

UECAP 

The Voluntary
Emissions
Control Action
Programme



MAINTAINING MOMENTUM

European Annual Progress Report 2012

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

Highlights

- 1 Reduction of potential emissions for the three main brominated flame retardants, according to survey results from the last 5 years
- 2 93% of the volume sold by EFRA member companies covered by the programme
- 3 Increased coverage for HBCD and further reduction of potential emissions to air and land
- 4 TBBPA potential emissions remained consistent at the lowest achievable level
- 5 11 manufacturing and user sites now certified globally
- 6 CEFIC awarded a commendation to the VECAP programme
- 7 Everkem, an importer of flame retardants, joined the programme

Foreword



Since 2008 Campine NV has been part of the widely successful voluntary product stewardship scheme initiated by industry, operating under the tenets of Responsible Care, to continuously improve the health, environmental performance and safety of products and processes.

We are particularly pleased to be supporting the programme in a year where survey results show that VECAP has weathered the impact of the financial crisis and continues to indicate an overall downward trend in potential emissions, demonstrating the ongoing commitment of the European chemical industry to ensure the safe and environmentally sound management of chemicals.

Campine NV is a Belgium-based company specializing in fire-retardant masterbatches for plastics, antimony trioxide production for fire-retardant application and polyethylene terephthalate (PET) catalysis and lead recycling. At production stage, it processes primarily antimony and lead. The company was VECAP certified in 2012 following the adoption of best available procedures to improve its environmental performance.

The programme has been very useful in helping our company encourage the responsible management of chemicals among all those in the workplace. It has also helped raise awareness that responsibility for environmental performance goes beyond the boundaries of the plant to include a better understanding of the handling and treatment of spent packaging.

Operating with VECAP best practices has enabled Campine NV to comply with national regulations as well as base operations on lean management and total quality. Our commitment to environmental and social responsibility has been enhanced by our participation in the programme, illustrating how VECAP can help industry to actively take responsibility for the environment.

Bart Cuypers

Product Manager
Campine NV Belgium

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Introduction to VECAP

As part of its commitment to Responsible Care®¹, the European Flame Retardant Association (EFRA)², a sector group of the European Chemical Industry Council (CEPIC)³, operates the Voluntary Emissions Control Action Programme (VECAP)⁴. This innovative environmental management initiative was established by the three main producers of flame retardants⁵, in partnership with user industries, to ensure better management of substances throughout the value chain.

VECAP aims to reduce the potential for emissions of flame retardants by raising awareness of responsible substance management and by promoting environmental best practice, from producers to downstream users, in the workplace. Although this programme does not deal with potential emissions during the service life of products or after their disposal, the flame retardant industry is actively involved in end-of-life issues management⁶.

Since the inception of the programme in 2004, potential emissions of flame retardants have been reduced across the three main producers' product groups. This was validated in 2012 and reflects the scheme's ongoing success in raising awareness of chemicals management among users in the value chain. The VECAP initiative has grown into a global product stewardship programme enabling the three leading flame retardant producers and many small and medium-sized enterprises (SMEs) to manage potential emissions of flame retardants, above and beyond regulatory requirements.

Flame retardants are substances that are incorporated into materials such as plastics and textiles. Flame retardants fulfill vital functions: they can either delay the start of a developing fire, slow down the combustion process or make the material self-extinguishing. The use of flame retardants is critical in providing people with more time to escape from fires and fire fighters with additional time to respond. They are commonly used in many domestic and industrial appliances such as computers, TVs, mobile phones, mattresses, upholstered furniture, transportation, construction and insulation boards in order to comply with fire safety standards.

VECAP is a programme for reducing emissions to the environment by:

- Increasing an understanding of chemicals management in the value chain
- Promoting and facilitating open and constructive dialogue with industry, regulators and other stakeholders
- Raising awareness among all those involved in the process, from site personnel to company top management
- Implementing and disseminating best practices identified through the programme

¹ Responsible Care® is the global chemical industry's unique initiative to improve health, environmental performance, enhance security, and to communicate with stakeholders about products and processes
www.cefic.org/Responsible-Care

² European Flame Retardant Association
www.flameretardants.eu

³ European Chemical Industry Council
www.cefic.org

⁴ Voluntary Emissions Control Action Programme
www.vecap.info

⁵ Albemarle, Chemtura, ICL-IP
www.albemarle.com, www.greatlakes.com,
www.icl-ip.com

⁶ EFRA, End of Life section
www.cefic-efra.com/index.php?option=com_content&view=article&id=97&Itemid=242&lang=en



BACKGROUND AND EVOLUTION

In 2004, member companies of EFRA and the Textile Finishers Association, with the support of EU regulatory authorities, initiated a Code of Good Practice requiring the UK textiles industry to reduce potential emissions of the flame retardant Deca-BDE. Over the years, this voluntary initiative was extended to include potential emissions of the two other main flame retardants HBCD and TBBPA.

The programme now surveys potential emissions to air, water and land across all three product groups to ensure that all users have a good understanding of chemicals management throughout the supply chain and are adopting and applying VECAP best practices.

VECAP GLOBALLY

The programme has now been adopted by many users of flame retardants in Europe and across the world. The users demonstrate their commitment by completing the VECAP questionnaire. They are provided with the Code of Good Practice, Key Recommendations, as well as Best Available Techniques (BAT) for emptying packaging in several languages⁷, taking into account regional differences.

