



iNEMI

International Electronics Manufacturing Initiative

iNEMI PVC Alternatives Project Proposal

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Background

- **7 of the top 10 global PC manufacturers have set goals to phase-out PVC, where viable alternatives are identified**
 - these 7 manufacturers represent over 50% of the worldwide market share for PCs (per IDC WW Quarterly PC Tracker for Q12008)
- **PVC alternatives project was proposed at the September 2008 iNEMI Sustainability Summit, approved by the Board**
- **The project will focus on 2 areas:**
 - *Cradle-to-grave Life cycle assessment (LCA) comparing PVC versus PVC-free cables*
 - *Technical evaluation of PVC alternatives – electrical, mechanical, safety*

What Has Been Done So Far?

- **Vinyl 2010 study on recovery of PVC (2003)**
 - Emphasis on EOL aspects of mixed cable waste
 - http://www.ecvm.org/img/db/PE_Recovery_Options_final_140503.pdf
- **EU Commission study on PVC and replacement materials (2004)**
 - Overview of publicly available LCAs, little information on PVC alternatives in electronic applications
 - http://ec.europa.eu/enterprise/chemicals/sustdev/pvc_en.htm
- **USEPA PVC Alternatives Project (2008)**
 - Focused on building and telecom wire, emphasis on base resins & additives (Pb vs Pb-free)
 - <http://www.epa.gov/dfe/pubs/projects/wire-cable/index.htm>
- **HDPUG Halogen-Free Guideline (2008)**
 - Includes a section on Cables, general information on PVC alternatives
 - www.hdpug.org (Guideline will be published in Nov 2008)
- **HDPUG PVC Alternatives Project**
 - New project, emphasis on supply chain readiness for PVC-free cables (all cable types)

iNEMI PVC Alternatives Project

Proposed Project Schedule

Project Formation

- Formalize Project, Identify Chairs and Begin SOW Development November 2008

iNEMI Technical Committee Review and Approval

- iNEMI TC Meeting December 2008

Project Execution

- LCA project Jan'09 – Aug'09
- Technical evaluation project Mar'09 – Jan'10
- Release Results
Feb'10 – Project Participants
Mar'10 – iNEMI Membership
Apr'10 – Publish Results (IPC/APEX)




LCA Project

Goal: Conduct a cradle-to-grave life cycle assessment on PVC and PVC alternatives, emphasis on power cords. The project should take into account the needs of electronic product sectors represented by iNEMI membership.

- 1. Identify market segment & cable design/BOM requirements**
- 2. Review & assess existing LCA studies for relevance in the electronics sector (slide 2)**
- 3. Identify candidate materials and develop life cycle inventory (LCI) – base resins + additives**
- 4. Identify LCA parameters and LCA tool of choice (SimaPro, GaBi, etc)**
- 5. Conduct the LCA per ISO 14040 requirements – may choose to do multiple LCAs with different LCA tools if resources allow**

Technical Evaluation of PVC Alternatives

Goal: Understand the electrical, mechanical and safety aspects of PVC alternatives. Develop, manage, and execute performance testing.

1. Develop an evaluation test matrix for PVC alternatives 
2. Create a PVC alternatives global safety standards matrix, emphasis on power cords
3. Manufacture PVC-free power cords (test samples) using commercially-available resins
4. Assign teams to carry out completion of the testing per agreed-up test matrix
5. Roll-up results for final report

Who Could Participate?

- **OEMs**
- **ODMs**
- **EMSs**
- **Cable Manufacturers**
- **Resin Manufacturers**
- **Raw Material Manufacturers – fillers, flame retardants, etc**
- **Safety Standards Organizations – UL, CSA, etc**
- **Universities**
- **LCA consultants – PE International, EarthShift, etc**
- **Governments – US EPA**



