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RAISING GLOBAL STANDARDS

HAZARDOUS SUBSTANCES AND E-WASTE MANAGEMENT IN THE EUROPEAN UNION

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As a result of expanding international production and trade, a consumer in Berlin, Boston, Beijing, or Bangalore can choose between many similar manufactured goods in her local store. For example, she can purchase a cell phone, laptop, freezer, stove, or vacuum cleaner made by a large multinational company that is a household name around the world. Similarly, environmental activists in San Francisco, Shanghai, Surat, and Stockholm might share a growing concern about the ecological and human health risks posed by discarded electronic and electrical products—so-called e-waste. In fact, societies around the world are struggling with growing levels of e-waste, which contains myriad hazardous substances that present significant environmental and human health problems (see the box on page 8).¹

The European Union (EU) has emerged as a global leader on hazardous substances policy.² While such policy has been a cornerstone of EU environmental policy since the 1960s, the EU has recently developed a series of new policy initiatives to further address negative environmental and human health impacts of hazardous substances. These new policies govern the use, recycling, and disposal of hazardous substances in electronic and electrical products and expand regulations on the production, use, and sales of tens of thousands of chemicals. While these policies regulate the management of hazardous substances and e-waste across 27 European countries, EU policy also increasingly shapes decisions by policymakers, manufacturers, and consumers around the world.

Three recent EU policy developments—two “directives” and one “regulation,” in EU terms—are of particular significance to the future management of hazardous chemicals and e-waste.³ The first directive covers waste electrical and electronic equipment (WEEE),⁴ and the second outlines restrictions on the use of certain hazardous sub-

stances in electrical and electronic equipment (RoHS).⁵ WEEE and RoHS entered into force in February 2003. Finally the regulation on the registration, evaluation, and authorization of chemicals (REACH) will soon be finalized and will become legally binding in 2007.

WEEE, RoHS, and REACH are noteworthy for several reasons. All are critical for EU sustainable development efforts. Furthermore, aspects of the new hazardous substances and e-waste standards are the highest in the world. As such, they are drawing considerable attention from policymakers, regulators, company managers, and environmental activists from around the globe. Because of growing international trade and the diffusion of policy ideas and information, producers and users of chemicals, heavy metals, and manufactured goods in markets such as the United States, Japan, and China will be affected by EU policy. In effect, new, higher EU regulatory and product standards are likely to push many global standards upward through a process that political scientist David Vogel calls “trading up.”⁶

EU Politics, Hazardous Substances, and E-Waste

Over the past decade, the EU has grown dramatically in terms of its national membership, market and population size, and environmental policy ambitions.⁷ As of 1 January, 2007, the EU consists of 27 member countries—up from 12 countries in 1994 (see Figure 1 and the box on page 10). Three more countries (Croatia, the Republic of Macedonia, and Turkey) are engaged in membership negotiations, and several others have expressed a desire to join in the future. At 27 members, the EU population is approximately 485 million; roughly one in 14 people in the world live in the EU.⁸ The size of the EU economy—roughly \$11 trillion—is similar to that of the United States (population 300 million).

Parallel to the EU’s growing size, EU legal and political authority has also been greatly expanded through the adoption of

a series of European treaties since the late 1980s. This expansion of EU policymaking competence includes most environmental policy issues, where European environmental policies are now among the most harmonized areas of member state policy.⁹ As the EU’s geographical scope and legal authority have expanded, the EU has become a central driving force on European hazardous substances and waste management and, in some respects, a regional and global leader in sustainable development initiatives. The box on page 12 summarizes the current EU environmental policymaking process.

EU officials periodically adopt broad strategies and action plans outlining policymaking goals for the coming years. Linked to its 2001 Sustainable Development Strategy, the EU set the goal to “by 2020, ensure that chemicals are only produced and used in ways that do not pose significant threats to human health and the environment.”¹⁰ This is almost identical to the 2020 goal adopted on an EU initiative at the World Summit on Sustainable Development in 2002.¹¹ In addition, EU integrated product policy aims to reduce resource use and the environmental impact of waste.¹² The EU Sixth Environment Action Programme (2002–2012) also outlines priorities for chemical management, including generating more scientific data, accelerating risk manage-

ment, and making substitutions for hazardous chemicals. “Natural resources and waste” is one of the Environment Action Programme’s four priority areas, focusing on the need to reduce waste volumes and improve recycling.