United States and Canada

- A significant number of Deca-BDE, HBCD and TBBPA users have committed to implementing the VECAP programme

Asia Pacific Region

- General commitment in the region to implement VECAP for brominated flame retardants
- The programme is being actively promoted by BSEF members in Japan, initially only for HBCD and now also for other brominated flame retardants
- Individual company initiatives also cover other countries such as China, South Korea and Taiwan

The expansion of VECAP to other regions like Eastern Europe demonstrates the willingness of the flame retardant industry to actively participate in the programme and take responsibility for the environment.

More details on how the programme works are available on page 15.



⁷ VECAP website <http://www.vecap.info/publications-2/>

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VECAP Progress Report 2012



OVERVIEW OF 2012 PROGRAMME RESULTS

In 2012, the VECAP programme operated under a tougher financial climate than in previous years. Despite the economic downturn, users have remained committed to the VECAP principles that underpin good environmental performance. The VECAP team has also continued to reach out to new users to identify where the biggest improvements can be made going forward and is working with second line users to adhere to the programme's values. In addition to this, the team continues to encourage certification, especially among users, and has seen the number of VECAP certified sites increase to 11 worldwide (*see page 15 for further information on VECAP certification*).

The latest survey results demonstrate that potential emissions of flame retardants continue to decrease among users of HBCD and have remained at the lowest achievable level among users of TBBPA. The minor increase in potential emissions of Deca-BDE was mainly due to second line users (customers of customers) joining the programme and not having

implemented the best practices yet. The expansion to new users is a key objective of the VECAP team, who are working closely with these groups to raise awareness of the value in using best available techniques.

The overall participation rate in the VECAP programme in 2012 remained stable, covering 93% of total volume sold by EFRA member companies. Participation increased among users of HBCD and TBBPA supplied by EFRA member companies, reflecting the ongoing success of the programme to encourage users to adopt environmental best practices. Coverage of the programme for users of Deca-BDE remained high but was affected by the announced voluntary phase out in the US at the end of 2012, which resulted in some users transitioning to an alternative solution or to a non-EFRA supplier. As the annual survey is carried out on the basis of the volume sold the previous year, the VECAP team is unable to access users who have switched supplier in the meantime.

Although flame retardants supplied by non-EFRA members cannot be included in

this report, it is reasonable to assume that users who procure volumes from different sources will also handle these raw materials with the same best practices as those supplied by EFRA member companies.

Finally, in 2012, EFRA welcomed a new member, Everkem⁸, who committed to participate in the VECAP effort. This means that starting from 2013, the surveys will be done by 4 companies, which should significantly increase the programme coverage in Europe.

⁸ Everkem
www.everkem.it

REACHING OUT TO SECOND LINE USERS

Second line users are supplied with flame retardants via a secondary channel, as opposed to direct customers who receive supplies straight from a flame retardant producer.

There are two types of second line user:

- 1 Users who buy from distributors of flame retardants. These are typically customers or agents of the flame retardant producer.**
- 2 Users who buy from flame retardant formulators. This occurs in the textile industry where formulators blend flame retardants and synergist with a latex binder and sell this liquid formulation to finishers or backcoaters, who then produce the final fabric.**

Introducing the principles of VECAP to second line users is still a challenge as the EFRA member companies do not have direct access to these users. The VECAP programme is a voluntary programme that relies on the initiative of distributors and formulators to carry out VECAP surveys among their downstream users. The VECAP Product Stewardship Team is actively encouraging distributors and formulators to reach out to these users.

DECA-BDE

Decabromodiphenyl ether (Deca-BDE) is a highly effective brominated flame retardant which increases resistance to fire and allows more time to escape. It is used to prevent fires in textiles, in the transportation sector (e.g. automotive and aviation industries) and in construction and building (e.g. wires, cables and pipes).

2012 SURVEY RESULTS FOR DECA-BDE

The following results relate to the survey carried out in 2012, based on 84% coverage of the volume sold in 2011 by EFRA member companies.

Participation in the programme remained high despite an increase in the percentage of total volume being distributed to second line users. The team will continue to place importance on working with new users not yet familiar with the VECAP methodology to

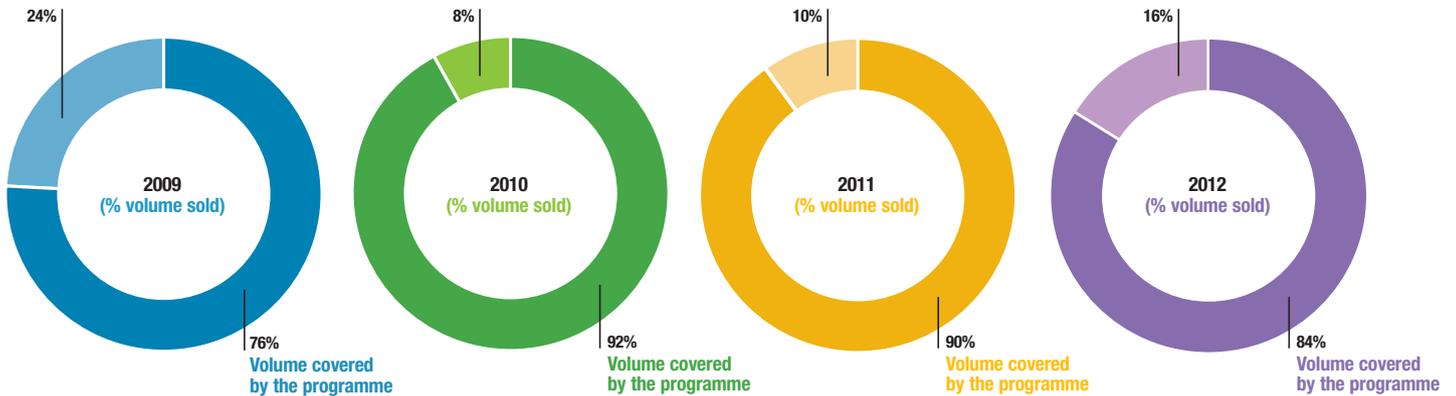
ensure an increase in their participation rate going forward.

