

Efficient compliance with environmental rules in the high-tech industry



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Preface

Efficient compliance with environmental rules in the high-tech industry is an Economist Intelligence Unit white paper, sponsored by Oracle.

The Economist Intelligence Unit bears sole responsibility for this report. The Economist Intelligence Unit's editorial team conducted the interviews, wrote and edited the report. The findings and views expressed in this report do not necessarily reflect the views of the sponsor. Roberto Michel is the author of the report.

Our report drew on desk research and in-depth interviews with senior executives in the high-tech industry. Our thanks are due to the interviewees for their time and insights.

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Executive summary

High-tech and electronics manufacturers are preparing to comply with two new important environmental regulations set by the EU. One is the EU's Waste Electrical and Electronic Equipment (WEEE) directive that governs producer responsibility for the recycling of electronic products. The other is the Restriction of Hazardous Substances (RoHS) directive that bans products containing certain levels of lead, cadmium, mercury, hexavalent chromium and two types of flame retardant—polybrominated biphenyl (PBB) and polybrominated diphenyl ether (PBDE). In addition, the industry faces the likelihood of similar legislation in other major markets, such as China. The cost of complying with RoHS and WEEE can be large; by some estimates, as high as 4% of revenue from the affected product lines for the first year of compliance.

Interviews with six companies in the high-tech electronics industry reveal three best practices for cost-effective compliance. Companies will be able to minimise costs and potentially gain a competitive edge in the following ways:

- by integrating compliance with WEEE and RoHS into larger environmental efforts;
- by assessing the supply-chain ramifications of compliance;
- and by building a platform for sustainable compliance through strong business processes and information systems.



Introduction

The electronics and high-tech industry faces what is possibly its biggest challenge in the field of environmental regulation. This is in the form of two EU directives. The first is the RoHS directive that limits the amount of certain hazardous materials that high-tech manufacturers are allowed to put into products sold in EU member states. The second is the WEEE directive that makes manufacturers responsible for recycling products (see box).

The industry—which spans makers of semiconductors, computers and networking equipment, electrical components, consumer

electronics and small electronic appliances—has been involved for decades in eliminating hazardous materials from products and recycling materials. For example, the Montreal Protocol of 1987 led to bans on the use of certain refrigerants in the appliances industry. Also, many electronic component manufacturers are affected by an EU regulation known as the End of Life Vehicles (ELV) directive. However, RoHS and WEEE involve many types of material, affect nearly every electronics sub-sector and cover all EU member states. The country-specific implementation of WEEE adds an additional layer of complexity.

RoHS and WEEE at a glance

- As of July 1st 2006, RoHS bans the placing on the EU market of new electrical and electronic equipment containing more than the agreed levels of lead, cadmium, mercury, hexavalent chromium, as well as two flame retardants— PBB and PBDE. Passed in January 2003 as Directive 2002/95/EC, RoHS penalties vary by country, and in some member states infringement can lead to halted sales of non-compliant products. The directive covers electronic and electrical products for both home and commercial use; there are various exempt products, including electronic equipment for military use and large-scale, stationary industry equipment. As recently as October

2005 the EU amended the directive to accommodate certain instances in which bans would be technically unfeasible. This amendment covered certain server and network equipment, but also established provisions for a periodic review of other possible exemptions that might occur in the future.

- WEEE sets criteria for the collection, treatment, recycling and recovery of waste electrical and electronic goods. It makes producers responsible for financing the recycling or “take-back” (ie, the logistics of retrieving used goods for refurbishing or recycling) of electrical and electronic equipment. Like RoHS, it applies to a wide variety of products, including computer equipment, consumer electronics such as audio players and televisions, and small household appliances with electron-

ics. WEEE was also passed in January 2003, but took effect in August 2005. Unlike RoHS, WEEE is not a “single market” directive, so member states can set their own implementation timetables. For example, in August 2005 the British Department of Trade and Industry delayed the UK’s WEEE deadline from January 2006 to June 2006. The directive requires that products be marked with the “do not trash” symbol and sets forth target recycling levels. The directive also imposes information requirements under which producers are required to register with member-state agencies and provide data on the volume and types of products sold in each member state. This is intended to encourage individual producer responsibility (IPR) by establishing a base line for tracking which manufacturers are attaining high levels of recycling or re-use.



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The two regulations were designed to complement each other. RoHS aims to keep hazardous materials out of products and WEEE seeks to cut the level of electronic and high-tech products ending up in landfills.