The Sustainable Development Strategy and the Sixth Environment Action Programme reconfirm the EU commitment to the precautionary principle in reference to hazardous substances—a commitment included in the 1992 Treaty on European Union. An oft-cited definition of the precautionary principle states that “where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.”¹³ More recently, the European Commission has argued that the precautionary principle should be taken into consideration across environmental and human health issues.¹⁴ This somewhat broader application has been supported by the European Court of Justice.¹⁵

WEEE and RoHS

E-waste is a rapidly growing problem in the EU. The waste electric and electronic equipment (WEEE) and restriction of hazardous substances (RoHS) directives are intended to tackle this problem by addressing hazardous substances in electronic and electrical products and waste

ENVIRONMENTAL AND HUMAN HEALTH THREATS FROM HAZARDOUS SUBSTANCES

Many hazardous substances are toxic to humans and animals. Moreover, toxic concentrations can build up in individuals over time (bioaccumulate) and also increase up through food webs (biomagnify). Toxic substances can persist in the environment and humans for long periods of time, ranging from years to decades. Contamination in animals is linked with disruption of endocrine functions, impairments of immune system functions, and functional and physiological effects on reproduction capabilities. Carcinogenic and tumori-

genic risks and development effects in infants from exposure to chemicals are attracting growing scientific and public attention. Health authorities in many countries have issued dietary guidelines for pregnant women and small children to reduce exposure to hazardous substances.

SOURCE: Arctic Monitoring and Assessment Programme (AMAP), *Arctic Pollution 2002* (Oslo: AMAP, 2002); United Nations Environment Programme, *Global Mercury Assessment* (Inter-Organization Programme for the Sound Management of Chemicals, December 2002).



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German recycler Eckard Ruegen disassembles old television sets in compliance with EU directives.

streams. WEEE is designed to increase European recovery and recycling of electrical and electronic equipment, thereby reducing the quantity of e-waste going to final disposal. Through the concept of extended producer responsibility, consumers can return all regulated electrical and electronic equipment (free of charge) to the producers, who are responsible for recycling, reprocessing, and safely disposing of the equipment and its components. Thus, WEEE provides incentives to producers to design electrical and electronic equipment in more environmentally friendly ways and to take future waste management requirements into account as they design new products.

The WEEE directive regulates ten different product categories (listed in Annex 1A of the directive): large household appliances; small household appliances; information technology and telecommunications equipment; consumer equipment; lighting equipment; electrical and electronic tools; toys, leisure, and sports equipment; medical devices; monitoring and control instruments; and automatic dispensers. In addition, the directive includes long lists of regulated individual

products under each of the 10 product categories (found in Annex 1B of the directive). Each EU member state is required to design a national implementation system (see the box on page 15). Furthermore, EU legislation, consistent with policy developments under the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, prohibits member states from exporting hazardous wastes to developing countries to rid Europe of such problems.

As a critical supplement to the WEEE directive, the RoHS directive strictly limits the use of 6 toxic substances in 8 of the 10 product categories covered by the WEEE directive (see Table 1 on page 16). However, the two WEEE-regulated product categories that are not initially covered by RoHS—medical devices and monitoring and control instruments—may be added later. The RoHS directive currently covers four heavy metals (lead, mercury, cadmium, and hexavalent chromium (Cr-VI)) and two chemicals, polybrominated biphenyls (PBB) and polybrominated diphenyl ethers (PBDE), all of which are common in electrical and electronic goods. Maximum allowed concentrations of each substance

are 0.1 percent by weight with the exception of cadmium, which is limited to 0.01 percent by weight.

Concentration limits set under the RoHS directive are by weight of homogeneous material, which means a material that cannot be mechanically disjoined into different materials. In the context of the RoHS directive, mechanically disjoined is defined as separated by mechanical actions such as unscrewing, cutting, grinding, and crushing. As such, maximum allowed concentrations set by the RoHS directive do not apply to the total weight of the finished product but to anything that can be identified as a different material. For example, an electrical product that is covered by a single plastic case that contains 1,500 parts per million (0.15 percent) of the flame-retardant PBB would violate the directive no matter the size or weight of the overall product.

REACH

The registration, evaluation and authorization of chemicals (REACH) regulation seeks to improve chemical management and regulation through the generation of better risk assessment data and stricter controls of the most hazardous chemicals. In many ways, REACH is a response to charges that EU chemical policy provided inadequate human health and environmental protection. For example, existing policies, dating back to the 1970s and early 1980s, distinguished between “existing” (pre-1981) and “new” chemicals (post-1981). These policies left all pre-1981 chemicals essentially unregulated and their risks largely unassessed. The 1993 Regulation on Existing Substances placed existing chemicals under EU authority, but controls remained lower than for new chemicals. For most of the tens of thousands of existing chemicals, which make up more than 95 percent of all commercial chemicals, there remain few or no data on emissions, toxicity, and ecosystem or human health effects. REACH is designed to change this.