Participating sites reported total potential emissions to be less than 0.3 metric tonnes per year.

FIGURE 1: Deca-BDE 2012 survey results

Survey year	2008	2009	2010	2011	2012
2011 Total Volume Sold (metric tonnes per year)	5000-7500	5000-7500	5000-7500	7500-10000	2500-5000
Total Potential Emissions (metric tonnes per year)	< 4	< 1.5	< 1.5	< 0.5	< 0.3

FIGURE 2: Percentage of volume covered by the programme



2012 POTENTIAL EMISSIONS TO AIR AND WATER

In 2012, the survey revealed that potential emissions to air remained low at 12 g/t, representing a 52% decrease in the last 5 years of reporting. This can be attributed to the strong

uptake of best practices among users of Deca-BDE, which continues to cover a high level of the volume sold.

The slight increase in potential emissions to water reported is related to the fact that since 2011, the majority (52%) of the volume covered

has been sold to textile applications while previously this only represented 37% of the volume covered. As this involves a water based process, by default, the potential water emissions were slightly higher compared to the plastics compounding application.

POTENTIAL LAND EMISSIONS AND DESTINATION OF DECA-BDE SPENT PACKAGING

Results from the 2012 survey show that potential emissions to land slightly increased compared to the previous year. This can also be explained by the increase in volume being distributed to second line users, not familiar yet with the best practices, which the VECAP team is committed to continue focusing on in future surveys.

Potential emissions to land from packaging waste residues increased in 2012 due to the above mentioned reasons. Despite this, 93.3% of empty packaging surveyed in 2012 was handled according to Best Available Techniques; either incinerated or sent for disposal to a controlled landfill, as indicated in Figure 5.

FIGURE 3: Comparative Deca-BDE survey results (2008-2012) by emission type (g/t)

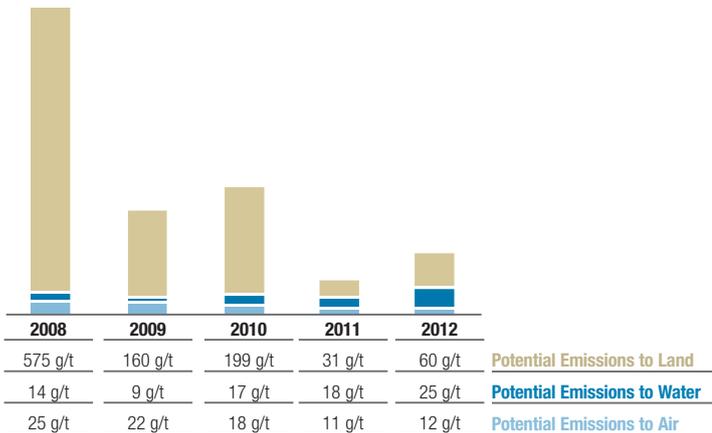


FIGURE 4: Deca-BDE potential land emissions from packaging waste residues

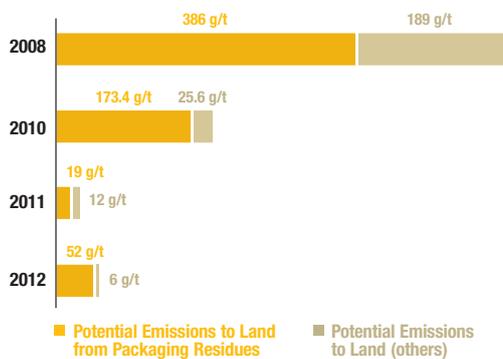
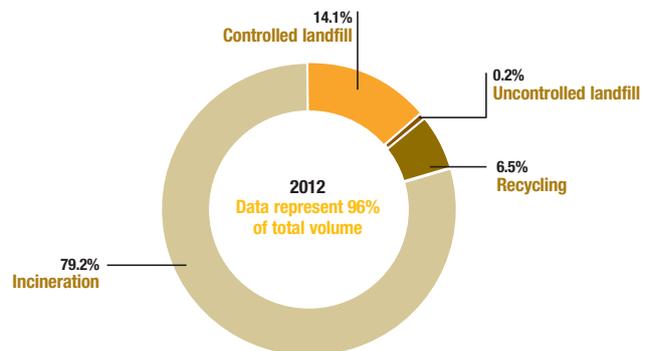


FIGURE 5: Survey 2012 (volume 2011) destination of Deca-BDE packaging



HBCD

Hexabromocyclododecane (HBCD) is a flame retardant used mainly in thermal insulation foams in order to protect property from fire. Its main application is in expanded and extruded polystyrene (EPS and XPS) insulation foam boards widely employed by the construction sector. HBCD has also a minor application in electrical boxes (HIPS). It is also used in the back coating of textiles in upholstered furniture.

2012 SURVEY RESULTS FOR HBCD

The results carried out in 2012 were based on 98% of the volume sold by EFRA member companies in 2011.

