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The "green" challenge

Complying with the impending environmental regulations in the Hi-tech industry

– Vijay N Krishna, Sandeep Kumar, Ravikant Karra

ViewPoint

With the recent passage of two major manufacturing regulations from the European Union (EU), the worldwide movement toward corporate environmental responsibility – often referred to as corporate sustainability – has become a business reality. The new laws in question are the RoHS (Restriction on the Use of Certain Hazardous Substances) and the WEEE (Waste Electrical and Electronic Equipment). Both directives place the financial burden on manufacturers, OEMs, and related businesses to absorb the costs of collecting, recycling and redesigning the regulated materials in question. Some experts believe the impact on the manufacturing industry could be equal to Y2K in scope, business repercussions and cost.

The RoHS directive (EU directive 2002/95/EC) restricts a total of six substances found in electrical and electronic equipment to a level below the maximum concentration values (MCV) prescribed in the law: lead, mercury, cadmium, hexavalent chromium, PBB and PBDE. The WEEE directive (EU directive 2002/96/EC) stipulates that producers or third-parties acting on their behalf must set up systems to deal with electrical and electronic equipment waste using the best available treatment, recovery and recycling techniques.

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Why the Directives?

Materials essential to high-tech products are making their way into landfills and life-giving groundwater basins at alarming rates. According to the U.S. Environmental Protection Agency (EPA), only 11 percent of computers worldwide are recycled-compared to 28 percent of overall municipal waste. A recent Lehman Brothers study estimates that more than 420 million cell phones will be sold in 2004, up 50 percent from 2003. Yet only five percent of cell phones are recycled. Cell phones typically contain lead, cadmium, mercury, and other materials that can degrade into arsenic. The National Safety Council estimate that 40 percent of lead found in landfills comes from electronic waste.

The WEEE directive imposes a minimum level of recycling to substantially reduce the amount of electric and electronic equipment going into landfill. RoHS was added to more completely address the pollution problems associated with the manufacture and disposal of electronics. Together, these directives seek to control the presence of environmental unfriendly substances during the product design and manufacturing processes as well as during the end-of-life recovery, salvage, and recycling processes.

Undoubtedly, other corporate sustainability practices will soon be enacted. For example, similar legislation is being enacted in China and Japan, and by several states within the U.S. The EPA has been looking at electronic waste for several years as part of the Cathode Ray Tube (CRT) Rule.

Impact on Manufacturing

The RoHS and WEEE directives impact not just manufacturing facilities but "producers", defined by the EU directives as any company that:

- Manufactures and sells electrical and electronic equipment under its own brand name
- Resells under its own brand name equipment produced by other suppliers
- Imports or exports branded or unbranded products on a professional basis into a EU member state for use within the community

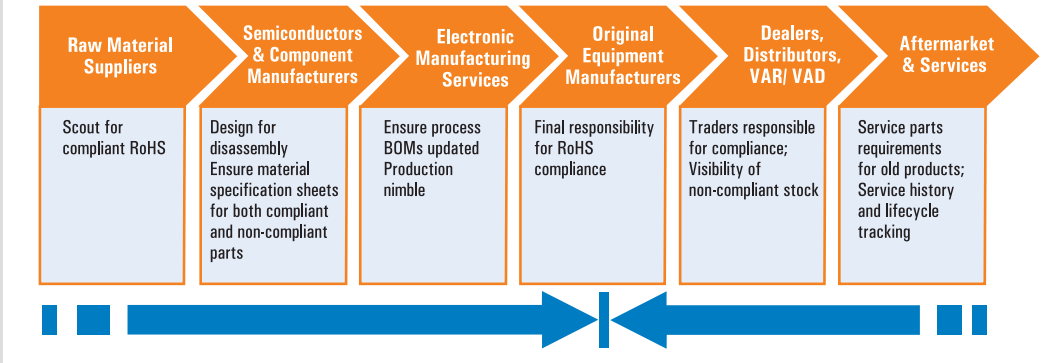

Figure 1: Impact of RoHS/WEEE directives on the High Tech Value Chain.

While a contract manufacturer may not have "producer" responsibility, the manufacturer would still be forced by its OEMs to be compliant. The effect on the high-tech manufacturing value chain is depicted in Figure 1.

