

**iNEMI Statement of Work (SOW)
Environmentally Conscious Electronics TIG
iNEMI Eco-Impact Evaluator for ICT
(Information and Communication Technology) Equipment Project**

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Basic Project Information

Scope of Work

An eco-environmental impact assessment estimating tool will be developed for Information and Communication Technology (ICT) equipment. 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 suppliers' industry. A major goal of the estimator is to provide a more simplified means to determine the key eco-environmental impact and improvement opportunities of a particular product type over its life cycle stages (e.g., raw materials extraction, manufacturing, installation, use, end-of-life treatment, etc.). The estimator tool should provide results in a form that is acceptable to the industry for communications and information sharing with related stakeholders. The project should also include a mechanism for updating the data and impact assessment methods (algorithms) over time. The major phases of this project are anticipated to be completed in approximately 12 months.

Purpose of Project

This project provides alignment with the Eco-Sustainability Summit's Life Cycle Analysis Team and their roadmap for developing a simplified tool to more easily derive key eco-environmental information for an ICT equipment / asset. It will provide a degree of accuracy that is suited to the industry's needs for such information. The project will provide a solution in the form of an estimator tool that will categorize targeted products / assets and a unified format of requesting LCA information from suppliers. Key elements within these product / asset types will be defined based on their relative importance in contributing to the overall eco-environmental impact. Providing eco-impact for ICT products is becoming a rapidly increasing requirement for placing products on the market. As such, the benefits of this eco-environmental impact estimator will provide iNEMI members with a more simplified means of evaluating such impacts, summarizing the results, communicating the information within the industry, and requests toward the supplier industry. There are clearly areas here where efficiency can be gained, e.g., with methodologies and shared information and data, without compromising any intellectual property or uniqueness in our businesses. iNEMI member companies can demonstrate with the evaluator the scalable and traceable continuous improvement process related to products and the supply chain. This project will be broken into two phases. The first phase will be devoted to defining the methodology and modules, identification of a mechanism for updating the methodology and/or tool as new data, products, and algorithms are developed, evaluating the methodology and modules through a Pilot of a generic type product to show how the methodology and modules are evaluated, refining the methodology, and generating the tasks necessary to develop the simplified tool. Phase 2 will use the information generated in Phase 1 to outline the elements needed for the simplified tool. The team will make a recommendation at the end of Phase 1 to continue the development of the tool or for member companies to use the information for in-house tool development.

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

This Project IS :	This Project IS NOT :
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	

Previous / Current Related Work

The Project Team will conduct an initial search of related research work and published literature within the industry on the subject matter to review and use as a starting point for the development of this eco-impact estimator tool. Websites and documents that should be included in this search include:

- Focus Group on ICT and Climate Change:
<http://www.itu.int/ITU-T/focusgroups/climate/index.html>
- ETSI (draft) DES/EE 00014 000-1: Environmental Engineering (EE); Life Cycle Assessment of Network Equipment which provides Telecom and Internet Services - General definition and common requirements
- International Lifecycle Data System Reference
- PAS 2050:2008; Specification for the assessment of the life cycle greenhouse gas emissions of goods and services
- Guide to PAS 2050; How to assess the carbon footprint of goods and services
- Carbon Trust – Code of Good Practice for Product Greenhouse Gas Emissions and Reduction Claims

Participants

Participants on this project will include:

- Original Equipment Manufacturers
- Original Design Manufacturers
- Electronic Manufacturing Services
- Component Manufacturers
- Academic researchers
- LCA Consultants

Potential Company Participation / Interest
<i>Alcatel-Lucent; Cisco; Albenmarle; NanoDynamics; Huawei; HP; Sanmina-SCI; Plexus; Foxconn; Celestica; Flextronics; Sun; Intel; Purdue; ASU; PE International; EarthShift; Metec; NIST; Material Processing Corp.</i>

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

Project Plan

Schedule with Milestones – Phase 1

Definitions, Methodology, and Categorization	Q1			Q2			Q3			Q4		
Research Project Information												
Develop Methodology and Assessment Categories (Phase 1)												
<i>Define Methodology</i>												
<i>Categorize assemblies / components (circuit boards, ICs, racks/frames, wiring, etc.)</i>												
<i>Categorize products / assets (large, medium, small)</i>												
<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												
Pilot a generic type product(s) to show how the methodology and modules are evaluated												
Review and Finalize Methodology												
<i>Identify issues arising from the pilot and revise the methodology</i>												
<i>Develop project plan for Phase 2 and make recommendation for continuation</i>												
<i>Review and finalize methodology w/ iNEMI members</i>												
<i>Prepare final documentation</i>												
<i>Distribute methodology to iNEMI members</i>												

Phase 2 – Eco-Impact Tool Development	Q4			Q5			Q6			Q7		
1. Simplified Tool Development (Phase 2) plug in database												
2. Develop category algorithms												
3. Link algorithms to appropriate database values												
4. Develop input / output formats												
5. Test prototype / compare w/ known LCA results												
6. Generate and publish final reports												

Resources Required from Participants

The Eco-Impact Evaluator for ICT Equipment Project asks each participating company to commit to the following:

- 1) Agree to commit appropriate resources to meet the project timeline and targeted end dates.
- 2) In the event project expenses are incurred, the costs will be shared evenly among participants.
- 3) Agree that this consortium will provide technical support within its membership in sharing knowledge regarding LCA methodologies and eco-environmental information.
- 4) Design and carry out tests and evaluations as agreed to, with other members of the project, to fulfill the Statement of Work.
- 5) Collaborate on input to final report. Document results and publish findings to iNEMI members.
- 6) Develop Phase 2 plans including detailed estimates for the formal development of an Eco-Impact Estimator tool with associated training modules.

Detailed Information

Phase 1 – Definitions, Methodology, and Categorization

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 the LCA modules.

- **Resources**
 - Team members to be identified based on interest and knowledge of equipment characteristics.
- **Materials and processes**
 - Develop basic framework for the tool including categorizing products and assets; life cycle 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.

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.

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.

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 life cycle 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 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 will be required and how to ensure they will be available.

Task 4. Pilot a generic type product to show how the methodology and modules are evaluated

a. 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.
 - The intent is not to evaluate the specific results of the LCA or compare LCA tools.

Task 5. Generate and publish final reports; review definitions, methodology, and categorization elements

a. 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.

- c. **Review and finalize definitions, methodology, and categorization elements with 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.
- 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

The Eco-Impact Tool Development (Phase 2) plan will be developed during the execution of the Phase 1 tasks. The tasks listed in this section are for reference purposes only.

- Task 1. Develop category algorithms**
- Task 2. Link algorithms to appropriate database values**
- Task 3. Develop input / output formats**
- Task 4. Develop tool**
- Task 5. Test prototype / compare with known LCA results**
- Task 6. Generate and publish Final Reports**

Project Monitoring Plans

- Planned teleconference schedule: Biweekly conference calls on Tuesday mornings at 8:00 a.m. (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 the iNEMI Technical Committee at the end of Task 2 – Methodology and Categorization (prior to review by iNEMI members).
- Provide quarterly reports briefly indicating progress. This could be a short series of 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 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.

Outcome of the Project

- Project success includes the full development and documentation of methodology and categories needed to develop a simplified LCA tool for ICT type products. This will include a unified data request format for the supplier industry to ensure the up-to-date status of the estimator. These results will be posted on the iNEMI website for sharing amongst iNEMI members.

General and Administrative Guidelines

General and Administrative Guidelines for this project and all other iNEMI Projects are documented at http://thor.inemi.org/webdownload/join/gen_guidelines.pdf.