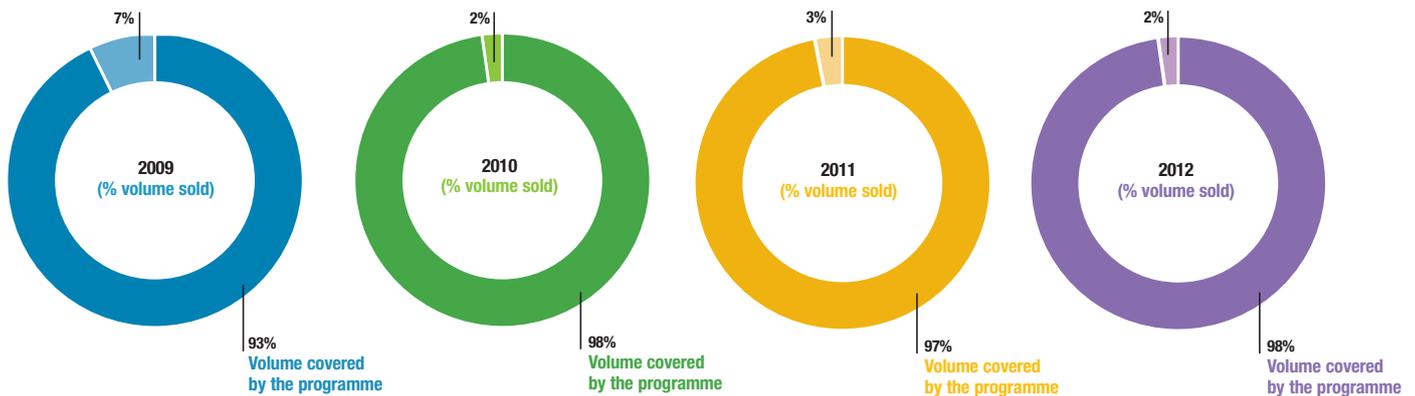
Participation in the programme has steadily increased since 2008 and continues to be the highest of the three main product groups.

Participating sites' total potential emissions were reported to be below 0.25 metric tonnes, while the total sales volume remained constant, as displayed in Figure 6.

FIGURE 6: HBCD 2012 survey results

Survey year	2008	2009	2010	2011	2012
2011 Total Volume Sold (metric tonnes per year)	10000-12500	7500-10000	7500-10000	10000-12500	10000-12500
Total Potential Emissions (metric tonnes per year)	< 2.5	< 0.5	< 0.6	< 0.5	< 0.25

FIGURE 7: Percentage of volume covered by the programme



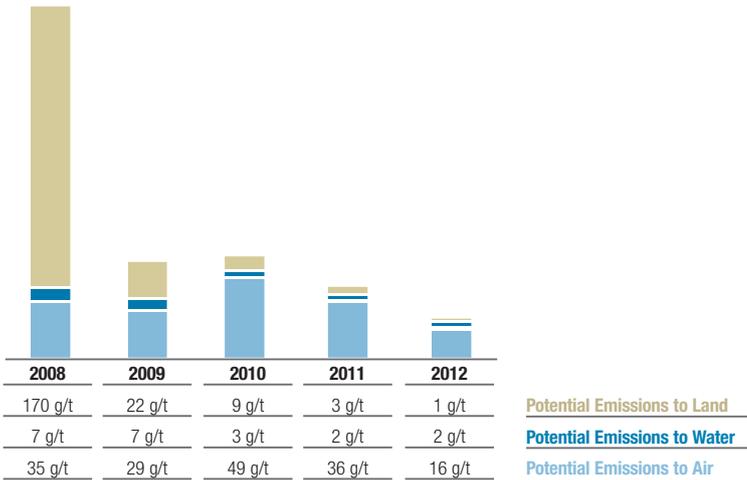
2012 POTENTIAL EMISSIONS TO AIR AND WATER

Potential emissions to air dropped from 36 g/t to 16 g/t in 2012, representing a 56% reduction compared to the previous year. This significant change was due to the additional uptake and

use of low-dust granular material among users which the VECAP team will continue to promote.

Potential emissions to water remained consistently low at 2 g/t, as demonstrated in Figure 8 on the next page.

FIGURE 8: Comparative HBCD survey results (2008-2012) by emission type (g/t)



POTENTIAL LAND EMISSIONS AND DESTINATION OF HBCD SPENT PACKAGING

Potential emissions to land were reduced to 1g/t in 2012, the lowest since the beginning of the programme. Survey results on potential emissions to land have shown a steady decline and now represent a 99% drop since 2008. A remarkable achievement such as this one demonstrates that

potential emissions can be reduced to the lowest achievable level through the adoption of Best Available Techniques by users.

The survey revealed that 96% of packaging waste continued to be handled according to VECAP best practices, as indicated in Figure 10. Spent packaging destined for recycling increased slightly compared to the previous year.

The VECAP team will carefully monitor this to ensure that there is a full understanding of these practices going forward.

