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**2009 Environmentally
Conscious Electronics
(ECE) Roadmap**
环境友好电子路线图：
Future Initiatives for
Sustainability
可持续性相关项目

Bob Pfahl

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Outline 内容

- **Introduction 简介**
- **Major ECE Focus Areas 环境友好电子ECE关注的领域:**
 - **Materials 材料**
 - **Energy 能源**
 - **Recycling/Reuse 回收重用**
 - **Eco-Design 生态设计**
 - **Sustainability 可持续性**
- **Plan for Action 行动计划**
- **Conclusions 总结**

Five Chapters 5个章节的主持

- **Materials** **Holly Evans, Strategic Counsel, LLC**
- **Energy** **Valerie Rickman, ITI**
- **Recycling-Reuse** **Jason Linnell, National Center for Electronic Recycling**
- **Eco-Design** **Cliff Bast, Acer, Inc.**
- **Sustainability** **Markus Stutz, Dell**

Trend Analysis趋势分析

- To produce environmentally-conscious electronics the ECE TIG must continue to keep pace with 环境友好的电子工作组要和以下需求保持步伐一致：
 - Continuing emergence of material restrictions 不断出现的材料限制
 - Energy efficiency requirements and renewable energy 能效和再生能源
 - End-of life requirements 产品生命周期结束后的处理要求
 - Holistic Eco-design requirements 全面的生态设计要求
 - Sustainable business practices 可持续的商业活动
- As many of these issues are shared by industry, it's best to work together! 这些大部分都是业界共同面临的问题，最好一起合作来解决



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Materials 材料

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Materials 材料

Short Term Needs 短期需求 - Identified in 2009 Roadmap

- **A strategy and action plan to facilitate low risk conversion of high-reliability applications to Pb-Free solders 降低高可靠产品部门向无铅转换风险的策略和行动方案**
- **Prepare for possibility of additional substance restrictions under RoHS and/or REACH (HBCDD, phthalates) 为可能更多的材料限制要求做准备**
- **Proactive programs to convert to halogenated flame retardant (HFR) - free and PVC-free material alternatives 具有前瞻性的项目为向无卤化阻燃剂 (HFR-free) 和无PVC替代材料转换做准备**

Pb-Free Conversion by Segment 各产品部门的无铅转移

Industry Segment	Status
Portable / Consumer	Full global conversion to Pb-free. Working improvements to mechanical shock.
Office Systems / Large Business / Communication Systems	Most have taken Pb exemption for mission critical electronics – exemption may sunset ~2014 Working to close Pb-free knowledge gaps.
Medical Products	Either out of scope or have taken Pb exemption.
Automotive	Mission critical electronics still using SnPb. Entertainment/communication systems moving to Pb-free.
Defense and Aerospace	Either out of scope or have taken Pb exemption. Working to ensure ongoing availability of SnPb components.

- The components supply chain is rapidly converting to RoHS compliant offerings (Pb-free) with little motivation to continue to produce SnPb product.
- Taking the Pb exemption has changed the risk profile for High Reliability producers.

Proactive HFR Free/PVC-Free Activities 积极的无卤化阻燃剂、无PVC活动

- **US EPA Design for Environment Program: Alternatives Assessment of Flame Retardants for the Electronics Industry**
 - EHS assessment of PCB laminates, report published by end 2009
- **iNEMI HFR-Free PCB Project**
 - Technical evaluation of key electrical and mechanical properties
- **iNEMI HFR-Free High-Reliability PCB Project**
- **iNEMI PVC Alternatives Initiative (Project in Formation)**
 - LCA of Alternatives
- **Intel-iNEMI Symposium on Environmentally Friendly Materials**
 - November 11-12, 2008 Shanghai, China
- **iNEMI HFR-Free Leadership Program**
 - HFR-Free PCB Materials
 - HFR-Free Signal Integrity

iNEMI HFR-Free Leadership Program

iNEMI无卤化阻燃剂领导项目

Consortium Objectives 联盟目标

- Identify technology readiness, supply chain capability, and reliability characteristics for “BFR-free” alternatives to conventional printed circuit board materials and assemblies 查看技术是否就绪，产业链的能力以及无溴化阻燃剂替代品在常规PCB材料和装配中的可靠性能
- Spans electrical and mechanical properties 包括电和机械属性
- Includes assessing if board/system design modifications can overcome material property limitations 评估板/系统设计的修改是否能弥补材料属性的限制
- Define technology limits for BFR-free materials across all market segments 定义各产品门类对无BFR材料的技术性能的限制要求
- Initial focus is on client platforms (desktop, notebook)
- Goal is to drive laminate supplier slash sheet content



