TI Corporate Citizenship

Topic Brief

Materials management

Texas Instruments

Materials management

Why it matters

As a company that strives for zero wasted resources at all our sites, we believe in responsibly managing material use and disposal. We efficiently use and reuse materials to protect the environment by keeping undesirable items out of local landfills and watersheds.

We involve TIers in reducing waste as well. Local sustainability champions spearhead recycling drives and build awareness of material reuse and recycling. While our programs and infrastructure vary by location, our commitment to zero waste remains the same.

Our approach

Step 1: Examine what we need

As a semiconductor designer and manufacturer, most of the materials we need are used to fabricate semiconductors and are present in our final products. When we purchase materials, we consider the resulting waste and whether there is an opportunity to reuse existing materials or purchase recycled materials or environmentally friendly items instead.

Step 2: Reuse what we can

We reuse materials in several ways:

- Recover metals from solids, liquids and sludge for use in other industries
- Sell used process chemicals for reuse in other industries
- Segregate and repurpose waste chemicals to reduce the amount disposed
- Clean and reuse wafer carriers when possible
- Empty and shred chemical containers so the material can be sold back to the plastics industry for reuse
- Donate wafer fabrication shoes to local nonprofits
- Repurpose or sell older manufacturing equipment
- Provide reusable tableware in cafeterias

Step 3: Recycle what's allowed

Our recyclable material comes primarily from our offices and manufacturing sites, and is managed and regulated differently depending on local requirements. These materials include:

Used manufacturing supplies

Our employee's hairnets, shoe covers and other daily personal protective equipment are collected and shipped to a facility that recycles them to make more nylon and plastics.

Office waste

Workspaces and conference rooms have recycling bins for office paper, corrugated boxes and aluminum cans that are collected and sent to recycling centers.

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Organic waste

TI Malaysia and several Texas sites have implemented cafeteria waste programs to collect organic material from the cafeteria and break it down into compost and fertilizer. We also work with cafeteria vendors to provide employees with compostable to-go boxes, cups, straws, napkins and utensils. Where possible, these sites strive to:

- Eliminate the use of foam and plastic
- Reduce the number of to-go containers by offering dine-in specials
- Encourage diners to separate and recycle waste
- Recycle napkin and paper-towel waste from cafeterias and restrooms
- Reduce or eliminate individual food and tray wrappers
- Collect cafeteria food waste.
- Procure organic or locally grown food

At some Texas sites, a local company composts our organic waste to create topdressing and soil-blend products to sell in the community or for use on our own landscaping. Outside the U.S., where it can be more customary to dine in at lunch, our sites do not offer disposable containers, and instead provide reusable dishes and collect food waste for composting or animal feed.

TI recycles or reuses:

- Plastic
- Paper, packaging and printed material
- Glass/aluminum cans and bottles
- Cardboard packaging/boxes
- Used office supplies
- Food/cafeteria waste
- Booties/hairnets/shoes
- Wafer carriers/scrap silicon wafers
- Manufacturing equipment
- Electronics/batteries
- Printer ink cartridges
- Rechargeable batteries
- Cellphones (through local vendors)

Scrap silicon wafers

Silicon wafers, the foundation of our semiconductors, are sold as scrap to solar-panel fabricators when they are no longer useful for products.

Electronic waste

We encourage employees to recycle old cellphones and printer ink cartridges through local or regional vendors. In addition, we:

- Educate employees on internal processes for properly disposing of electronic equipment used at work, including computer monitors and laptops
- Provide forums for employees to share information on recycling personal e-waste
- Use the R2 Certified Recycling Co. for e-waste, and are members of the Electronics Products Recycling Association for eight Canadian provinces
- We also participate in various recycling programs, including:
  - Call2Recycle Rechargeable Battery Recycling Corp. (RBRC), which handles rechargeable battery recycling in the U.S. and Canada
  - Eco Enterprises Quebec, and Canada Stewardship Services Alliance for British Columbia, Saskatchewan, Manitoba and Ontario provinces, which manages paper, packaging and printed material recycling

Managing industrial waste

We thoroughly vet and contract with established waste management firms to remove, transport and properly dispose of hazardous waste. Though the regulatory bodies in the countries where we operate differ on what materials they classify as hazardous waste, we do not treat, process, dispose of, import or export hazardous waste generated from our facilities. We also do not ship hazardous waste, as defined in the Basel Convention, across international boundaries.

Industrial waste that originates from manufacturing operations is classified according to regulating authorities in each operating region, and primarily includes chemicals. Where possible, we use high-pressure water instead of chemicals in certain cleanup applications or replace them with environmentally benign substitutes. When we must use chemicals, we carefully manage their transport, distribution, use and disposal.