FIGURE 9: HBCD potential land emissions from packaging waste residues

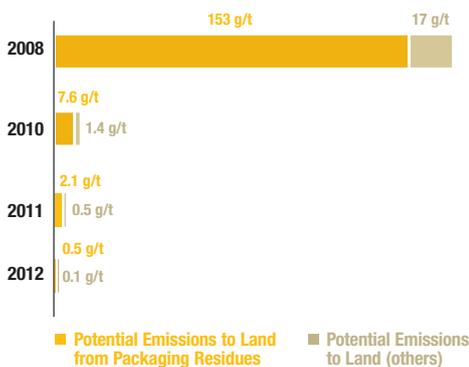
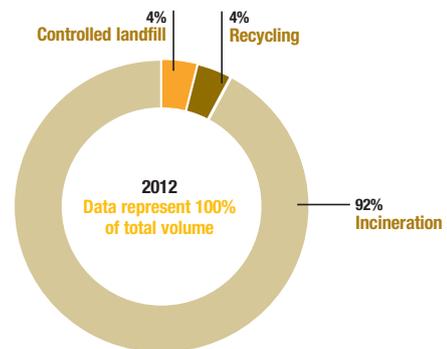


FIGURE 10: Survey 2012 (volume 2011) destination of HBCD packaging



TBBPA

Tetrabromobisphenol A (TBBPA) is applied to improve fire safety, mainly in electrical and electronic equipment. It is used in more than 90% of cases, as a reactive in flame retardant-4 printed circuit boards, the most commonly used board in electronic devices.

2012 SURVEY RESULTS FOR TBBPA

The results relate to the survey carried out in 2012, based on volume sold by EFRA member companies in 2011.

The coverage of the programme increased to 95% while potential emissions remained steady at the lowest rate. Room for improvement is

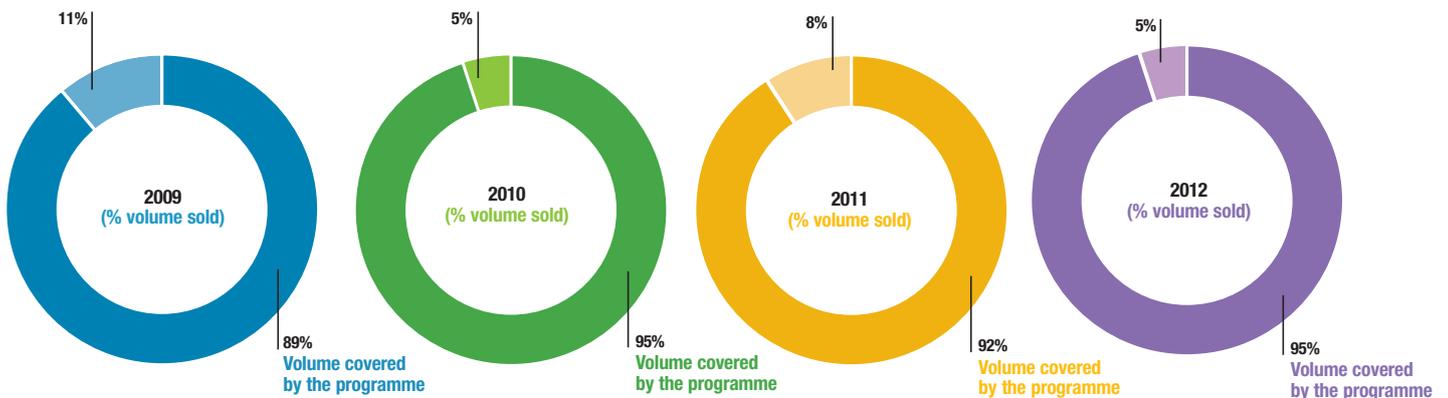
limited, as the Product Stewardship Team reached the default values for potential air and water emissions, and potential land emissions are at zero.

Total potential emissions at participating sites were reported to be below 0.003 metric tonnes per year.

FIGURE 11: TBBPA 2012 survey results

Survey year	2008	2009	2010	2011	2012
2011 Total Volume Sold (metric tonnes per year)	2500-5000	2500-5000	1000-2500	1000-2500	1000-2500
Total Potential Emissions (metric tonnes per year)	< 1	< 0.25	< 0.50	< 0.005	< 0.003

FIGURE 12: Percentage of volume covered by the programme



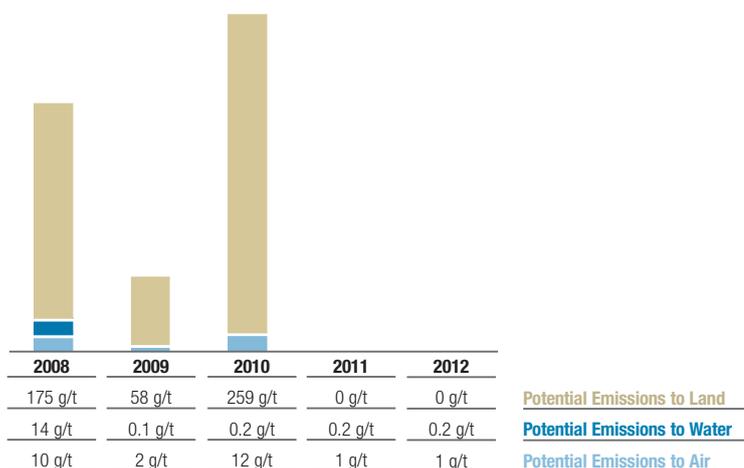
2012 POTENTIAL EMISSIONS TO AIR, WATER AND LAND

Both potential emissions to air and water remained consistently low with surveys reporting 1g/t potential emissions to air and 0.2 g/t for potential emissions to water.

In the previous 2011 annual progress report, potential emissions to land were reduced to zero.

This was maintained in 2012, demonstrating the willingness of industry to continue participating in the programme. These results are displayed in Figure 13 below.

