



INEMI[®]

International Electronics Manufacturing Initiative

Eco-Impact Evaluator for ICT Products – SOW Development

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Advancing manufacturing technology

Scope of Work

- Phase 1

1. Focused on commonly used equipment/ assets within the ICT industry
2. Categorize the kinds of materials and assemblies.
3. Developing a methodology for providing a simplified means of deriving key eco-environmental information for ICT equipment / assets
4. Building on the knowledge from the ICT industry, published literature, and publicly available data / information
5. Centered on generating data / design guidelines for development of an industry standard
6. Intended to be periodically updated to incorporate new and continually advancing technologies, processes, and materials, as well as LCA methodologies.

- Phase 2

1. The estimator will be developed to provide the **major** eco-environmental impacts of different categories of ICT equipment, with a degree of accuracy that is relative to the information's intended use within the ICT and the first tier supplier's industry.
2. Develop an eco-environmental impact assessment estimating tool for Information and Communications Technology (ICT) products.

iNEMI Eco-Impact Evaluator (Phase 1)

What the Project IS / IS NOT:

This Project IS :	This Project IS NOT :
Phase 1	
Developing a methodology for providing a simplified means of deriving key eco-environmental information for ICT equipment / assets	Intended to develop an LCA tool that will provide an in-depth assessment of <u>all</u> eco-environmental impacts
Focused on commonly used equipment/ assets within the ICT industry	Intended to be a static model that can be used indefinitely without further updates and input from the ICT industry
Centered on generating data / design guidelines for development of an industry standard	A risk assessment
Intended to be periodically updated to incorporate new and continually advancing technologies, processes, and materials, as well as LCA methodologies.	Biased towards specific suppliers, consultants, geographies, or market segments

iNEMI Eco-Impact Evaluator (Phase 2)

What the Project IS / IS NOT:

This Project <u>IS</u> :	This Project IS <u>NOT</u> :
Phase 2	
Focused on developing an estimator / emulator tool that will provide a degree of accuracy relative to the end results intended use	Intended to address comparisons between products, equipment assets, components or materials that highlight their unique eco-environmental attributes or other features
Building on the knowledge from the ICT industry, published literature, and publicly available data / information	

Comments / Discussion Captured During Calls

- **Can we use the roadmap emulator methodology to help define the materials and assets for the study.**
 - Jim Arnold forwarded sample of the iNEMI Roadmap emulator tables to the team for review and comment
- **Need to develop an equipment list (categories) to use as the baseline for the model, i.e., equipment racks and frames, backplanes, circuit boards, microelectronic components, wiring, etc**
- **Identify Life Cycle stages to be evaluated (i.e., transportation, manufacturing, use, end-of-life, etc.).**
 - How far back in the supply chain should the model go?
- **It should be understood that the output for this approach will only provide an estimate of the environmental impact at a “high” level and more in-depth studies would be needed for the evaluation of a specific piece of equipment or system.**
 - This latter approach is considered outside the scope of this project.

Comments / Discussion Captured During Calls

- Identify the output requirements for the tool, e.g., carbon footprint, global warming gases, etc.
- Internal studies indicate boards and components could be the majority source of the environmental impact.
 - Does the team want to have the other system components/hardware referenced as “generic” items in the model with output tied to the principle characteristic (e.g., weight of steel racks).
- What is the trend in the industry for product design?
 - How will product design teams determine what parts of the product they need to focus on to reduce the environmental impact?
- How do we define complexity?
 - Ease of use of detailed and complex analysis (typically run by an external 3rd party) or a “desktop” estimator for internal use by design teams.
- We need to identify how we plan to model the use phase and end of life

Comments / Discussion Captured During Calls

- **May want to go back to Sustainability Summit meeting in September '08 to identify some of the issues that were identified at the time.**
- **One of the key things is that the industry is being asked what the impact of the equipment on the environmental, e.g., carbon footprint, global warming gases, water usage, etc.**
- **Trend going forward is that ICT products are estimated to have a lower environmental impact than other electronic products.**
 - **Tracking the environmental impact of existing and future products is becoming increasingly important for the equipment manufacturers.**
- **This effort could involve the development of the methodology as well as a simplified tool.**
 - **Estimated resources (time and services) required for each of these scenarios will be needed to identify the elements of each task.**

Comments / Discussion Captured During Calls

- **One challenge is that once a tool is developed, how can it be continuously updated.**
 - If equipment descriptions are changed, what processes are needed to keep the model up-to-date.
 - This will need to be determined as part of the study.
- **Request everyone provide a short sentence or description for any of the tasks and sub-tasks listed in the slides.**
- **Does the team wish to give the user the ability to replace a generic module with a product specific one**
 - For example, if somebody comes out with a significantly more efficient cooling fan?
- **How flexible will the tool need to be?**
 - If something new comes along there should be a mechanism to insert the new information into the tool.