Screening

We screen all incoming chemicals before incorporating them into our semiconductor manufacturing processes in our fabs and assembly sites.

Screening includes a review of customer concerns and regulatory standards, in addition to any environmental, safety and health (ESH) controls required for their use. We incorporate restrictions and standards related to chemicals in our contracts with suppliers.

If concerns about a chemical or other material arise during review, the matter is elevated to a chemical and material review board staffed by company experts. If a chemical or material is thought to be necessary for manufacturing but still raises concerns, our manufacturing leaders review the issue; where appropriate, they authorize additional time and resources to seek a safer alternative, or implement more stringent use controls.

Handling

To ensure safe handling, we:

- Communicate and train personnel on workplace hazards and proper chemical usage
- Use controls such as safety interlocks and ventilation to minimize exposure
- Require TIers to wear personal protective equipment
- Limit deliveries and storage to one central location at each site
- Feed chemicals through carefully constructed distribution systems with appropriate leak detection, ventilation and abatement controls
- Discharge chemicals through wastewater treatment, wet scrubbers, thermal oxidizers and absorbers

Restricting

Producing world-class semiconductors involves the use of hazardous and nonhazardous chemicals and gases, which is why we have stringent controls in place. We also periodically assess the potential environmental, safety and health impact of these materials as new scientific information becomes available and regulations are adopted.

We are committed to identifying and using the safest, lowest-risk materials in operations, and focus on compliance with all applicable conventions, protocols, laws and regulations for chemical use. Click here for a complete list of chemicals TI restricts.

External restrictions

The European Union (EU) and China have stringent standards for product content and have banned some chemicals altogether. These standards include:

- EU's Restriction on Use of Hazardous Substances in Electrical and Electronic Equipment (RoHS) – Restricts electrical and electronic equipment containing cadmium, mercury, hexavalent chromium, polybrominated biphenyl and polybrominated diphenyl ether flame-retardants above specified thresholds from entering the EU. Approximately 95 percent of our worldwide net product sales are shipped in accordance with all EU RoHS legislation
- EU's Regulation on Registration, Evaluation, Authorization and Restriction of Chemicals (REACH) – To comply with REACH, we gather and file information about the properties of chemical substances we use. We also provide information to customers about the status of REACH-listed substances in our products

- China Management Methods for Controlling Pollution by Electronic Information Products (China RoHS) – Although our components are not required to meet China RoHS labeling requirements, which primarily apply to end-equipment manufacturers, we changed our shipping labels and provided additional information to our customers so they can more easily meet compliance needs

Lead

Long before legislation required such measures, TI led the industry in developing lead (Pb)-free alternatives for products. Although most customers have shifted to using Pb-free products, we continue to manufacture a few that contain lead for those who require it. These products are usually outside the scope of RoHS requirements, such as military products or can have an exemption applied to them by our customer's application, such as servers.

Brominated and chlorinated flame retardants

One of the challenges facing TI and the electronics industry is how to reduce or eliminate the use of brominated flame retardants (BFRs) and chlorinated flame retardants (CFRs), which are integral to semiconductor packaging materials. While BFRs and CFRs contained in products pose no risk as sold, their improper or unsafe disposal is of concern. We removed these materials from products that were converted to Pb-free and RoHS-compliant before they became an industry concern.

Our Pb-free and RoHS-compliant devices also meet globally defined restrictions as defined in documents such as the Global Automotive Declarable Substance List when applied to electronic components; what was previously the Joint Industry Guide JIG-101 and was replaced by the new International Electrotechnical Commission 62474 database in late 2013. Our products listed as green go beyond these types of regulatory requirement lists and include compliance to low-halogen efforts.

Nanomaterials

We regularly work within the industry to assess new substances, and are actively involved with research groups to evaluate the use of nanomaterials for specific functions. Currently, we only embed nanoscale features and structures within select semiconductors. We are working with industry partners to study these materials further to better understand potential environmental, safety and health impacts, and to ensure our management systems provide appropriate controls and protections, should they be needed.

More than 90 percent of the semiconductor products we ship are considered green and meet low-halogen industry requirements. We define green to mean "Pb-free; RoHS-compliant; and free of chlorine, bromine and antimony trioxide-based flame retardants."

Our "Halogens, Chlorine and Bromine: Concentration in TI's 'Green' Devices" document explains the thresholds for BFRs and CFRs. Products defined by TI as green meet the Joint Electronic Devices Engineering Council's (JEDEC) JS709 Low Halogen Guidelines. More information can be found on our Eco-Info website.

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