FIGURE 13: Comparative TBBPA survey results (2008-2012) by emission type (g/t)



CEFIC COMMENDATION

The European Flame Retardant Association (EFRA) was awarded a special commendation by Cefic for the VECAP programme at the annual European Responsible Care Award Ceremony. This event took place on 28th September 2012 during the Global Chemical Industry European Convention in London.

The judges paid tribute to the programme as an innovative environmental management tool for handling chemicals through the supply chain and demonstrating the active involvement of companies to adopt good practices.

For more information, please visit: www.cefic.org/Responsible-Care



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Vision for the future



Despite the economic downturn, the 2012 VECAP survey results were positive with particular achievements for HBCD. The overall reduction in potential emissions across the three product streams over the last five years proves that the VECAP scheme continues to be successful in raising awareness of responsible chemicals management among users in the value chain. The expansion of VECAP to a new member, adoption of the Code of Good Practice and further certification demonstrates the willingness of industry to take responsibility for environmental concerns. The VECAP team will continue to focus on the distribution network and participation of second-line users to encourage the uptake of VECAP best practices. The team will also actively promote the extension of the scheme to other regions worldwide.

FURTHER REDUCTION IN POTENTIAL LAND EMISSIONS

The 2012 survey results show how potential emissions for the three main flame retardants have steadily declined since 2008. Last year potential emissions to land for TBBPA were reduced to zero, while this year potential emissions to land for HBCD were reduced to 1g/t. This accomplishment demonstrates that full value chain cooperation with best practice is achievable with the right commitment and determination. The VECAP team will focus on emissions to land for Deca-BDE to ensure a full understanding of the practices in this area, as well as the reduction of future potential emissions to land.

INCREASING VECAP COVERAGE

The programme is being actively promoted in the Asia Pacific region as well as being extended to other flame retardant producers beyond EFRA. The industry will also remain focused on increasing volume coverage which this year stood at 93% of the volume sold by EFRA member companies. There will be a determined effort by the VECAP team to continue to encourage second-line users, including distributors, to implement best practices.

ENHANCING UNDERSTANDING OF PACKAGING WASTE RECYCLING PRACTICES

The VECAP team will continue to focus on improving the understanding of these practices. Last year research revealed that authorities in Italy and Spain recommend recycling or reuse as the preferred option for spent packaging. Gaining a deeper understanding in this area will allow the VECAP team to move beyond the current assumption that packaging residues will lead to emissions. Best practices will be recommended to those companies who recycle, to avoid potential emissions.

WIDENING THE SCOPE TO ENCOMPASS OTHER MATERIALS

The VECAP methodology can be applied to a wide range of substances. The VECAP team is still working on simplifying and generalising its survey tools for this purpose and also intends to widen the scope of the programme to include other industries and additional products.

BROADENING THE SCOPE TO ADDRESS THE 'END OF LIFE' OF FLAME RETARDANT CONTAINING PRODUCTS

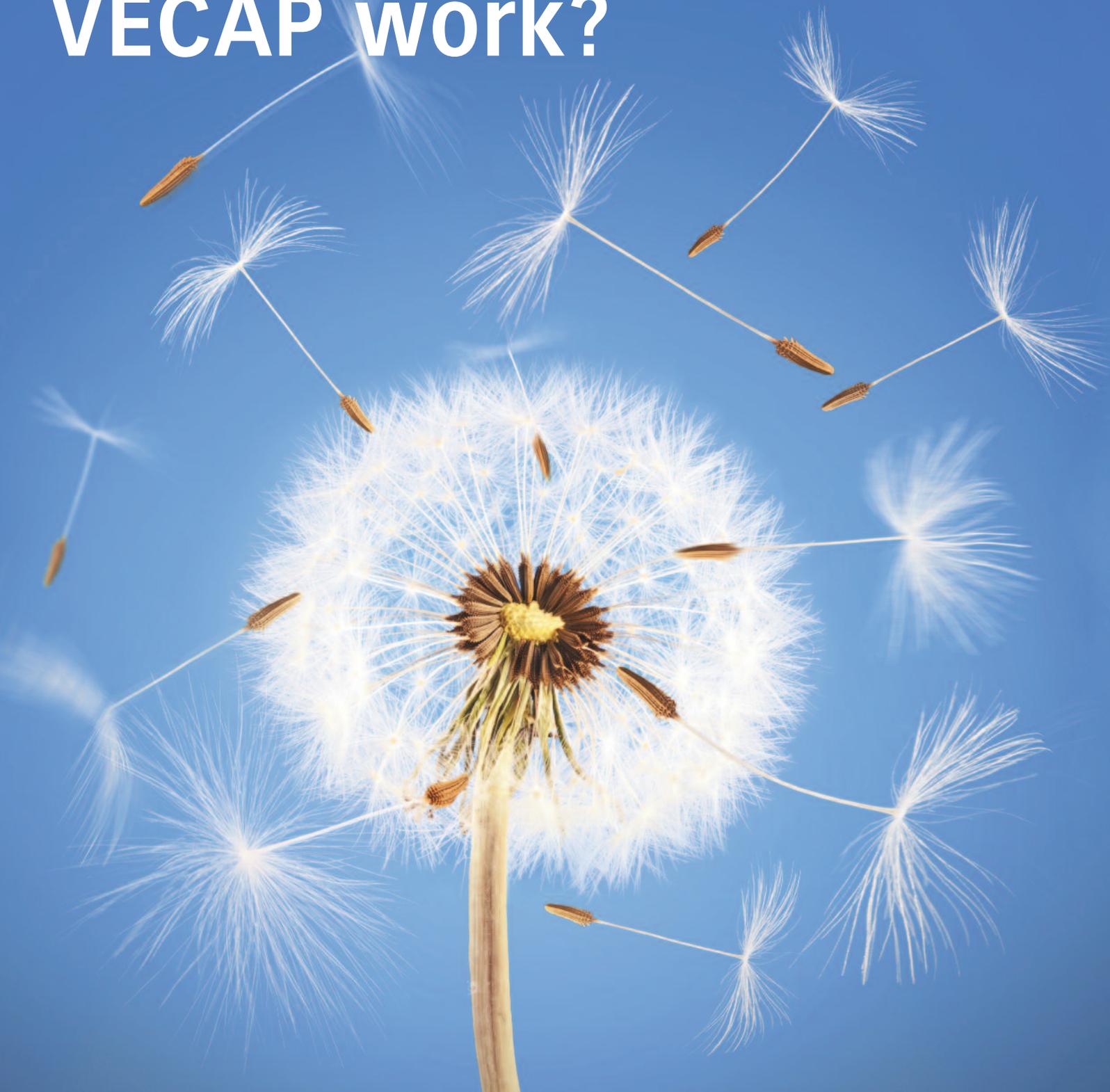
EFRA members have been participating in an end-of-life working group⁹ focusing on recycling practices for products containing flame retardants. In 2011, EFRA initiated a pilot study¹⁰ on plastics recycling from post-consumer flat panel displays (FPDs). The project demonstrates how industry is taking responsibility to address electronic waste through investment into the research of recycling solutions.