The scope of these regulations makes them more challenging than previous environmental regulations, say industry participants. "We have dealt with materials restrictions in the past," says Viktor Sundberg, vice-president of environmental affairs for Electrolux Household Appliances, Europe. "The difference with RoHS is that we've never had to deal with restrictions on six materials at once."

AMR Research, an information technology (IT) analyst firm, estimates the cost to mitigate RoHS and WEEE risks in the electronics industry will range from 2% to 4% of revenue from the affected product lines for the first year, with long-term annual costs levelling off below 1%. AMR includes the cost of product redesign, component testing, the potential for excess or obsolete inventory and any additional software or IT system enhancements.

The EU estimates the electronics and high-tech

industry will spend €500m (US\$590m) to €900m annually on WEEE compliance. Of this amount, €300m to €600m will be spent on collecting the used products and €200m to €300m on recovery, re-use and recycling.

With RoHS, the maximum penalty is to order companies to halt sales of a particular item—a fact that enabled Mr Sundberg to persuade his company to elevate the importance of the compliance effort. "One thing we did in the beginning with RoHS was to build the alertness that, in principal, everything we sell, if we don't change it, will be non-compliant and, in the end, we'll have nothing to sell," he says. "That made some people wake up."

In short, RoHS and WEEE entail high costs, both actual and potential. The challenge is to work out how to minimise those costs, while also looking for ways to create competitive advantages, such as being able to discuss the availability of compliant products with customers before competitors can, and building a long-term reputation for environmentally sound products.

Companies must also keep in mind that other governments worldwide are implementing similar

Following Europe

The new EU legislation governing hazardous materials levels and recycling responsibility is not the only such regulation facing companies. Other major markets are considering or have already passed rules similar to the RoHS and WEEE directives. Among these are:

- **China.** The proposed Regulation for Pollution Control of Electronics Products is being referred to in the industry as "China RoHS", and would govern hazardous materials in electronic products sold in China. The

proposed rule would restrict the same six substances regulated under the EU's RoHS. However, exemptions are unclear in the draft, which also calls for restrictions to come into effect on July 1st 2006—the same deadline for the EU's RoHS. The rise of China as a manufacturing center for electronic components and as a market for equipment producers, means that global companies are watching this proposal closely.

- **California.** The Electronic Waste Recycling Act of 2003 (SB 20) together with an amendment to this act (SB 50) govern the recycling of certain electronic devices, including computer monitors, flat panel dis-

plays and television displays greater than four inches in size. Effective from January 1st 2007, SB 50 prohibits the sale of electronic devices that are not compliant with the EU's RoHS directive.

- **Japan.** An industry group—the Japan Electronics and Information Technology Industries Association—has devised a voluntary guideline for moving the electronics industry towards the use of lead-free solders by the end of 2005. The "World Lead-free Soldering Roadmap" suggests a framework under which companies in the electronics industry can halt the use of leaded soldering materials by 2005.



regulations to RoHS and WEEE (see box, page 4). This has led some global electronics companies to integrate the EU compliance efforts with other compliance efforts worldwide, as well as blending compliance-related requirements with long-term product development goals.

Ultimately, the best compliance approach is to develop long-term strategies to achieve environmental goals. Since the late 1990s Sony Electronics has worked to introduce lead-free solders and safer flame retardants in its products, according to Mark Small, vice-president of corporate environment, safety and health issues at Sony Electronics.

Setting tough internal goals while monitoring worldwide regulatory developments can help a company comply with specific requirements when they come into effect. "You can do things reactively, but it's going to be more expensive," Mr Small says. "We are constantly looking at materials that could be an issue and looking for ways to design around that. That takes planning and a long-term effort."

Senior executives and compliance managers at

high-tech and electronics companies suggest various tactics to minimise the cost of compliance with RoHS and WEEE, as well as similar requirements worldwide.

The main strategies that emerge are:

- integrate compliance with the specific EU rules with other compliance efforts worldwide and with long-term product development and supplier management goals;
- keep a supply-chain focus. For instance, with RoHS, look to negotiate higher volume deals once compliant parts are found and tested, in exchange for lower prices;
- build a business process and IT platform for low-cost, sustainable compliance. This may include the establishment of an environmental compliance organisation or steering committee, as well as task forces for specific regulations. Another requirement is likely to be the enhancement of IT systems to enable executives to have access to consistent product, item and component data.



