



## Building Solutions



# Working with a new Flame Retardant

HBCD to the Polymeric-FR  
for eXtruded PolyStyrene foam insulation

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POPRC-9 – Rome, October 14, 2013

# Dow Building Solutions at a Glance\*

Delivering **insulation** and **weatherization** solutions that improve energy efficiency and sustainability of residential and commercial buildings around the world.

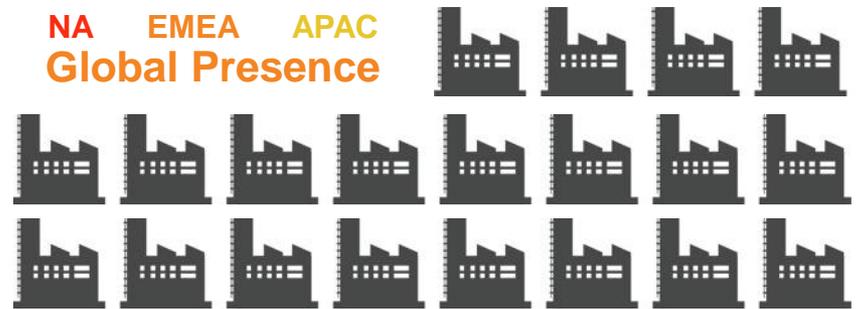
Offering **differentiated insulation components**: insulated sheathing, foam sealant **products** and insulated wall systems for new and retrofit constructions

Inventor of extruded polystyrene foam (XPS)



**1 000**  
EMPLOYEES

NA EMEA APAC  
Global Presence



**20** MANUFACTURING SITES

**2** STATE-OF-THE-ART  
R&D CENTERS

U S A I S W I T Z E R L A N D

\*2012 data



## Search for an alternative FR

- Polystyrene foam insulation (EPS and XPS) contains flame retardants to comply with European fire performance standards for construction products (Class E to EN13501-1)
- HBCD has allowed PS foam insulation to meet these standards, but is scheduled to be phased out by 2014 in Japan and by 2015 in the European Union because of its PBT properties (Persistent, Bio-accumulative, Toxic).
- Industry associations (EXIBA for XPS in Europe) coordinated a search for an alternative flame retardant to HBCD. The critical requirements included:
  - Proven HSE profile meeting the REACH criteria
  - Compliance of properties with XPS product standard (hEN13164)
- Stage 1: screening of commercially available flame retardants (2003-2005):
  - technical feasibility > EHS screens > no preferred candidate after HSE testing
- Stage 2: screening of near-commercial and novel flame retardants (2006-2011):
  - small quantities of new molecules > multi-year HSE profiling > technical scale-up > performance validation of XPS product properties (hEN-13164)

Extensive – Rigorous – Time consuming Process

## Polymeric-FR development

- Dow's researchers contributed to the "Alternative FR Study" and developed a large molecule polymeric flame retardant.
- PS foam with PolyFR maintains fire performance, insulation and mechanical properties
- **PolyFR** is inherently more sustainable due to large molecular size.
- Laboratory studies supplemented by modeling results indicate that the PolyFR is not a PBT:
  - US EPA design for environment (DfE) draft HBCD alternatives report confirmed superior environmental & health profile (Sep'13)



### Award winning technology

The new PolyFR has received a number of awards including the 2012 R&D 100 Award, the 4<sup>th</sup> Annual Michigan Green Chemistry Governor's Award, and the 2012 Wall Street Journal Technology Innovation Runners-up Award in the Materials and Other Base Technologies Category.

# ■ Converting Styrofoam™-XPS to PolyFR

- Dow Building Solutions (DBS) started to convert its STYROFOAM™ XPS to PolyFR in Japan (Oct'13). Europe, Middle East and North America will follow.
- Ability to sell (Europe, N.A.) is impacted by legal and regulatory requirements ensuring construction safety
  - verification of continued consistency of performance and durability
  - renewal of national application certificates



## World leader in XPS

- Dow invented XPS foam in the '40's
- STYROFOAM™ XPS foam insulation has contributed to energy reduction and green house gases reduction for over 60 years
- Key contributor to meeting CO2 reduction targets around the globe

## Closing remarks

Dow is committed to moving to PolyFR

- PolyFR is designed to be non-PBT and it is an effective FR in PS-foam
- Specific reformulations and process adjustments are required (even with an effective FR like PolyFR)
- Any product reformulation legally requires re-Certification to comply with hEN13164

**Dow Building Solutions will convert European Styrofoam lines to PolyFR before the REACH deadline of August 2015.**

**40% of the energy** buildings account for 40 percent of energy consumption.

PolyFR can preserve PS foam industry, which annually produces foam that contributes to energy efficient buildings and avoids service lifetime totals of 1.7 giga ton of CO2 equivalent greenhouse gases per year.



**Thank**  
**You**