⁹ EFRA, End of Life section
www.cefic-efra.com/index.php?option=com_content&view=article&id=97&Itemid=242&lang=en

¹⁰ EFRA factsheet
www.cefic-efra.com/images/stories/factsheet/201111%20-%20Factsheet%20FPD%20Recycling%20Project_EN_final.pdf

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How does VECAP work?



The VECAP process is driven by the principle of continuous improvement, namely, taking advantage of experience gained by adapting the methodology to better address any new issues that may arise. The VECAP programme focuses on the producers and downstream users of the three main flame retardants. However, in principle, the VECAP methodology can be applied to reduce emissions of any type of chemical.

VECAP does not physically measure emissions from chemical production processes, but rather calculates or estimates, based on practical experience and studies, potential emissions associated with user and producer processes and practices. Nonetheless, it is possible for users to insert their own values in the emissions calculation tool, whenever they have measured or more accurate data than the default values available.

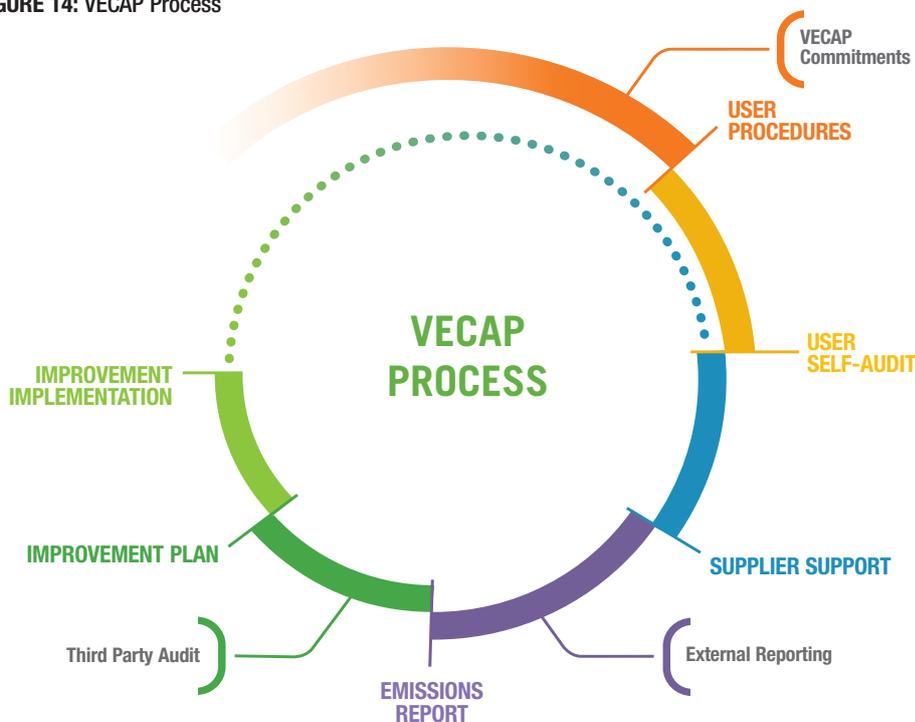
VECAP CERTIFICATION

Since the programme's inception, independent certification has been the final step in the continuous improvement process. In 2009, a certification scheme was launched based on ISO 9001/14001 principles. The scheme was developed in association with Bureau Veritas, with environmental audits carried out by independent auditors. For SMEs, it applies only to the process and use of best practices, while for larger companies it can be extended to their management system, in line with other standards like ISO 14001 or Responsible Care® management systems.

THE VECAP TEAM AND EMISSIONS SURVEY TOOL

VECAP's success is due to the combined efforts of a team of professionals with knowledge of flame retardants production and application processes. Members of the Product Stewardship Team include a Product Steward,

FIGURE 14: VECAP Process



the three flame retardant suppliers within EFRA, which going forward will include Everkem, as well as Cefic representatives and members of the European Polystyrene Foams Producers Associations (Plastics Europe and EXIBA). The VECAP Product Steward, supported by the Product Stewardship Team, develops the tools needed for the methodology, including the questionnaires used for the estimation of potential environmental emissions.