Integrate with larger efforts

Companies are facing the fact that complying with RoHS and WEEE requires some specific and structured measures. Executives need to ensure their companies assess the applicability of the directives to their products and markets, and begin working with suppliers and recycling partners to implement compliance.

“The first step most companies take with compliance is to investigate whether the directives apply to their products or not, based on the types of products sold and the markets and applications,” says Hardeep Gulati, senior director of product strategy for product lifecycle management (PLM) at Oracle Corporation. “If you’re in consumer electronics, the applicability of the rules is much clearer, because there are fewer exceptions.”

With RoHS, says Mr Gulati, most original equipment manufacturers (OEMs) are undertaking an exhaustive process of examining all components and products being sold in Europe and obtaining part-content declarations and other data from suppliers. Companies are also testing components and compiling the data up to the bill-of-material (BOM) level to assess the overall compliance of the final product.

With WEEE compliance, firms face the added complications that they have to track when the rules go into force in each member country and register recycling-related data with national agencies. These registries list each “producer” company, as well as information concerning its product lines sold in the country-specific market.

As a result, implementation of the EU’s WEEE directive varies by member state, says Richard Hess, manager of corporate environment, health and safety at computer manufacturer, Sun Microsystems. “On the

WEEE side of the house, the regulations are coming down not just in one big snowball, but through about 50 different versions worldwide,” Mr Hess says. “So companies are having to react on the end-of-life [recycling] issue in a variety of ways, which is causing some angst.”

The reaction of most of the affected companies to such complexities has been to establish committees or task forces to handle RoHS and WEEE compliance. There is a risk, however, that some companies may not link these tactical efforts to larger initiatives. Many companies are taking a reactive approach to environmental compliance, says Mr Gulati: “compliance has been addressed at the task-force level, less proactively and more in a fire-drill mode.”

However, there are some global companies that are linking tactical compliance with longer-term efforts. For example, according to Mr Hess, Sun Microsystems launched a “Design for Sustainability Forum” that meets regularly with its product-development organisation to give feedback on regulatory requirements.

Some global electronics companies have environmental affairs organisations that monitor regulations worldwide and co-ordinate RoHS and WEEE compliance with other requirements. For example, Canon Europe, a subsidiary of high-tech manufacturer Canon, Inc., of Japan, has a European environment and product safety operations organisation. Christer Persson, general manager of the organisation, says the group has established RoHS and WEEE project teams, but is involved with other environmental efforts as well, such as the implementation of ISO 14001 for Canon Europe’s country organisations. ISO 14001 is a voluntary,



Setting worldwide materials expectations

One way to integrate multiple environmental regulations is to set worldwide internal standards that are not tied to any single directive, but rather encompass worldwide requirements and voluntary standards. Electrolux, the global electronics manufacturer, has done this by compiling a comprehensive list of restricted materials.

In 2004 Electrolux developed a “restricted materials list” that informs suppliers of chemicals and materials that are banned, restricted, or subject to concern. The list is maintained on the Internet, ensuring currency.

To promote green procurement, Canon issued the “global Canon green procurement standards” and “global Canon green procurement guidebook” in 1997. In 2003 the “green procurement standards” were revised and divided into “parts and

materials” and “purchased goods” sections. While the standards are broader than a restricted materials list, the “parts and materials” section does provide specific information to suppliers on prohibited and restricted materials.

Some high-tech electronics companies are using the Joint Industry Guide to support material-content reporting. The guide, developed by industry associations, provides a standardised list of materials that must be disclosed.

international standard for environmental management.

Mr Persson says ISO 14001 is a good foundation for compliance efforts, since it addresses the documentation and tracking of regulatory requirements. “By achieving ISO 14001, we create a better platform for the communication and understanding of environmental requirements, customer needs and how to develop our own environmental activities,” Mr Persson says. “If you think of ISO 14001 as a box, within that box you will find a number of different things and right now you’ll find RoHS and WEEE.”

At a global level, says Mr Persson, Canon began elevating the importance of environmental goals in the late 1980s, when former Canon president, Ryuzaburo Kaku, introduced the “Kyosei” (living and working together for the common good) philosophy at the company. This philosophy led to specific initiatives such as a “green procurement” program that supersedes the hazardous materials requirements of any one country.

While RoHS restricts six substances, Canon’s green procurement program restricts or bans about 20 substances. For example, out of concern for workers’ health because of risks from the lead sludge generated during manufacturing, Canon eliminated lead from

most of its camera lenses during the 1990s.