Industries impacted include manufacturers of:

- Household appliances (large and small)
- Consumer durables such as computers, printers, radios, and televisions
- Telecommunication equipment and mobile devices
- Lighting equipment
- Medical devices and instruments
- Metrological devices and process control devices such as valves and actuators
- Consumer electronics games and automated sports equipment
- Electric and electronic tools and accessories

Timeframe and Costs

The impact of compliance with RoHS and WEEE is further complicated by the EU's aggressive timeframe:

- January 2004 – Directive comes into effect
- January 2005 – Producers are responsible for the recovery and recycling operations
- July 2006 – Producers must meet recycling and recovery targets

Cost estimates for complying with the directives vary widely. However, industry experts believe that enhancements to existing systems will be extensive, and the legal costs of not complying could be even greater. One $10 billion OEM estimated that the cost of recycling process and business changes would be approximately $100 million based on a 10-year product lifecycle. A substantial part of this amount would be spent in IT infrastructure changes and enhancements. Dr. Kieren Mayers of Sony estimates WEEE compliance costs for producers will be 1 percent to 2 percent of sales revenue.[1] AMR estimates that supporting WEEE compliance could consume up to six percent of IT development budgets over the next three years.

Business Implications and Recommendations

Corporate sustainability must be faced head-on and considered as only one example of the fast-growing wave of environmental regulations affecting product development and manufacturing processes. Not since the Y2K challenge have so many companies had to creatively and dramatically restructure to meet such a pressing business-critical deadline. Most companies underestimate the impact these directives will have on major business processes, and few companies have developed a business strategy or budget to handle the required systems changes. The consequences of complying with RoHS/WEEE range from "going-out-of-business-sales" for ill-prepared manufacturers to a seriously affected bottom line. Reacting to environmental compliance regulations could prove costly and catastrophic for many manufacturers. Manufacturers need to anticipate worst case scenarios and evolve "Design for Environment" strategies that are futuristic. Tool evolution and choice should needs to follow the strategic choices made.[2]

Although the signs of coming legislation have been apparent for the last decade, the industry as a whole is just beginning to consider solutions, much less implement them. Most of today's initiatives are being handled in-house. While companies are beginning to put a structure in place to support these compliance initiatives, high-level strategy assessments are lacking. Some companies are appointing a Chief Compliance Officer or Director of Safety, Health and Environment to spearhead these efforts. A few have already budgeted for corporate sustainability programs in general and for RoHS/WEEE compliance in particular. But these early adopters are in the minority.

[1] *California Management Review, VOL. 45,NO. 3 SPRING 2003*

[2] O'Marah, Kevin, "RoHS Transition Threatens Electronics Manufacturing Business" (AMR Research, 4/01/2004).

Now is the time to turn strategy into active solutions. Ongoing environmental regulations fall into the category of a Product Lifecycle Management (PLM) problem for manufacturers. Currently, it is primarily high-tech manufacturers that are affected, but the regulations will soon be expanded to include all manufacturers. The RoHS/WEEE directives (and, by implication, future environmental regulations) have far-reaching impact on business processes, including:

1. ***Compliance Reporting:*** Reports must include new EU trade documents, labeling on equipment, tracking reuse, and disposal compliance.

2. ***Product Design:*** Manufacturers will need to ensure that all components used are WEEE/RoHS-compliant with product-level testing needed to certify conformity. They must also design products for easy disassembly and recycling, especially for products with shorter lifecycles. This is broadly being termed as DfE (Design for Environment).

3. ***Sourcing/Procurement:*** Typically, suppliers are chosen based on cost, quality, reliability and flexibility. Additional parameters of compliance requirements, declarations from suppliers, and measures to ensure conformance need to be put in place. Both contract management processes and actual order processing practices must change. The labels used on products also need to comply with RoHS (since some inks used on labels could contain lead).

4. ***Service and Repair:*** For products with long product lifecycles, manufacturers need to track, repair and upgrade histories to support End of Life (EOL) processing. While non-compliant spares can be used for products "put into market" prior to July 1, 2006, this is not expected to continue indefinitely.

5. ***Reverse Logistics:*** Close integration with logistics service providers to ensure pick-up and disposal. For short lifecycle products, this will be of higher significance.

6. ***Production Processes:*** Changes in the production process based on the enhanced requirements placed on product design, sourcing, labeling, and so forth.

7. ***Administration and Implementation:*** Additional staff must be added to administer and support these requirements.