For each of the two types of flame retardant applications - plastics (additive and reactive) and textiles - different questionnaires are developed in collaboration with downstream users, considering every step in the user process in order to cover all potential emission points. Once the user has completed the questionnaire, a survey report is issued by the supplier highlighting potential emissions. Consequently, the user receives recommendations on how best to achieve emission reductions.

If these recommendations are implemented, an updated emissions report is issued and sent to the user.

A full survey of every user is not undertaken each year, as the VECAP team focuses on 'new' participants and areas where the greatest emission reductions may be expected, based on analysis of the previous year's survey.

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HOW DOES VECAP WORK?

EMISSIONS DATA COLLECTION & REPORTING

Questionnaires are first collated by each supplier, who highlights potential emissions identified, and enters them in a dedicated database. The data of the suppliers are then consolidated by Cefic's Statistical Services, and finally compiled and analysed by the VECAP Product Steward. Data are then treated to obtain estimated potential emissions in g/t sold in the EU. Cefic's Statistical Services and

the Product Steward are the only parties with access to confidential individual potential emissions data of all participants.

IMPLEMENTING BEST PRACTICES

VECAP helps companies implement best practices and make continuous improvements by encouraging the user to adopt the Industry's Code of Good Practice which is regularly updated. As an annex to the Code, BAT guidance documents have been

developed for emptying bags and Intermediate Bulk Containers efficiently. Listed below are examples of where flame retardant emissions can occur, highlighting critical points in the process of handling and treating chemicals. For more information, please refer to the 2010 European VECAP annual report¹¹.

¹¹ www.vecap.info/publications-2/

HANDLING AND TREATING CHEMICALS

Listed below are examples of where flame retardant emissions can occur, highlighting critical points in the process of handling and treating chemicals:

MANUFACTURING

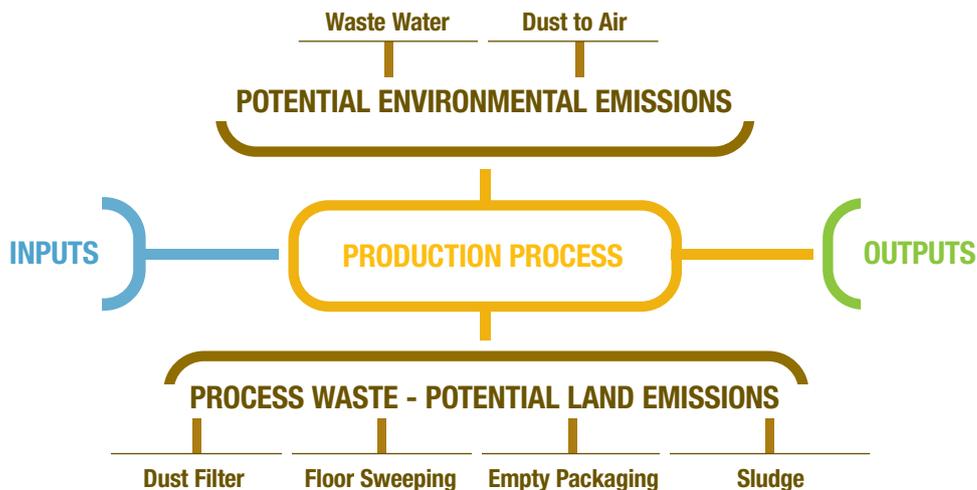
- 1 Production
- 2 Packaging
- 3 Shipping

PROCESSING

- 1 Dust from unloading and feed operations
- 2 Leaks in feed equipment on production lines
- 3 Inadequate or missing air filters
- 4 Improper clean-up of spills

WASTE DISPOSAL

- 1 Residues in packaging
- 2 Poorly treated wastewater from system wash-outs
- 3 Waste not reprocessed
- 4 Use of uncontrolled landfills



Abbreviations

BAT	Best Available Technique
BSEF	Bromine Science and Environmental Forum
Cefic	European Chemical Industry Council
Deca-BDE	Decabromodiphenyl ether
EFRA	European Flame Retardants Association
HBCD	Hexabromocyclododecane
TBBPA	Tetrabromobisphenol A
VECAP	Voluntary Emissions Control Action Programme

For further information

www.vecap.info

VECAP Product Steward

info@vecap.info

The European Flame Retardants Association (EFRA) brings together the leading companies which manufacture or market flame retardants in Europe. EFRA covers all types of flame retardants: chemicals based on bromine, chlorine, phosphorus, nitrogen and inorganic compounds. EFRA is a sector group of Cefic, the European Chemical Industry Council.

www.flameretardants.eu

EFRA

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Fax: +32 2 676 73 92
E-mail: efra@cefic.be

The Bromine Science and Environmental Forum (BSEF) is the international organisation of the bromine chemical industry, whose remit is to inform stakeholders and commission science on brominated chemicals such as flame retardants.

www.bsef.org

BSEF Secretariat

37 Square de Meeûs
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Fax. +32 2 735 60 63
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Responsible Care®
OUR COMMITMENT TO SUSTAINABILITY



VECAP

VECAP is a voluntary initiative of member companies of the European Flame Retardants Association (EFRA) together with the industry's global organisation, the Bromine Science and Environmental Forum (BSEF).