“Regulations should be thought of as the minimum requirement—as a sort of license to produce,” Mr Persson says. “So we believe it’s a good idea to create your own environmental design goals and better understand all materials that could be problematic in products and constantly work on areas like energy efficiency.”

Other large consumer-oriented companies take a similar approach. With consumer products, says Electrolux’s Mr Sundberg, superior energy efficiency takes multiple design life-cycles. Energy efficiency has given consumer electronics companies such as Electrolux experience in blending environmental goals with the research and development (R&D) process.

Producer responsibility for recycling under WEEE, however, is a newer challenge for the high-tech industry than the elimination of hazardous materials. Electrolux, for example, was able to eliminate chlorofluorocarbons (CFCs) from appliances such as refrigerators in advance of regulations, says Mr Persson, but, by contrast, the producer-responsibility approach to recycling “takes new skills completely.”

Sony Electronics has been working for a number of years with recyclers on a voluntary basis in the US, says Mr Small. By the mid-1990s Sony was recycling



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waste from returned products that could not be refurbished. Today it works with recycling partners at three US facilities to recycle waste and also uses components made from recycled material. For example, the plastic in television speaker boxes comes from post-consumer material and Sony's cathode ray tube glass plant near San Diego obtains its raw material from recycled glass. "We've been recycling for many years for the same reason WEEE was written up and passed—we saw the value of it and the need for it," says Mr Small.

While integrating short-term compliance efforts with long-term goals is a best practice, few industry participants take the short-term tasks lightly. Canon Europe's Mr Persson says WEEE compliance depends on closely tracking country-specific requirements. "The main challenge with WEEE, for our office, is to provide best-practice information and cross-reference information to the managers at the country level and also supply them with product-related and product-marking data," he says.



Focus on the supply chain

There are plenty of misconceptions about compliance with RoHS and WEEE, but experts at Fujitsu Transaction Solutions like to point out a couple of major ones. First is the notion that a US-based company selling products only in North America will be unaffected by these European regulations. Second is the hope that compliance will be a simple exercise carried out by one or two departments.

The missing factor in both cases is supply-chain complexity, says Barbara Elise Self, environmental compliance project manager for Fujitsu Transaction Solutions. Failure to deal with this complexity could lead to component shortages or other unexpected supply problems. For example, says Ms Self, even a company with a US market focus probably buys components from suppliers moving to RoHS-compliant materials. "Even if your company doesn't sell into Europe or your products are exempt, you might find your supply of non-RoHS compliant parts is going to dry up," she says. "You can't put your head in the sand with RoHS." Fujitsu Transaction Solutions makes point-of-sale terminals and self-scanning equipment for retailers. Although these products go to businesses, not consumers, a significant portion of revenue falls under RoHS and WEEE, says Ms Self, with some of the company's US factories supplying the European market. The parent company has dictated that all products must comply with RoHS and WEEE by April 1st 2006.

As part of its RoHS compliance programme, Fujitsu Transaction Solutions analysed its product roadmaps and looked for opportunities to add functional enhancements. In addition, it analysed inventory levels for spare parts and evaluated broader sourcing questions. "We also looked at rationalising our

sourcing—buying from fewer suppliers in larger volume—to hold down costs," according to Ms Self.

ViaSat—a manufacturer of satellite and other wireless-networking technologies to both military and commercial markets—also has assessed the supply-chain ramifications of RoHS. Early on ViaSat verified that its products for the military carried exemptions, but further experience has shown that changes in the electronics market can have an effect on even exempt products.

Among the concerns, says Lon Plourde, ViaSat's manager of compliance, is that component manufacturers are shifting most or all of their product lines to lead-free materials, making traditional leaded components less available, or more expensive, or both. "Even though we don't have to comply with RoHS on the military side, we still have ways in which we are affected by the directive," he says.

For products that do fall under RoHS, says Mr Plourde, another issue is that ViaSat sometimes integrates other manufacturers' equipment into its products, but because ViaSat produces high-end equipment in low volumes, equipment suppliers might not be willing to design a RoHS-compliant version just for ViaSat.

