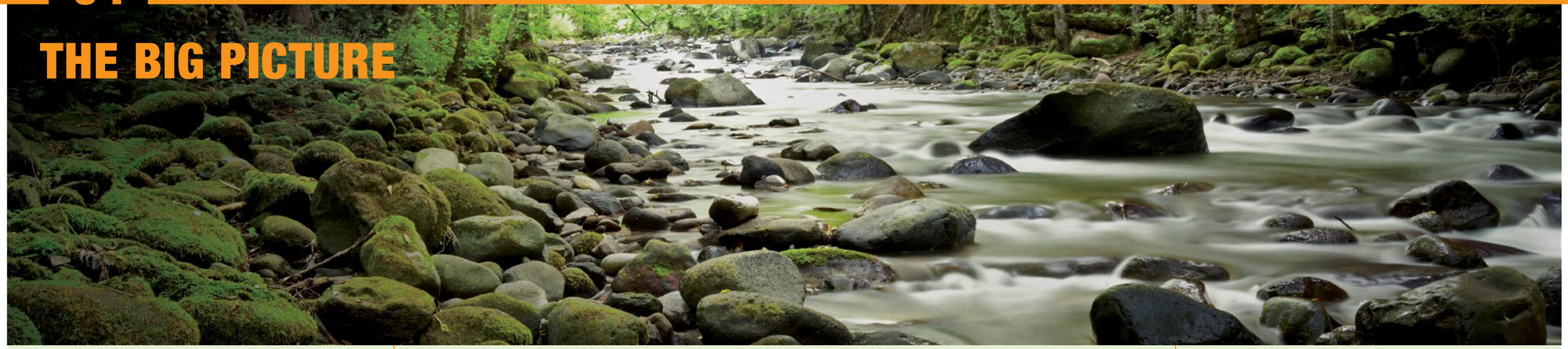
Recognising the remarkable impact the VECAP programme had in helping industries to manage chemicals responsibly and in an environmentally sound manner, in 2015 the programme took an additional step forward, extending its application to all solid brominated flame retardants produced by VECAP member companies.

The industry commitment to the environmentally sound management of brominated flame retardants has been reiterated and strengthened over time, and it is set to continue in the future. The VECAP product stewardship programme represents the umbrella under which industries' effort toward the responsible management of chemicals in the value chain is coordinated and enhanced. Find out more about how the programme has evolved and how easy it is to implement through the materials available on our website[11].

11. http://www.vecap.info

04

THE BIG PICTURE



Nowadays, companies increasingly take special care to manage the impact of their day-to-day business on the environment. Over the years, companies have increasingly taken commitments toward a better, more responsible management of resources. These commitments apply also when it comes to better controlling and reducing potential emissions of chemicals into the environment. Industries are fully aware of their responsibility towards the environment, society and future generations, and have well started to manage and continually improve their environmental performance at every stage of the value chain.

Although this is a trend globally observable, the 2001 Green paper of the European Commission promoting a European Framework for Corporate Social Responsibility (CSR) was a pioneer effort to define CSR. According to the document, CSR is a 'concept whereby companies decide voluntarily to contribute to a better society and a cleaner environment'[12]. The European-lead effort to ensure industries' commitment toward a more efficient and sustainable management of resources has been echoed internationally, showing that industry, civil society, and public authorities all have a greater and greater interest in having a solid CSR strategy.

It is in this context that the VECAP product stewardship programme reiterates its voluntary commitment to taking responsibility for the environmentally sound management of chemicals. More than ten years after the launch of the programme, greening production and the value chain is an increasing priority for all industry sectors and through VECAP the brominated flame retardants industry seeks to reduce the environmental footprint of its value chain and ensure resources are used as efficiently and sustainably as possible.

12. COM (2001) 366: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52001DC0366&from=EN

05

VECAP IN PRACTICE

Potential emissions to the environment can occur at all stages of the production process: transport and storage, opening and emptying of packaging, and the disposal of that packaging at the end of the production process. VECAP has been tailored on participating companies' needs and challenges to provide support and guidelines on how to control and reduce potential emissions of chemicals into the environment throughout the value chain.

Understanding the principles of the programme at all levels – from top management to operatives – is important for a long term responsible practice. Therefore, information and educational materials, such as posters for the factory floor and offices, are provided to help staff become familiar with, understand and accurately apply VECAP recommended best practices.