Program Highlights

- **A broad transition to halogen-free materials could become quite disruptive 大范围地转为无卤材料可能有破坏性的影响**
- **Existing halogen-free materials are worse than existing brominated FR4 on several key parameters 就几个关键参数而言，目前的无卤材料较溴化FR4差**
- **This effort is focused on driving tradeoffs across design, fabrication, and materials to derive solutions 该项目的重点是要使设计、生产和材料相互折衷互补来解决问题**
- **95 People Attended Program Review in Taipei on April 15, 2009**

Firms Participating in the Program Development

参与项目规划的公司



i n v e n t



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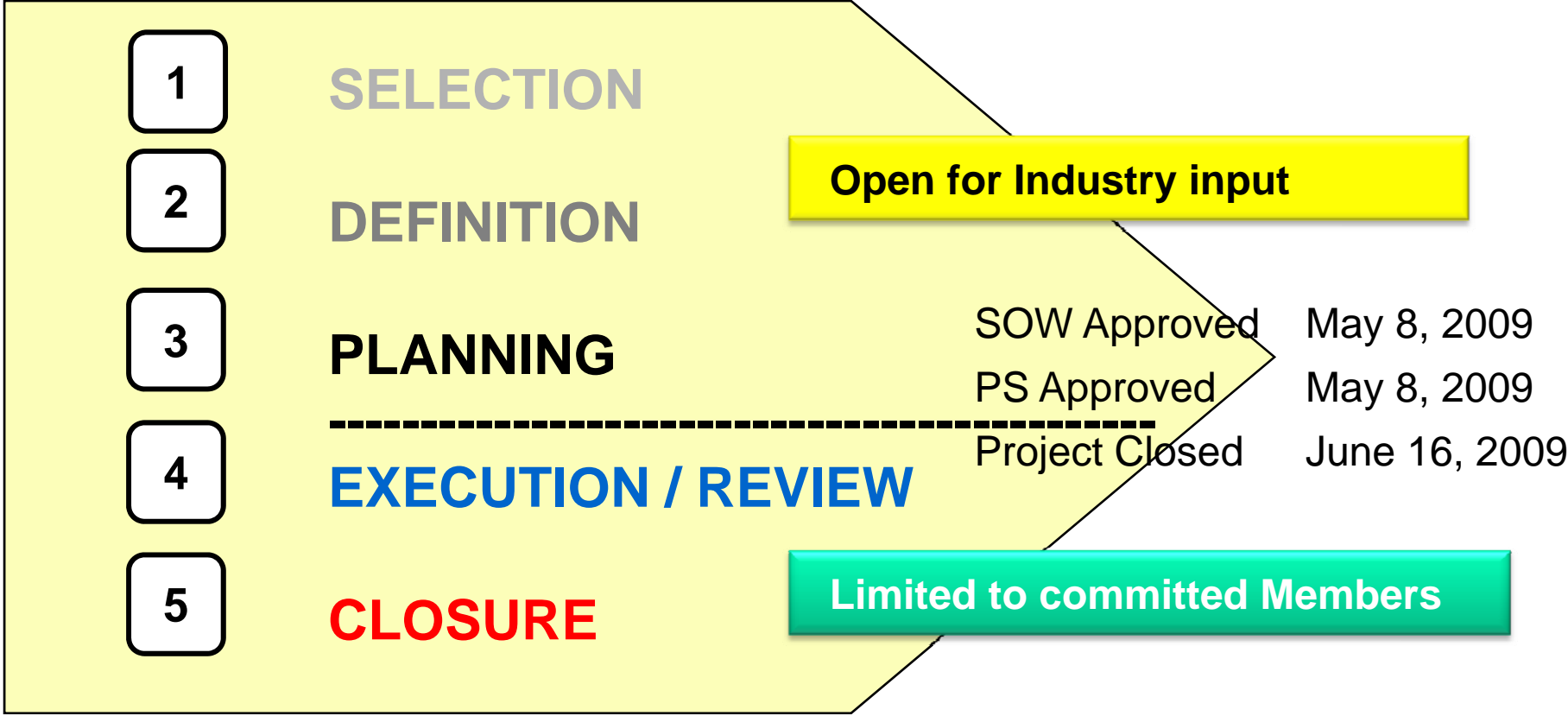
Doosan Corporation
Electro-Materials



