Partnership on Flame Retardant Alternatives to decabromodiphenyl ether.

Scope: The partnership on flame retardant alternatives to decabromodiphenyl ether is an assessment of hazards of flame retardant chemicals that are potentially functional, viable[i] alternatives to decaBDE. These alternatives have the potential to enable a product to meet relevant flammability and performance standards when used in one or more of the following materials*:

1. Polyolefins
    a. Polypropylene (PP)
    b. Polyethylene (PE)
    c. Ethylene vinyl acetate (EVA)

2. Styrenics
    a. High-impact polystyrene (HIPS)
    b. Acrylonitrile butadiene styrene (ABS)
    c. Polyphenylene oxide – polystyrene (PPO-PS)

3. Engineering thermoplastics
    a. Polyesters
        i. Polybutylene terephthalate (PBT)
        ii. Polyethylene terephthalate (PET)
    b. Polyamides
        i. e.g., nylon
    c. Polycarbonate (PC) and polycarbonate blends, e.g. PC-ABS
    d. Polyimides
    e. Melamine

4. Thermosets
    a. Unsaturated polyesters
    b. Epoxy (electronics, building and aerospace applications)

5. Elastomers
    a. Ethylene Propylene Diene Monomer (EPDM) rubber
    b. Thermoplastic polyurethanes (TPUs)
    c. Ethylene vinyl acetate (EVA)

6. Waterborne emulsions and coatings – including but not limited to those designed for textile backcoatings such as:
    a. Acrylic emulsions
    b. Polyvinyl chloride emulsions
    c. Ethylene vinyl chloride emulsions
    d. Urethane emulsions

* The polymers listed under each class of materials are examples of each material type that are most relevant to this project. Note - melamine is not a polymer.

The partnership's participants refined the scope of this assessment from the original Action Plan with information supplied by experts in industries that use decaBDE in their products and from academics, NGOs and government participants. The assessment will provide hazard information (human toxicity, ecotoxicity, fate) on flame retardants that are potentially functional alternatives to decaBDE, selected for evaluation in this report. While this project is not designed to recommend specific flame retardants, it does evaluate potential alternatives to decaBDE that are likely to be functional and viable[i] in a variety of applications. This evaluation will support informed substitution and has potential to identify environmentally preferable substitutes. The alternative flame retardant chemicals[ii] will be evaluated for hazard potential independent of the polymer matrices with which they might be used. This assessment does not provide all of the information that a decision maker may need to be able to choose an alternative flame retardant.

While the assessment will not attempt to include comprehensive life cycle assessment information, it will, by both inclusion and by reference, note relevant life-cycle considerations that may aid in the selection of alternatives. These flame retardant chemicals are potential alternatives in that they may have similar performance and function to decaBDE when used in materials and products where decaBDE currently is, or previously was, used as a flame retardant. The scope is outlined in terms of categories of materials rather than specific applications or products because decaBDE has many varied applications. In this approach, the partnership intends to provide toxicity and fate information on potential flame retardant alternatives for product manufacturers who must make substitution decisions, and for other interested parties.

Statement of scope for a lay audience:
To help product manufacturers select safer chemicals, this project assessed the toxicity and environmental fate of flame retardant chemicals that are potential alternatives to decabromodiphenyl ether. Decabromodiphenyl ether is used to enable certain products to pass flammability standards. Decabromodiphenyl ether has been used in certain materials (e.g., plastics and textiles) for the manufacture of products such as consumer electronics, appliances, wire and cable insulation, seating, electronics and paneling for cars, buses or airplanes, plastic pallets, and materials (flooring, or wall coverings, roofing) used in buildings or during construction.

[i] Viable refers to the functional performance of a chemical not the environmental preferability.

[ii] For the purposes of this report, 'chemicals' include both discrete substances that can be represented by a definite structural diagram (such as methane) and reaction mixtures that cannot. Reaction mixtures include those that are well defined with a few components (such as propylene glycol), mixtures that may be difficult to characterize and/or are of variable composition (such as PCBs or Arochlors), and polymers.