A manufacturer may need to assess the cost of having multiple production lines if it intends to market one RoHS-compliant product line for Europe and a non-compliant, but otherwise identical, product line elsewhere. However, some global companies think it is unfeasible to create a compliant production line while still running the non-compliant line. "Having parallel production lines would be expensive," according to Mr Persson of Canon Europe. "We believe it's more practical to have the same high standard on our



WEEE seen from a procurement viewpoint

One way some major companies are supporting aspects of compliance with the WEEE directive is to join together in consortia. Electrolux, for example, co-operated with three other companies—Braun, Hewlett-Packard and Sony—to found the European Recycling Platform.

Established in December 2002, the platform is a pan-European take-back and recycling scheme operated with two general contractors—CCR

and Geodis—who subcontract the actual recycling and transportation to third parties. The platform's stated goals include that the general contractors must achieve the best competitive price per country or product group and must maintain competition between recycling systems.

The platform manages the contractors' activities, but invoices members directly for their share of costs. According to Mr Sundberg, maintaining oversight over one entity—the platform—is more efficient than trying to arrange for recycling on a country-by-country

basis, and then afterwards managing the relationship with numerous recycling partners. "There is no fantastic secret to this tool," says Mr Sundberg. "In rough terms, it's treating WEEE services as we would the purchasing of any important service."

The platform began its take-back and recycling operations in Austria, Ireland, Portugal and Spain in August 2005. Besides the founding members, other companies to have joined the platform include Elica, Logitech, Lucent, Omron, Saeco, Samsung, Toshiba and Varta/Remington.

products regardless of where they are delivered."

There are many supply-chain details to address as part of RoHS, including the compliance of accessories added to end-items at the regional level. For example, Canon factories in other parts of the world supply most of Canon Europe's products and RoHS compliance is on track for these items under corporate efforts, says Mr Persson. However, Canon Europe still needs to ensure that all electrical and electronic products it buys from third-party suppliers comply with RoHS. This mainly involves electrical cables that are part of the final items sold to customers in Europe.

At Sun Microsystems, the supply-chain challenges with WEEE tend to be "downstream" in the distribution chain. Sun uses various sales channel and logistics partners in Europe and other partners who deliver industry solutions on Sun hardware. In some cases, says Mr Hess, these partners, rather than Sun, hold the detailed data on which products were shipped to individual customers in EU markets.

It is particularly important to have this ship-to data available because of the WEEE directive's concept of IPR, in which recycling-related fees will be tied to the success of a producer in recycling or re-using a high percentage of the products it sells. To support IPR, the WEEE directive's Article 12 calls on member states to keep registers of producers and collect information on the "quantities and categories" of goods sold in their markets.

Added to these IPR needs, Sun is in the process of working with its distribution partners to obtain detailed ship-to data and, ideally, feed it back electronically into Sun's systems. Sun will seek more robust, automated ways to integrate its partners' shipping data with its internal enterprise resource planning (ERP) system, which benefits from being consistent and global in its implementation. However, says Mr Hess, there is no easy way to obtain this data. "Near-term, there is much work to be done administratively," he says.



Build an IT platform

IT systems play an important role in supporting RoHS and WEEE. This is natural, as for decades electronic and high-tech firms have used database-driven IT systems to store information on designs, products and their components. Because RoHS specifies materials restrictions, compliance with the directive relies on the extensive use of component and design data in IT systems. While WEEE does not restrict product materials, the provisions in the directive for product marking, as well as its requirement to register product- and sales-related data with agencies, also inevitably entails reliance on IT systems to aid compliance.

Engineering departments typically use some form of product data management (PDM) system, but, more recently, some companies have moved to newer PLM systems better capable of sharing information outside the engineering department. Product data such as bills of material also need to be integrated with ERP systems used by operations. ERP systems typically hold data on what has been produced, sold, and distributed.

Consolidation around a “single instance” of item data in such systems will make it easier for companies to comply with environmental regulations, says Jonathan Oomrigar, Oracle’s vice-president for the high-tech sector. This can be challenging for global electronics companies with multiple subsidiaries or geographic divisions that historically may have used separate systems. As a result, some companies may choose a federalised approach to consistent item data in which a management software “hub” is deployed to centralise data from multiple systems.

“Today a new level of global responsiveness is needed for environmental compliance, because, over

and over again, another country will come up with a new regulation,” says Mr Oomrigar. “This means that systems have to be at a level where companies can respond to new regulations without each one requiring a monumental effort.”

Companies have taken various approaches to enhancing or deploying IT systems in response to RoHS and WEEE. A common step is to produce new part numbers to designate RoHS-compliant equipment. Technology Forecasters, a research firm that studies the high-tech electronics market, surveyed electronic component manufacturers in both 2004 and 2005 and found that 72% were using different part numbers for lead-free components in 2005, compared with 52% in 2004.