SHENGYI SCI. TECH



Next Steps 下一步



Recommendations 建议

- **Need for development and implementation of good scientific methodologies to assess true environmental impacts of materials and potential trade-offs of alternatives (LCA-type approach) 开发并使用好的科学的方法来评估材料以及可能的替代品对环境的真正影响**
- **Greater involvement of industry on policy making for material restrictions to assure better understanding of trade-offs inherent in substitutions 工业界应更多地参与到关于材料限制的政策制定中，这样政策制定者才能了解替换材料本身所带来的折衷**

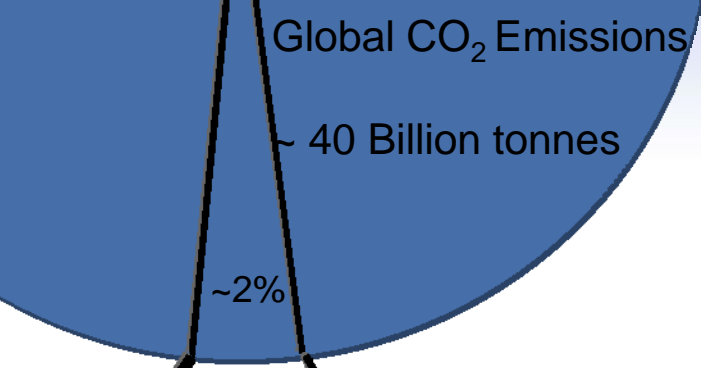


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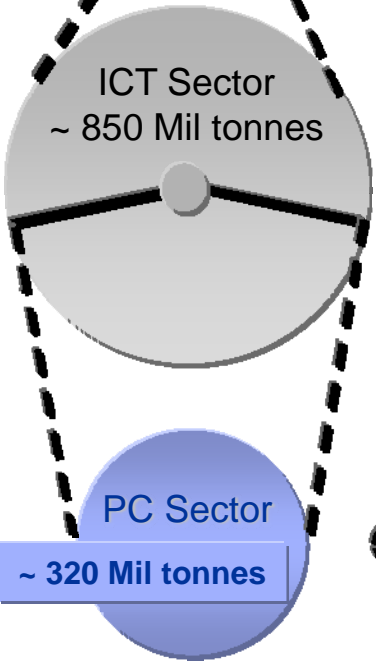
Energy
能源