Comments / Discussion Captured During Calls

- **Two important and central points: updating capability; generating data.**
 - **These points need a program or procedure for data quality assessment.**
 - **Something that may be considered as part of the work elements of the project.**
- **If you leave off toxicity issues the focus becomes more focused on Greenhouse gases.**
- **Need to have a balanced approach**
- **Work within the best available or best accepted LCA methods**
- **Toxicity and risk assessment: many times when toxicity is addressed the discussion migrates towards risk assessment.**
- **List key areas where the methodology should target: e.g. green house gas emissions, water usage.**
 - **Team to help create a listing of the areas.**

Comments / Discussion Captured During Calls

- **The Ecoinvent database has many of the modules of interest modeled from cradle to gate.**
 - It also includes generic use-phase information and several end-of-life options specifically for electronic products.
 - The full list of processes can be found at [ecoinvent Centre Portal](#)
 - A list of the most pertinent processes has been provided to the coordinator for review by the team.
- **Briefly mention the databases and existing and new tool developments**
- **Contributions from the team are encouraged to enhance the value of this portion of the SOW.**
- **Programs that are currently in place; Tools and usages, e.g., EPD program.**

Eco-Impact Statement of Work

Phase 1 Identified Tasks



Task 1 - Research Project Information

- **The intent of this task is to review existing information and tools, and identify the elements and work breakdown for the Phase 1 tasks.**
 - **Resources**
 - **Initial review and recommendation by the project formation team. The final determination on how to organize the project will be made by the project team**
 - **Materials and Processes**
 - **Review current / draft standards. Review literature, research papers.**

Task 2 - Develop Methodology and Assessment

Categories

a) Define Methodology

Using the information obtained in Task 1 define the initial approach in the categorization of the equipment and identification of modules

– Resources

- **Team members to be identified based on interest and knowledge of equipment / asset characteristics**

– Materials and Processes

- **Develop basic framework for the tool including categorizing products and assets; lifecycle stages; assemblies and components; and developing input/output formats for easy information entry and results reporting. No proprietary software will be developed or employed.**

– Testing Procedures

- **Identify testing / evaluation protocols for each defined product category.**

Task 2 - Develop Methodology and Tool

b) Categorize Assemblies and Components

Identify and define the subgroups for the assemblies and components, e.g., (circuit boards, ICs, Racks/frames, wiring, etc.)

–Resources

- Team members to be identified based on interest and knowledge of equipment characteristics

–Materials and Processes

- Develop basic framework for the tool by defining the categories for assemblies and components. No proprietary software will be developed or employed. Tool will most likely be spreadsheet based, e.g., MS Excel or something similar. Identify generic assemblies and component classifications for use in the pilot. Revise definitions based on results obtained during the pilot.

–Testing Procedures

- Use the pilot as the basis for testing the complexity and modifying the category assignments

Task 2 - Develop Methodology and Tool

c) Categorize Products / Assets

Identify and define the subgroups for the products and assets, e.g., large, medium, small. The latter categorization could be based on product type instead of the more generic listing based on equipment size.

–Resources

- Team members to be identified based on interest and knowledge of equipment characteristics

–Materials and Processes

- Develop basic framework for the tool by defining the categories for products and assets. No proprietary software will be developed or employed. Tool will most likely be spreadsheet based, e.g., MS Excel or something similar. Identify generic product and assets classifications for use in the pilot. Revise definitions based on results obtained during the pilot.

–Testing Procedures

- Use the pilot as the basis for testing the complexity and modifying the category assignments

Task 2 - Develop Methodology and Tool

d) Categorize Life Cycle Stages

Identify and define the life cycle stages to be used, e.g., raw materials/manufacturing, use, end of life, and how to handle transport. The categorization could be broken down into additional categories.

– Resources

- Team members to be identified based on interest and knowledge of equipment characteristics

– Materials and Processes

- Develop basic framework for categorizing the lifecycle stages considering the complexity in developing algorithms for deriving eco-impact values; and developing input/output formats for easy information entry and results reporting. No proprietary software will be developed or employed. Revise categorization tool as needed based on input from participants.

– Testing Procedures

- Use the pilot as the basis for testing the complexity and modifying the category assignments. Adjust methodology as necessary to provide results with desired level of accuracy

Task 3 - Create Mechanism for Updating Tools

- e) **Create a mechanism for updating the tool as new data, products, and algorithms are developed**
 - **This task will run in parallel to Task 2. This sub-team will need to evaluate the categories and determine the difficulty in keeping any tool developed in sync with changes in the assemblies, product characteristics, or Life cycle stages.**
 - **Resources**
 - **Team members to be identified based on interest and knowledge of equipment characteristics**
 - **Materials and Processes**
 - **Identify the time period for updating the tool, the responsibility for identifying what needs to be updated and who will do the updating. Identify what resources that will be required and how to ensure they will be available**

Task 4 - Pilot a Generic Type Product

- **Identify issues arising from the pilot and revise the methodology**
 - This task will utilize information generated by the sub-teams to define a generic type product.
 - This may include multiple product types if different categories are identified for the different product types.
 - The pilot will be used to determine the difficulty in keeping any tool developed in sync with changes in either the products or databases used by the tool.
 - The intent is not to evaluate the specific results of the LCA or compare LCA tools.
- **Resources**
 - Project Team
- **Materials and Processes**
 - An existing LCA tool or tools will be used to evaluate the generic product(s).
 - This task will be used to assess the effectiveness of the categorization of the assemblies, product, and life cycle categories.