8. ***Recycling:*** Research into cost-effective recycling practices, and perhaps even turning recycling centers into profit centers

All producers of electrical and electronic equipment must ensure that material is collected and appropriately recycled. Companies will need to track product data from design through End-of-Life (EOL). The requirements will usher in substantial system changes, a host of new business processes, and significant systems integration efforts. Additionally, producers will have to furnish material declaration sheets for long lifecycle products already in the market as well as all products to be released into the market in the future.

Impact on the IT Infrastructure

The RoHS/WEEE directives will place numerous demands on the IT infrastructure:

- Compliance reporting and material declaration sheets for all products manufactured
- Developing and enhancing systems that capture data on disposal/ recycling practices
- Changes to packaging to incorporate compliance specifications
- Links to collection centers to specify disassembly processes and track recycling percentages for compliance documentation
- Global availability of information on product bills, process bills, and material declaration sheets
- Quality management documentation Impacted systems will include systems as diverse as Product

Lifecycle Management (PLM) solutions to tr ack component parts through the lifecycle of all pertinent products and ensuring re-use to meet the minimum requirements; Product Data Management (PDM) solutions with links to sourcing and procurement systems; and Customer Relationship Management (CRM) links to capture recycling requests from customers

New linkages and systems will need to be developed to enable Communication with product collection and recycling centers, Compliance documentation with tracking to determine performance against WEEE targets and a master product database with both product and process bill of materials (pertinent assembly processes must be listed—for example, if soldering requires lead.)

Some of the key implementation challenges include the following:

- The preparation of material declaration sheets for existing and future products, involving significant data crunching across multiple systems
- Changes to existing applications for inclusion of compliance data
- Establishing data linkages with collection and recycling centers for controlling the disassembly processes
- Tracking recycling percentages for compliance documentation
- Training and hiring personnel to direct and implement programs

In the final analysis

Compliance with pending and existing environmental directives will influence many aspects of business operations—from the way products are created to how they are packaged and shipped. Compliance directives will impact most entities in varying degrees, especially OEMs and component manufacturing companies. Companies will move through stages such as learning, consulting, implementation and, ultimately, resolution. A typical progression is as follows:

- Identify and assess all business functions/ processes impacted
- Develop a comprehensive corporate sustainability blueprint
- Outsource portions of the research, system development, data extraction, reporting and documentation activities
- Look for ways to turn compliance requirements into strategic opportunities

Most compliance strategies are lagging behind mandated deadlines, placing high-tech manufacturing companies at serious risk. Many companies can benefit from the guidance of a strategic partner that specializes in environmental compliance. The ideal partner should have extensive experience across all the affected application domains such as materials management, CRM, supply chain, procurement, and quality control. Based on Infosys' extensive experience across the high-tech manufacturing industry, we recommend an all-embracing approach that takes into account not only current regulations, but pending requirements from other countries.

Producer responsibility and corporate sustainability for environmental control is here to stay—both due to legislation and consumer expectations. Investing in green processes and corporate sustainability practices will help companies compete in future markets. Companies must immediately assess the potential impact on operations due to the RoHS/WEEE directives. In particular, they should carefully consider the impact of implementing a comprehensive corporate sustainability program to deal with future environmental regulations and the growing trend toward environmental responsibility and control.

Further Reading

1. "RoHS Transition Threatens Electronics Manufacturing Business", AMR Research Report, 04/01/2004, Kevin O'Marah
2. "Green Regulations are a Guide to Design for Lower Product Lifecycle Costs", AMR Research Report, Nov 2003, Kevin O'Marah, Heather Keltz
3. Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment, the European Parliament and the Council of the European Union
4. Directive 2002/96/EC of the European Parliament and of the Council of 27 January 2003 on Waste Electrical and Electronic Equipment (WEEE), the European Parliament and the Council of the European Union
5. "WEEE and RoHS Directives Could Be As Big As Y2K for High-Tech", AMR Research Report, 12/11/2003, (Kevin O'Mara)
6. "Budgeting for Green: The High Cost of Environmental Compliance," AMR Research Report, Bruce Richardson, 10/14/2004
7. WEEE and RoHS: "Capitalizing on Changes In The Electrical and Electronic Industries", A Report from the Goodbye Chain Group, Harvey Stone, Jim Christiansen, 2003
8. "Electronic Waste Processing: Manufacturers Running Out Of Time", AMR Research Report, Vinay Asgekar, 2003
9. Official Journal Of The European Union, Section L 37/23.
10. "Are you green enough?", Article by Crista Souza, Electronics Supply & Manufacturing, 2004.
11. "California Management Review", Vol. 45, No. 3 Spring 2003

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