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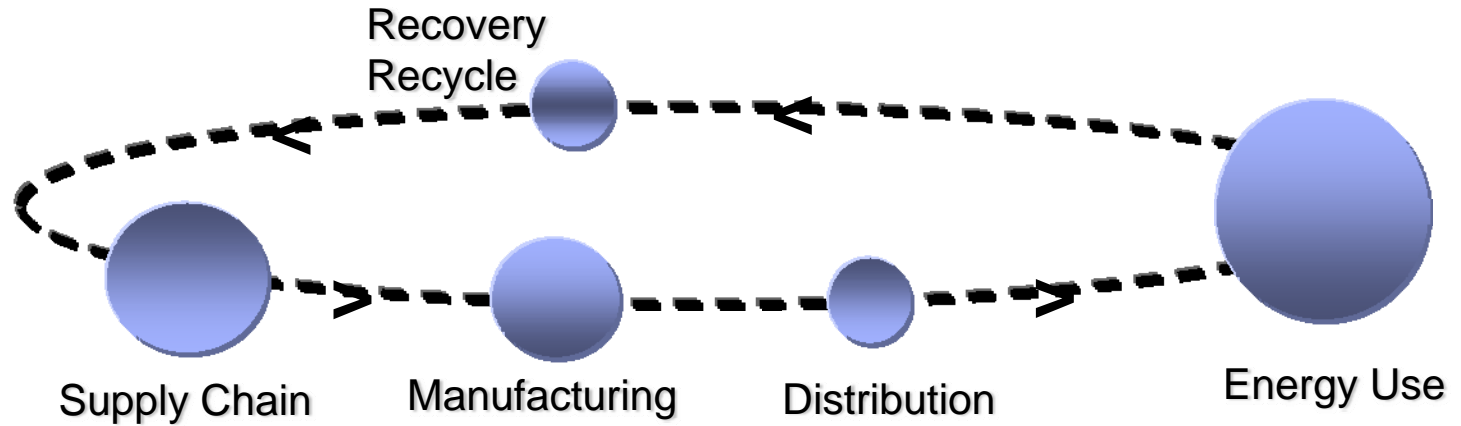
The Big Picture

Climate/ Energy Example
气候变化/能源的例子



How do we get the facts and data?

- Standardized Product Lifecycle Assessment
- Identifies opportunities & issues
- Allows identifying what counts most



Sources: Smart 2020 Report 2008; IDC; Gartner



Energy Efficiency – Becoming More Common in the Marketplace 市场 对能效开始普遍关注

It pays for businesses to “go green”

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Lenovo takes an active role in combating climate change

Lenovo is committed to providing environmentally responsible, energy-efficient technology choices. In 2007, they joined the Board of Climate Savers Computing to support their efforts in reducing CO₂ emissions related to IT by 50% by 2010.

Lenovo helps you save money while meeting your energy goals

Choose Lenovo systems from these cutting-edge series and you'll meet both ENERGY STAR® and EPEAT Gold standards.




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Lenovo's green strategies include:

- All Lenovo ThinkPad notebooks, ThinkVision monitors and many ThinkCentre products launched from 2008 are ENERGY STAR® 4.0 compliant and deliver up to 70% energy efficiency improvements.
- Lenovo systems with EPEAT Gold ratings contain up to 90% reusable and recyclable materials and ship in packaging that is 90% recyclable.
- Lenovo Power Manager and BatteryStretch technologies offer adjustable power management.

All Lenovo LCDs launched from 2008 are ENERGY STAR 4.0 and EPEAT Gold certified.

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Energy 能源

Situation Analysis 状态分析

- Energy Costs Impacting End User 能耗成本影响最终用户
- Regulations impacting technology choices 法规影响技术的选择
- Energy Management 能源管理
 - Reducing Energy Use in Data Centers is a Market Opportunity 降低数据中心的能源消耗是一个市场机遇

Needs 需求

- More efficient power supply technology 更高效的电源技术
- Harmonize energy management standards (Energy Star, EuP, etc)
协调能源管理的各种标准
- New innovative energy sources 能源的创新



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Recycling-
Reuse
回收重用

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Recycling-Reuse

- **Develop metrics and infrastructure for effective resource management** 建立评估指标和高效资源管理的基础
 - Quantify & promote dematerialization efforts underway within industry
 - Increase information sharing between brand owners and electronics recyclers to increase reuse/recycling efficiencies & lower costs
 - Prioritize product & packaging design features that will enable cost-effective, environmentally-responsible reuse/recycling, use data to influence emerging regulations and standards (Basel Convention, R2 guidelines, EPEAT, etc)
- **Identify opportunities for post-industrial & post-consumer recycled content** 使用各种 (工业产生或消费产生的) 回收材料的机会
 - Quantify use of recycled content metals and plastics in “common” electronic components today, identify opportunities for further R&D



