InEDIC Ecodesign Manual

Tool 6: MET Matrix

The MET matrix is a qualitative or semi-qualitative environmental analysis method that is applied to provide a general view of the inputs and outputs of each phase of the product life cycle and to identify the main environmental aspects and possible environmental improvement options. Prioritization of environmental aspects is based on environmental knowledge, although the MET matrix requires quantitative data.

The relatively simple structure of the matrix allows the ecodesign team to analyze all phases of product life cycle (vertical analysis) and the various environmental impacts associated with each phase (horizontal analysis). This was achieved by grouping environmental aspects into three main categories (**M**aterial use, **E**nergy use and **T**oxic materials and emissions including waste), and dividing the life cycle into five main phases (extraction of resources and acquisition of raw materials, ceramic factory production, distribution, use or application, end of life system / final disposal).

The ecodesign team is recommended to perform the analysis in three steps:

1. **Define product system boundaries**, as it was described in Section 0 of this manual (set of criteria specifying which unit processes are part of a product system).

2. **Perform needs analysis** and answer two questions:
   - Does the product fulfill its main and auxiliary functions?
   - Is it possible to modify the product system to fulfill the same functions in a more effective way?

3. **Perform functional product analysis** using MET Matrix Worksheet. First of all the ecodesign team should describe product functions, strengths and weaknesses (which can cause some concerns), energy and material consumption as well as actual lifetime of the product. This process usually starts from disassembly of the product and measurement of the weights of its parts and components. Data about the type and amount of materials and components present in product should be listed identifying their interrelationship. Systematically the functional product analysis can be divided into three steps:

   1. Filling in the MET Matrix Worksheet for the selected product, including all associated environmental aspects and auxiliary materials/consumables that are used during a product's life cycle.
   2. Filling in an additional MET Matrix Worksheet for any part or component of the product, that is associated with high environmental load.
   3. Analysis of the matrix and highlighting of hot spots.

The table below presents a short explanation of what information should be included in the matrix.

M – Materials
This column should include information about the inputs/outputs associated with each phase of the product life cycle of the ceramic material. Special attention should be paid to the main and auxiliary materials and parts: — that are used in the largest quantities; — that generate high pollution load during their production process; — that are or include non-renewable or scarce materials; — that are incompatible with each other; — that are used inefficiently or are non-reusable.
E – Energy
This column should include information regarding energy demand: — materials with an extremely high energy requirements during their production process; — energy consumption during the product manufacturing; — energy consumption for transportation, operation, maintenance and other associated processes; — air emissions due to energy use.
T – Toxic materials and emissions (including waste)
Toxic emissions to land, water and air as well as consumption of toxic materials should be listed in this column.

It is recommended to use as much measured data as possible and avoid fuzzy statements. Furthermore, the use of ecodesign checklists should be considered to assure that no important environmental aspects are forgotten. Contribution of an external environmental expert is recommended in the prioritization process of environmental aspects.

On the next page the MET matrix worksheet is depicted, including some information that needs to be identified in order for the matrix to be completed.

		M Use of Materials	E Use of Energy	T/(w) Toxic Inputs/emissions	Extra information
Pre-production (extraction of resources and acquisition of raw materials)		Include e. g.: All ceramic raw material, additives, frit, fluxes necessary for ceramic production. Auxiliary materials for maintenance activities.	Include e. g.: Energy for machinery during extraction phase (e.g. diesel). Energy for raw materials processing (e.g. washing, screening)	Toxic waste produced during raw material extraction and subsequent transformation	
Production		Include e. g.: Auxiliary materials for the production and maintenance activities	Energy (electric and fuel) for the manufacturing processes.	Toxic waste produced during the manufacturing processes including maintenance. Gaseous emissions (to air) and emissions to water from production.	Some industries like brick and roof tiles may not have emissions to water from production.
Distribution		All materials used for packaging. Auxiliary products	Energy used in packaging processes. Energy for transporting the products to their final distributors	Combustion gases emitted from transport. Packaging waste	
Use	**Operation**	Materials, e.g. fixative in case of ceramic tiles, cleaning materials	--	Waste if anything is broken	
	Servicing	Cleaning materials	Energy consumption during maintenance and repair	Waste if there is a need to repair	
End-of-Life	**Recovery**	--	Energy for waste transportation and management	Recycled waste materials	In case of products for construction (brick, tiles, sanitary ware)
	Disposal				