Task 5 - Generate and Publish Final Reports

- a) **Review Definitions, Methodology, and Categorization Elements; Generate and Publish Final Reports**
 - Identify issues arising from the pilot and revise the methodology
 - Resources
 - Project Team
 - Materials and Processes
 - Based on input and comments from participants, identify and recommend revisions to the definitions, methodology, and categories.
- b) **Develop project plan for Phase 2 and make recommendation for continuation**
 - Resources
 - Project Team
 - Materials and Processes
 - Based on input and comments from participants, develop a detailed project plan for Phase 2 and make recommendation on whether to proceed with Phase 2 as an iNEMI Project.

Task 5 - Generate and Publish Final Reports

- c) **Review and finalize definitions, methodology, and categorization elements w/ iNEMI members**
 - **Resources**
 - Project Team
 - **Materials and Processes**
 - Based on input and comments from participants, make final revisions to the definitions, methodology, and categories.
 - Prepare final documentation and post within iNEMI website for member sharing.
 - Issue press release for iNEMI on the methodology.
- d) **Prepare final documentation**
 - **Resources**
 - Project Team
 - **Materials and Processes**
 - Based on input and comments from participants, make final revisions to the definitions, methodology, and categories.
 - Prepare final documentation and post within iNEMI website for member sharing.
 - Issue press release for iNEMI on the methodology.

Task 5 - Generate and Publish Final Reports

e) Distribute Phase 1 summary to iNEMI members

– Resources

- Project Team

– Materials and Processes

- Based on input and comments from participants, make final revisions to the definitions, methodology, and categories.
- Prepare final documentation and post within iNEMI website for member sharing.
- Issue press release for iNEMI on the methodology.

Phase 2 – Eco-Impact Tool Development

- **Develop category algorithms**
- **Link algorithms to appropriate data base values**
- **Develop input / output formats**
- **Develop Tool**
- **Test prototype / compare w/ known LCA results**
- **Generate and Publish Final Reports**

Project Monitoring Plans

- **Planned teleconference schedule: Biweekly conference calls on Tuesday mornings at 8am (PST/PDT)**
- **Meeting minutes provided through e-mail**
- **Follow-up with individuals on an as needed basis**
- **Workshops and face-to-face meetings as appropriate**
- **Progress reports will be issued as tasks are completed**
- **A mid-point progress update will be made to iNEMI Technical Committee at the end of Task 2 – methodology and categorization (prior to review by iNEMI members).**
- **Provided quarterly reports briefly indicating progress. This could be a short series a PowerPoint slides showing the work in progress.**
- **Review all project requirements with prospective participants before the project begins**
- **A final report will be issued documenting the methodology and categorization at the end of the Phase 1.**
- **Issue report on the planning for Phase 2 – Tool Development and make recommendation to continue or stop project at the end of Phase 1**

Phase 1 – Definitions, Methodology, and Categorization

<i>Project Tasks</i>	<i>Company Participation / Interest</i>
Research Project Information	
Develop Methodology and Assessment Categories (Phase 1)	
<ul style="list-style-type: none"> • <i>Define Methodology</i> 	
<ul style="list-style-type: none"> • <i>Categorize assemblies / components (circuit boards, ICs, Racks/frames, wiring, ...)</i> 	
<ul style="list-style-type: none"> • <i>Categorize products / assets (large, medium, small)</i> 	
<ul style="list-style-type: none"> • <i>Categorize life cycle stages (1. Raw Materials / Manufacturing; 2. Use; 3. End of Life; How to handle transport)</i> 	
Identify mechanism for updating the methodology and/or tool as new data, products, and algorithms are developed	
<i>Pilot a generic type product(s) to show how the methodology and modules are evaluated</i>	
Review and Finalize Methodology	
<ul style="list-style-type: none"> • <i>Identify issues arising from the pilot and revise the methodology</i> 	
<ul style="list-style-type: none"> • <i>Develop project plan for Phase 2 and make recommendation for continuation</i> 	
<ul style="list-style-type: none"> • <i>Review and finalize methodology w/ iNEMI members</i> 	
<ul style="list-style-type: none"> • <i>Prepare final documentation</i> 	
<ul style="list-style-type: none"> • <i>Distribute methodology to iNEMI members</i> 	