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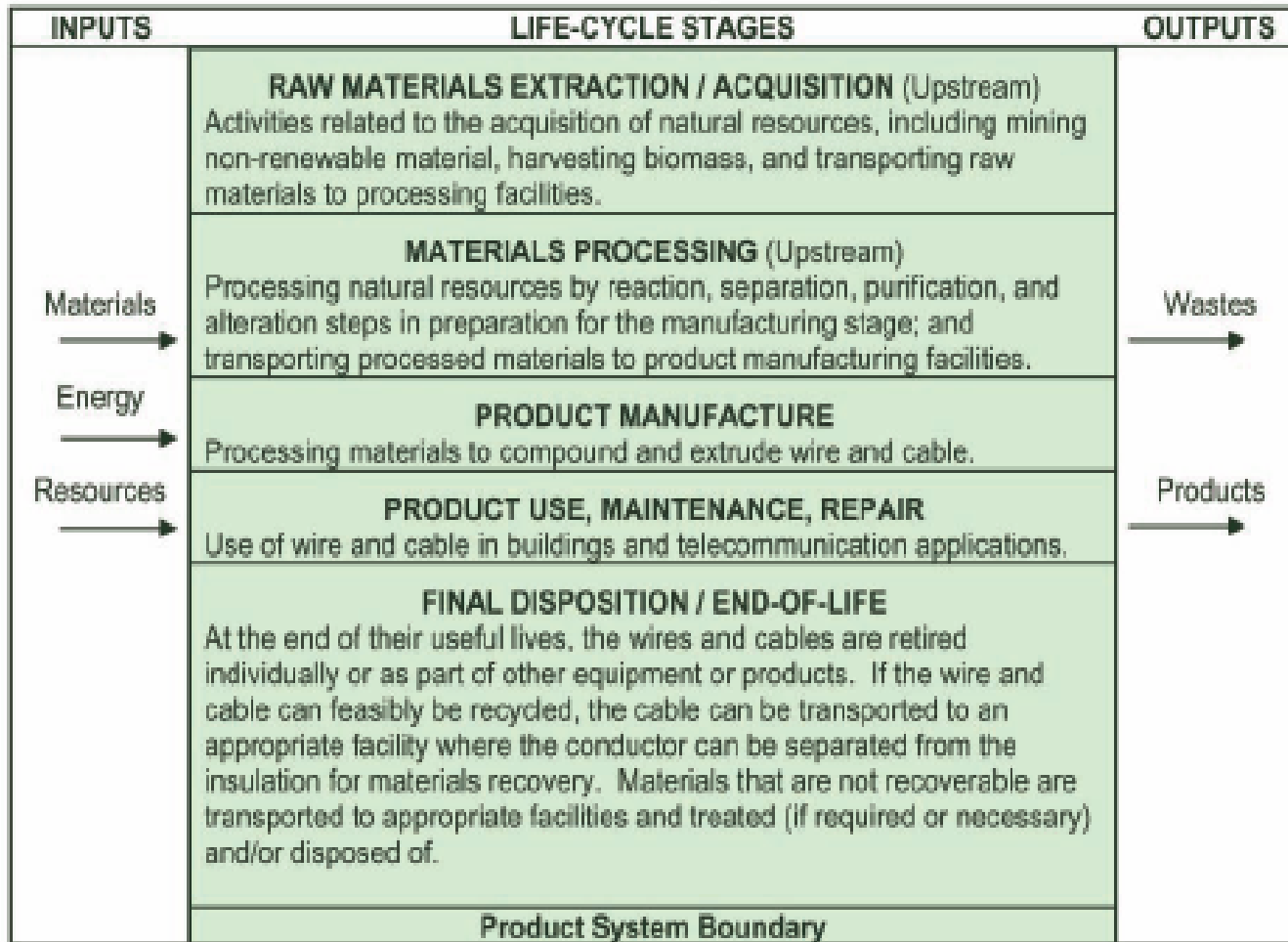
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LCA Stages – courtesy USEPA



General Material Performance Requirements for Wire & Cable

- A specified level of flame retardancy on extruded cable insulation/jacket - VW-1, FT2 or other regional equivalents
- Some level of flame retardancy on injection molded plugs/strain reliefs, like UL 94 V-0 or regional equivalent
- Electrical performance, such as spark test, dielectric strength and insulation resistance
- Flexibility
- Mechanical Performance such as tensile strength and tensile elongation
- Aging performance to ensure functionality over time
- Cold bend and heat shock
- Conductor corrosion