Instituting new part-number schemes typically involves adding to or changing data fields in ERP and PDM systems. At Fujitsu Transaction Solutions, the company added prefixes and new fields to its ERP system to designate which products are RoHS compliant. There was also a need to store weight information, as well as track material declarations and survey data from suppliers. The aim of the system enhancements, according to Ms Self, is to make it impossible inadvertently to buy non-compliant parts or inadvertently to sell a non-compliant product.

Other companies have developed new systems or have deployed additional software applications to address environmental compliance. For example, Electrolux created a database of compliance-related documents within a groupware system. This system also provides contact information for managers who serve as “issue co-ordinators” for 60 different concerns.

“This system is very handy,” says Mr Sundberg.



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“Whenever an Electrolux employee is in a meeting or at a branch organisation and needs to quickly pull up a directive or position paper, they can access that information immediately.”

Canon Europe uses a content management system to store and access documents related to compliance efforts, says Mr Persson. At the corporate level, Canon has a worldwide PDM with consistent engineering data; however, it is considering enhancing its systems for managing supplier and component data. According to Mr Persson, regulations such as RoHS, as well as internal-sourcing goals, make it necessary to track more supplier-related data than in years past.

Compliance concerns have prompted ViaSat to add a compliance module to its PLM system to address RoHS and add WEEE-related data to its ERP system. The

RoHS-compliance module has Internet-based workflow functionality to automate the process of obtaining materials declarations and electronic signatures from suppliers.

Reports from the field indicate the RoHS compliance and broader internal standards on restricted materials have made it necessary to track more test data and materials-characteristics data than was necessary several years ago. Of particular concern with lead-free components is a phenomenon known as tin whiskers associated with tin platings. Tin whiskers can cause electrical termination problems that may affect product reliability, making it necessary for companies to track more data. In ViaSat’s case, all of this extra data on component characteristics is being added to the PLM system.



A reshaped organisation

Building an appropriate organisational structure is also an important part of sustained environmental compliance. At Fujitsu Transaction Solutions, a steering committee oversees the efforts of the RoHS and WEEE project teams. The committee's members include a senior vice-president with profit and loss responsibility.

Even the more tactical project teams typically have participants from several disciplines such as procurement, quality assurance, engineering and manufacturing. At Fujitsu Transaction Solutions, the sales and marketing functions are involved in environmental-compliance efforts, especially pertaining to communicating compliance-readiness to customers.

Kent Schrock, the company's director of marketing programs, sees superior compliance-readiness as an advantage. "We've talked to customers who've said, 'Thank you for sharing your progress on this—no one else is sharing information,'" he says. Mr Schrock adds: "I firmly believe compliance can be used as a marketing advantage. It's a chance to explain to customers what the realities are in terms of costs and discuss product needs."

At Electrolux, the environmental affairs organisation headed by Mr Sundberg monitors all environmental rules set by the EU and its 25 member states and takes part in environmental efforts by associations. Mr Sundberg's group also provides

support to the product development department regarding regulatory requirements. Specific efforts for RoHS and WEEE compliance, however, are assigned to RoHS and WEEE "office" teams. "The potential impact of RoHS was so big that we decided we need to have an office dedicated to driving efforts across the R&D organisation, the factory organisation and all the other functions to make sure the right tools and measures are in place to assure compliance," says Mr Sundberg.

The RoHS office reports to a senior vice-president, who reports to the CEO. Mr Sundberg himself reports to the CEO. "Our senior managers are very much concerned and involved with environmental compliance," Mr Sundberg says. "They are kept informed and follow up to see that we reach compliance."

The bottom-line is that those companies that build a consistent organisational structure and technology platform for compliance with multiple environmental rules are better positioned to cut compliance costs. Standard forms and mechanisms to communicate with suppliers and improved information systems also should be seen as part of a common platform.

As Mr Hess, of Sun Microsystems, concludes: "there are a multitude of regulations to respond to, but, from both an information-systems standpoint and from a process and procedural standpoint, it's best to have some commonality."

Whilst every effort has been taken to verify the accuracy of this information, neither The Economist Intelligence Unit Ltd. nor the sponsor of this report can accept any responsibility or liability for reliance by any person on this white paper or any of the information, opinions or conclusions set out in the white paper.

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