

## **Working Paper No. 3 Materials/Products Definition**

The U.S. LCI database is intended to provide cradle-to-gate data for a variety of materials and products used in various industry sectors. As described in the working paper on transparency, transparency can be maximized by publishing LCI data on unit processes. (Care must, of course, be taken to maintain the confidentiality of data on certain unit processes, for example, where there is a single or limited number of producers.) Users of the LCI database, however, are not expected to act as LCI practitioners and construct process trees for each material or product for which they need LCI data. Various users are interested in materials at various levels of fabrication/processing, leading to the dilemma of where to locate the “gate.”

With unit process data entered in the database, the “gate” can be flexible. Unit process data sets can be used to construct pre-established process trees modeling materials and products at various levels of fabrication/processing. For example, an automotive user may purchase sheet metal and fabricate it into car doors. This user would want to access rolled-up cradle-to-gate data for the production of sheet metal, then either add generic data for the subsequent transformation processes (*see working paper on transformation processes*) or develop specific fabrication data using their own process energy data linked to the common energy and transportation database (*see working paper on energy and transportation database*). An architect, on the other hand, would want to access cradle-to-gate data for a completed building product such as metal siding, instead of starting with sheet metal and proceeding through the various fabrication and coating processes to arrive at the final product. The process tree for metal siding thus would encompass all the processes in the sheet metal tree (which could be accessed as a rolled-up data set) plus all the additional steps to produce siding. In any case, the user would be able to view all the unit process data in the process tree as well as the rolled-up data for the product of interest.

A very broad list of products and materials for consideration for Phase II data development is attached. The data are grouped in four main categories: building and construction materials/products, automotive/durable products manufacturing materials, packaging materials, and commodity chemicals/materials.

## **BUILDING & CONSTRUCTION PRODUCTS (from Athena database)**

### **Wood Structural**

- Softwood lumber, green and kiln dried
- Softwood plywood
- Structural waferboard
- Oriented strandboard
- Parallel strand lumber
- Laminated veneer lumber
- Glue laminated beams
- Wood "I" joists
- Parallel/pitched chord light frame trusses
- Composte wood/steel open web joists

### **Steel Structural**

- Trusses (bar joists)
- Galvanized studs
- Galvanized decking
- Composite steel/wood joist components
- Reinforcement bar
- Hollow structural steel
- Tubing
- Heavy and light sections
- Hot and cold rolled sheet
- Galvanized sheet
- Welded wire mesh and ladder wire
- Nails and fasteners

### **Concrete Structural**

- 15, 20, 30, 60 Mpa ready mixed
- Precast "double T" beams
- Precast hollow deck
- Standard concrete blocks
- Cement mortar

### **Cladding**

- Wood bevel siding
- Wood tongue and groove siding
- Wood shiplap siding
- Sheet steel cladding
- Common brick
- Modular brick
- Face brick
- Glazed face brick
- Concrete brick
- Silicate (sandlime) brick
- Cementitious stucco
- Vinyl siding

### **Gypsum Wallboard (various thicknesses)**

- Regular paper faced
- Type X (fire resistant)
- Moisture resistant
- Mobile home board
- Gypsum fiber board
- Shaftliner board
- Drying type ready-mixed joint compound
- Setting type dry joint compound
- Paper joint tape

### **Insulation and Vapor Barrier**

- Rock wool (mineral) batt
- Fiberglass batt
- Cellulose
- Polystyrene rigid expanded (EPS) and extruded (XPS)
- Polyethylene

### **Glazing Systems**

- Standard double glazed
- Tin-coated glass
- Tin-coated glass, argon filled
- Silver-coated glass, argon filled

### **Window Frame Materials**

- Wood
- PVC
- PVC clad wood
- Aluminum

### **Paint Finishes**

- Latex acrylic
- Oil alkyd
- Oil alkyd varnish

### **Residential Roofing**

- Organic felt-based asphalt shingles
- Fiberglass mat-based asphalt shingles
- #15 saturated underlayment felt
- #30 saturated underlayment felt
- Mineral surface roll roofing
- Clay roofing tiles
- Concrete roofing tiles

### **Commercial/Industrial Roofing**

- Roofing asphalt
- EPDM membrane
- SBS modified bitumen
- PVC membrane
- Polyisocyanurate roofing insulation

## **MATERIALS USED IN THE MANUFACTURE OF AUTOMOBILES AND OTHER DURABLE GOODS**

### **Steel**

Cold rolled  
Hot dip galvanized  
Electrolytic zinc plated  
Billet  
High strength steel  
Various specialty alloys

### **Aluminum**

Primary ingot  
Primary sheet  
Secondary ingot  
Secondary die casting  
Extrusion  
Various alloys

### **Non-ferrous Metals**

Lead  
Nickel  
Copper  
Zinc  
Tin  
Silicon  
Magnesium  
Titanium

### **Precious Metals**

Silver  
Gold  
Palladium  
Platinum  
Rhodium

## **COMMON PACKAGING MATERIALS**

### **Paper and Paperboard**

Bleached Kraft  
Virgin  
Recycled  
Unbleached Kraft  
Virgin  
Recycled  
Corrugated

### **Coatings**

Clay  
Wax  
PE

### **Plastic**

### **Plastic Resins**

EPDM (ethylene propylene diene monomer)  
Nylon 6  
Nylon 6,6  
PP (polypropylene)  
PE (polyethylene)  
PUR (polyurethane)  
PVC (polyvinyl chloride)  
TPO (thermoplastic polyolefin)  
ABS (acrylonitrile butadiene styrene)  
EP resin (ethylene propylene)  
PET (polyethylene terephthalate)  
SBR (styrene butadiene rubber)  
NBR (nitrile butadiene rubber)  
PS (polystyrene)  
PET textiles  
PP textiles  
MDI  
TDI  
Polyol

### **Paint Systems**

Solvent-based  
Powder  
Water-based  
Fillers

### **Minerals**

Glass  
Glass fibers  
Carbon fibers

### **Pallets**

Wood  
Plastic

### **Drums**

Steel  
Plastic  
Paperboard

### **Miscellaneous**

Aseptic Packaging  
Foil  
Cellophane  
Printing Inks  
Adhesives

Films (various resins)  
Blow Molded (various resins)  
Injection Molded (various resins)  
Extruded (various resins)  
Thermoformed (various resins)  
Calendared  
Polystyrene Foam

**COMMODITY CHEMICALS/MATERIALS**

Limestone  
Lime  
Salt  
Sodium Hydroxide  
Chlorine  
Sulfur  
Hydrochloric Acid  
Sulfuric Acid  
Surfactants-various  
Ammonia  
Ethylene glycol  
Propylene glycol  
EVA  
EVOH  
Talc  
Titanium dioxide  
Vinegar  
Mineral oil  
Drinking/tap water  
Others?

**Agricultural**

Phosphate Fertilizer  
Nitrate Fertilizer  
Potash Fertilizer  
Cotton  
Corn  
Cornstarch  
Potatoes  
Potato starch  
Soybeans  
Palm oil  
Coconut oil  
Natural rubber  
Others?