The chapter below shows examples of where emissions to the environment can occur and what the VECAP recommended practices are to control and reduce them.

TRANSPORT AND STORAGE

Solid chemicals (powder or low dust granules) are transported to warehouses in bags that, on arrival, are brought to a storage area in the factory. During this early stage in the process potential emissions of chemicals could occur as bags could break. VECAP best practice recommends that bags are carefully checked on arrival, and when removed from storage, to **ensure that they are not damaged** and that all seals are intact. **Any tears should be repaired immediately** and spills cleaned up.

OPENING AND EMPTYING BAGS AND IBCs

Once on site, intermediate bulk containers (IBCs) and bags containing chemicals are taken to filling stations where they are opened. At this stage chemicals might spill on the floor, be discharged into the air as dust, or adhere to the personal protective clothing of workers. Emptying bags and IBCs is also a critical point since any residues left in packaging could lead to environmental emissions during disposal of the packaging.

VECAP best practices recommend that when using a chemical in powder form, bags should only be opened in a sealed environment, with all **windows and doors in the surrounding areas firmly closed**. Furthermore, in places where powder materials are handled, a local exhaust **ventilation system** should be in place, preferably a tiered system composed of several filters, regularly maintained. This limits the risk of environmental emissions, allowing for the air to be filtered and residual dust to be appropriately disposed of. When making liquid slurry, the recommended practice is that **bags** are **securely connected to the entrance of the machine** (the mal) before opening them.

Big bags should be thoroughly emptied shaking all four corners of the bag carefully to ensure the maximum content is removed. IBCs should **be tilted in order to allow remaining liquid product to be accessed and more fully removed**.

In the event that **chemicals spill** on the floor at any stage of the process, spillage should be **cleaned immediately**, preferably with dry cleaning via a vacuum system. If using a wet clean process, cleaning water should be collected and treated, either on site or at a municipal water treatment facility. Sludge resulting from waste water treatment should be incinerated.

END OF THE PRODUCTION PROCESS - DISPOSAL

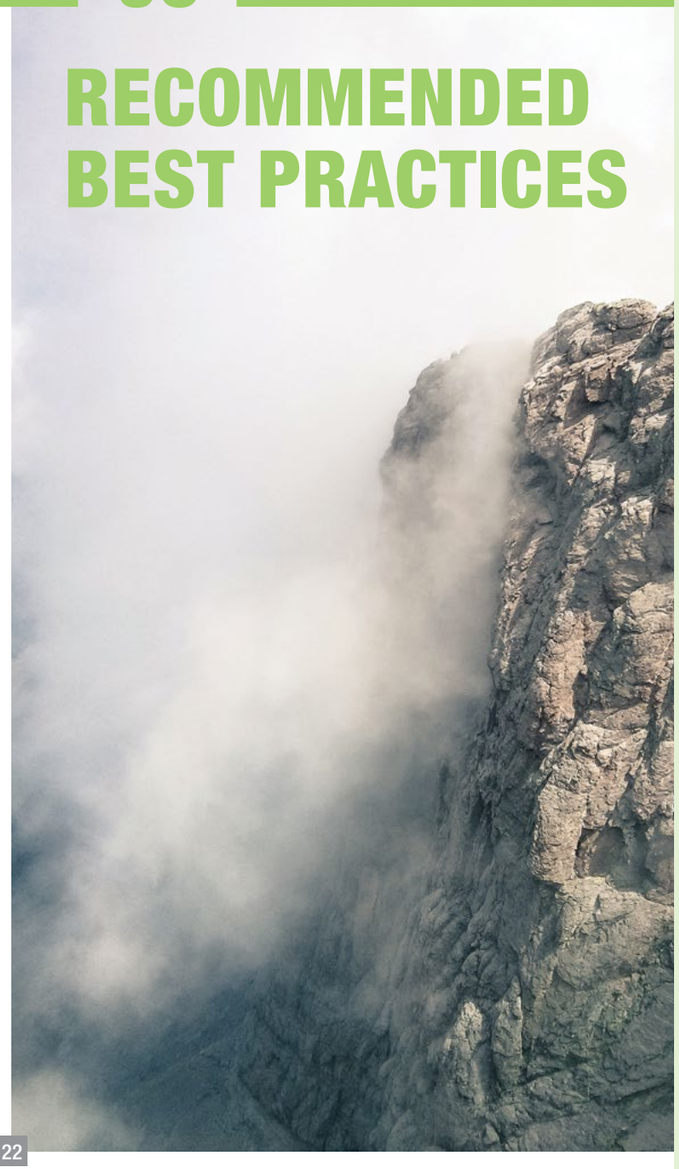
VECAP best practices extend to the end of the production process and the safe disposal of packaging and waste. Once bags and containers have been emptied, remaining solid and liquid additives are difficult to remove and can increase potential emissions to land and water.