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Eco-Design
生态设计

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Eco-Design 生态设计

➤ Promote life cycle thinking 生命周期思想

- Develop building block approach to LCAs in IT industry (iNEMI Eco-Impact Evaluator Project, in progress)
- Participate in international carbon footprint standards, particularly as they relate to product carbon footprint (PCF) labeling (ex: GHG Protocol)

➤ Encourage harmonization of green procurement standards in both B2B and B2C markets 绿色采购标准的协调一致，包括B2B和B2C市场

- Prepare for revision to IEEE 1680 (EPEAT standard for PCs) and future EPEAT standards for printers, servers, etc
- Identify key requirements differences in regional green procurement standards, work towards global harmonization (ex: painted plastics)
- Address emerging retailer interest in sustainability “indexing” in EU, US

➤ Engage in international eco-design standards 参与国际生态设计标准

- Existing ICT/CE Vertical IEC Standard 62075
- New Horizontal “Environmental Conscious Design” IEC Standard 62430





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Sustainability 可持续性

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Sustainability Requires Balancing Competing Objectives 可持续性 要求对各种目标进行平衡折衷

- **Environmental Regulations do not always lead to sustainability**

环境法规不总带来可持续性的结果

–Legislating the use of corn based ethanol in automobile fuels without considering environmental, social and economic impacts 如尚未考虑环境、社会和经济性影响就制定法规要求在汽车中使用玉米基的乙醇做燃料

–Legislating the use of Compact Fluorescent Lamps without requiring the development of a recycling infrastructure for the mercury in the lamps. 还没建立好回收机制对灯泡中的汞进行处理就制定法规要求使用紧凑型荧光节能灯

Electronics as solution to climate change

电子作为应对气候变化的方案

- Smart city planning
- Smart buildings
- Smart appliances
- Dematerialization
- Smart industry
- I-optimization
- Smart grid
- Integrated renewables
- Smart work
- Intelligent transport

Potential Impact: Reduction of 1 billion tons of Green House Gas emissions. 可能减少10亿吨温室气体排放



iNEMI Sustainability Summit 可持续性峰会

“The electronics industry must develop a strategic vision of sustainable electronics” iNEMI Board of Directors

- **iNEMI Sustainability Summit, September 22-23,2008 at Motorola, Schaumburg, Illinois, USA**
 - The motivation for the workshop was a recognition that the electronics industry should act strategically on environmental issues.
- **The goals of the workshop, breakout groups and action groups were to:**
 - Evaluate opportunities for industry collaboration on proactive environmental programs
 - Define academic research needs to support these programs
 - Stimulate funding for the necessary research
 - Form and execute the required industrial collaborative program
- **Speakers Represented:**
 - Intel, Cisco, Motorola, Alcatel-Lucent, Rohm and Haas; Purdue University, Arizona State University, Clean Production Action

Four Proposed Projects from Summit 四个项目

- 1. Non-Competitive LCAs for ICT Products based on a building block approach using assembly emulators (Contact: Tom Okasinski at tokrasinski@alcatel-lucent.com or Todd Myers at Cisco)**
- 2. PVC Replacement Alternatives (Contact: Scott O'Connell at Scott_OConnell@Dell.com)**
 - LCA comparing PVC versus PVC-free cables
 - Technical evaluation of alternatives
- 3. Establish market for postconsumer plastics as feedstock for “Green” products (ex. Polycarbonate, ABS)**
- 4. Establish new electronic applications for postconsumer blended plastics (ex. housings for power supplies)**



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Conclusions 总结

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Concluding Thoughts 总结

- **New global environmental requirements continue to multiply – faster than industry can effectively respond**
- **Industry needs to be more proactive in developing solutions that:**
 - **Are based on science and engineering, delivering value to customers**
 - **Are available in advance of new regulations**
 - **Can influence future regulations and stakeholder groups for more sustainable results**
- **iNEMI and its members plan to play a significant role in preparing industry for these future needs.**
- **Sustainability will be a major undertaking for industry as well as society.**
- **Electronic solutions can help to empower people to live a more sustainable lifestyle**

www.inemi.org

Email contacts:

Bob Pfahl

bob.pfahl@inemi.org



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