design FOR THE ENVIRONMENT

Wire & Cable Partnership

Assessing Life-Cycle Impacts in the Wire & Cable Industry

What Are the Partnership's Goals?

EPA's Design for the Environment (DfE) Program and the Massachusetts Toxics Use Reduction Institute (TURI) have formed a partnership with industry stakeholders to generate information on the environmental impacts of traditional and alternative cable construction. The goal is to help companies make environmentally sound product and material choices.

When completed it is expected that the LCA results can be used by the wire and cable industry to select material formulations that work well for a given application and that may have fewer impacts on public health and the environment. The LCA will also identify opportunities for improvement, by highlighting the greatest impact areas of a given product, as well as areas that need further investigation.

Project partners include wire and cable manufacturers, additive suppliers, original equipment manufacturers (OEMs), trade association members (National Electrical Manufacturers Association and the Vinyl Institute of the American Plastics Council), TURI, and EPA. The current list of active industry partners includes Albemarle, AlphaGary, Belden CDT, Cable Components Group, CommScope, Crompton Corporation, Daikin America, DuPont, General Cable, Georgia Gulf, Judd Wire, Rockwell Collins, SGS U.S. Testing Company, Southwire, Superior Essex, Teknor Apex, Underwriter's Laboratories, United Copper Industries, and Zion Polycom.

The specific goal of the partnership is to evaluate the environmental impacts of the current standard material formulation and the alternative formulations for heat stabilizer, flame retardant, and polymer systems for selected wire and cable products, in order to determine whether the alternatives present an environmentally preferable option.

The partnership will first develop partial life-cycle inventories through the manufacturing stage (cradle-to-gate) of standard and alternative formulations for three selected wire and cable products (Phase I), and then assess the full environmental life-cycle impacts of the standard and alternative formulations for one or more of these wire and cable

What Is EPA's Design for the Environment Program?

EPA's Design for the Environment (DfE) Program forms partnerships to reduce risk to people and the environment through pollution prevention. DfE offers unique technical tools, methodologies, and expertise to evaluate the health and environmental risks or life-cycle impacts of traditional and alternative technologies, materials, and processes. DfE has formed several partnerships with the electronics industry, including:

- Assessing the life-cycle impacts of tin-lead solder and lead-free alternatives
- Assessing the life-cycle impacts of computer displays (cathode ray tubes and flat-panels)
- Evaluating lead-free surface finishes and cleaner technologies for making holes conductive in printed wiring board manufacturing

What is TURI?

The Toxics Use Reduction Institute (TURI) at the University of Massachusetts Lowell helps industries, institutions, and communities implement toxics use reduction as a means of achieving both a cleaner environment and a healthy economy. TURI began working on the Wire and Cable (W&C) Supply Chain Initiative in early 2001, with the goals of looking at alternatives to toxic chemicals used in the sector and assisting W&C manufacturers in the region in meeting customer and global restrictions on the use of certain toxic chemicals.

products (Phase II). Partial life-cycle inventories (LCI) will be developed in Phase I for the following product types:

- Category 6, riser-rated communication cable (CMR);
- Category 6, plenum-rated communication cable (CMP); and
- Non-metallic sheathed cable, as used in building wire (NM-B).

These products were chosen by the project partners because together they contain materials common to many wire and cable applications, they typically contain materials for which alternatives are being sought, and they represent a significant share of the wire and cable market. Using a life-cycle assessment (LCA) approach, the study will generate data to help manufacturers, users, and suppliers of wire and cable incorporate environmental considerations into their decision-making processes.

An LCA examines the full life cycle of a product, and estimates environmental impacts from each of the following life-cycle stages:

- Raw material extraction or acquisition and material processing;
- Product manufacture;
- Product use/maintenance; and
- End-of-life disposition.

Why is the Partnership Evaluating Wire & Cable?

The wire and cable industry manufactures a wide range of products that support a multitude of applications. The total amount of U.S shipments of copper-insulated wire and cable were estimated in 2004 to be 2.4 billion pounds and $9 billion dollars in sales. Key functional components of wire and cable products include heat stabilizers, which may contain lead, flame retardants, and polymer systems used in insulation and jacketing. These materials and other ingredients impart electrical insulation, physical stability, and fire performance properties, but have been identified as materials of potential environmental concern or as materials for which industry stakeholders have expressed a desire to identify and evaluate alternatives. In some applications, lead and other heavy metals have been removed from cable constructions, while other applications continue to use these materials. European legislation, for example, has driven these changes for electronics and automotive applications; however, similar changes have not been made for other applications (e.g., telecom, building wire) where such drivers are not present. In some applications, alternative materials are available but have not been widely used, either due to a lack of market drivers, cost, or their inability to meet all of the requirements of the more demanding applications.

More information is available on some wire and cable materials than others. Much is known about lead, a toxic chemical that can be released into the air and groundwater during processes such as mining, use, waste treatment, and disposal. Once in the environment, lead is persistent (as are all metals), and it bioaccumulates in the food chain. PVC is a commonly used polymer in wire and cable products. Substantial research has been conducted on PVC and its life-cycle impacts; however, very little of the work has focused specifically on its use in wire and cable applications. In addition, there is information available for the production of low-density polyethylene, an alternative jacketing material, but no studies detailing its life cycle impacts in wire and cable have been performed. Little to no life-cycle information is available for cross-linked polyethylene or fluorinated ethylene propylene, which are also used in cable formulations. Researchers continue to examine whether or not deca-BDE debrominates into persistent and bioaccumulative lower-congener compounds such as penta-BDE. Comprehensive information about life-cycle impacts and risks of both the traditional and alternative materials is needed to assist the wire and cable industry in identifying formulations that are environmentally preferable, while still meeting cost and performance goals.

What are the Project Milestones?

Key milestones in the DfE/TURI Wire & Cable Partnership include:

- **Partnership formation:** March 2004
- **Phase I draft Life-Cycle Inventory:** December 2005
- **Phase II draft Life-Cycle Impact Assessment:** June 2006
- **Draft final LCA report:** February 2007
- **Publicize results:** June 2007

How Can I Get More Information?

To learn more about the DfE Program or the Wire & Cable Partnership, or to obtain an electronic version of this fact sheet (document #EPA 744-F-05-004), visit the Office of Pollution Prevention and Toxics' DfE Program Web site: www.epa.gov/dfe.

To obtain hard copies of DfE Program technical reports, pollution prevention case studies, and project summaries, contact:

National Service Center for Environmental Publications
U.S. Environmental Protection Agency
P.O. Box 42419
Cincinnati, OH 45242
Phone: (513) 489-8190, (800) 490-9198
Fax: (513) 489-8695
E-mail: ncepimal@one.net