A very important recommended best practice when handling solid chemicals is to try and **use the form that produces the least dust**, such as choosing granules over powder. VECAP also encourages **the use of the minimum necessary amount of packaging**. For example, in case of polymer additives big bags are preferred and it is recommended to use 20-25kg paper or plastic bags only if the process requires that specific size of packaging. **Empty bags** should be carefully **scrapped out** to eliminate residues and then **'foiled' or folded and sealed into another bag**. Stored empty packaging should be kept protected from the weather before being sent for appropriate disposal such as **incineration, controlled landfill or controlled recycling**. For liquids, VECAP recommends the **cleaning and re-use of IBCs** rather than their disposal.

The waste products collected through the applications of VECAP recommended best practices should be handled carefully and appropriately disposed of to avoid potential emissions to the environment. **Filters** from the ventilation system and the collected dust should be handled as **chemical waste**. Equally, all **waste water** should be **filtered** to remove residues prior to discharge and the resulting **sludge** should be treated as **chemical waste**. Unavoidable waste water streams, for instance from rinsing the process baths and the cleaning of IBCs, should ideally be **reused in the next production run** and not sent to waste water treatment. When treating waste water, it is possible for emissions to still occur because many polymer additives have a low solubility in water and may not degrade biologically in waste water treatment systems. There is also a resulting sludge from waste water treatment that needs to be suitably discarded.

06

RECOMMENDED BEST PRACTICES



AWARENESS AND HOUSEKEEPING

Vecap adresses all steps in the value chain where polymer additives are handled as a powder, liquid or aqueous dispersion regardless of the application.

Employees should be trained on the benefits of timely, regular and thorough cleaning of work areas. Guidelines for good housekeeping should be made available to everyone. Waste from spills should be clearly marked and kept in designated closed containers. Protective clothing should be cleaned professionally. When possible, product form choices should consider potential for emissions.

Materials are available in multiple languages to encourage awareness of best practice at all levels of a company from the factory floor to top management.

TRANSPORT AND STORAGE

Solid chemicals are transported and stored in bags. Liquid chemicals are transported and stored in intermediate bulk containers (IBCs).

To avoid emissions to the environment polymer additives should be stored in a designated closed building or container.

As a damage to the bags can cause product leaks, VECAP best practice is for bags to be checked for any damage on arrival and when collected from warehouses.

OPENING AND EMPTYING BAGS AND IBCs

On site, bags and BICs containing chemicals are taken to filling stations where they are opened.

During the opening and emptying of bags and IBCs chemicals can be emitted into the air as dust, spilled or adhere to personal protection clothing.

VECAP recommended practices help ensure that the maximum residue is removed from containers and the minimum product emitted to the environment.

END OF PRODUCTION PROCESS

The final steps in all production processes of polymer additives - safe disposal of wastes, packaging and treatment of water - are very important to reduce emissions.

In previous years the VECAP methodology has demonstrated major potential environmental emissions from used packaging, filter residues and for water based production untreated waste water.

Packaging should be minimised; all waste including empty packaging should be stored away from the elements; IBCs should be cleaned before re-use; bags should be disposed of in an environmentally sound manner; process water should be reused; waste water should be treated, and sent out of rainwater drainage or sewers; sludge from water treatment should be incinerated.

VECAP IS A VOLUNTARY PROGRAMME OF MEMBER COMPANIES OF THE EUROPEAN FLAME RETARDANTS ASSOCIATION (EFRA) TOGETHER WITH THE INDUSTRY'S GLOBAL ORGANISATION, THE BROMINE SCIENCE ENVIRONMENTAL FORUM (BSEF).

More informations at **vecap.info** and **www.flameretardants.eu**

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