In addition, because producers need to present risk assessment data for every new substance they want to bring to mar-

ket—information not required for existing substances—the separation between existing and new substances creates disincentives for innovation and substitution. Such incentives are particularly perverse because more information exists about newer chemicals, which might substitute for older ones, in terms of their properties and environmental behavior. Many critics also believe that the influence of precaution on EU chemical management remains too limited.¹⁶ To this end, critics argue that European chemical assessment and regulation continue to rely too heavily on the need for clear scientific proof of harm. Also, significant differences in national implementation of EU chemical policy remain, yielding uneven regulatory outcomes for older policies.

The new REACH regulation will replace many existing chemical laws and abolish the regulatory distinction between existing and new chemicals. It requires

approximately 30,000 existing substances to undergo a registration procedure over the next 11 years (2007–2018). This covers most types of chemicals produced or imported into the EU in quantities greater than 1 metric ton annually. Exceptions are made for polymers and intermediaries, and certain kinds of products are covered by separate regulations (for example, pesticides, pharmaceuticals, and cosmetics). Chemicals manufactured in quantities greater than 1,000 metric tons per year and those that are carcinogenic, mutagenic, and reproductive toxicants will be registered during the first three years. For chemicals that are handled in quantities of at least 10 tons per year, the manufacturer or importer will have to compile a chemicals safety report.

During REACH’s evaluation process, a newly established European Chemicals Agency located in Helsinki, Finland, and designated national authorities in member

states will collaborate and evaluate those chemicals identified during the registration procedure as being of particular concern. Such evaluation will assess the need for additional risk reduction measures in the form of use restrictions or complete bans. Chemicals determined to be of serious concern, based on the evaluation process, can be required to undergo an authorization process under which companies would need to get explicit permission from authorities before selling or using such chemicals. Companies that want to keep using a chemical of high concern would also have to demonstrate to relevant authorities that the chemical can be used safely and that there are no viable alternatives for particular uses.

EU Environmental Politics

The development of WEEE, RoHS, and REACH involved extensive negotiations between the European Commission, the European Council, and the European Parliament. It also included extensive stakeholder participation and intense lobbying by private sector and civil society groups. During the negotiations, many changes and compromises were made to proposed policies, particularly with respect to REACH.

The adopted versions of WEEE, RoHS, and REACH may not be as “green” as

Figure 1. Map of European Union Member States as of 1 January 2007.



SOURCE: http://europa.eu/abc/maps/index_en.htm

EU MEMBERSHIP GROWTH

- 1957: Belgium, France, Italy, the Netherlands, Luxembourg, and West Germany
- 1973: United Kingdom, Ireland, and Denmark
- 1981: Greece
- 1986: Spain and Portugal
- 1995: Austria, Sweden, and Finland
- 2004: Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, and Slovenia
- 2007: Bulgaria and Romania

some had hoped. In contrast, others think the policies are much too costly, inflexible, and stringent. Nevertheless, WEEE, RoHS, and REACH significantly raise EU standards for the management of hazardous substances and e-waste. While the adoption of each policy is important, the directives' long-term ability to change producer and consumer behavior will be the test of their contributions toward building more sustainable societies.

Since the adoption of WEEE and RoHS, member states have worked to translate these directives into national legislation and regulations covering public authorities, domestic firms, and consumers. Five countries—United Kingdom, Germany, France, Spain, and Italy—account for 80 percent of all e-waste in Europe.¹⁷ As such, effective implementation of WEEE and RoHS in these countries is critical for overall success in tackling the e-waste problem. Some EU countries, notably Belgium, Denmark, the Netherlands, and Sweden, had adopted domestic electronics waste legislation even before WEEE, and therefore needed to make only limited additions.¹⁸ For many other countries, the implementation of WEEE demanded much domestic legislative and practical action.¹⁹ In particular, the United Kingdom has been slow to translate the new EU legislation into domestic law.²⁰

Simply put, REACH is one of the largest and most complex environmental policies in European history. Because it is so recent, there have been only limited efforts on implementation to date. Such a significant piece of regulation engendered intense political negotiations and lobbying, involving all major EU organizations, member states, and a host of environmental, consumer, and industrial interest groups. Whereas supporters of WEEE, RoHS, and REACH stress their contributions to greater human health protection and sustainability, opponents have expressed concerns about, for example, the economic costs to individual firms and consumers and potential implications for international trade and/or jobs.

Environmental and consumer advocacy groups view WEEE as “common sense in practice.”²¹ They also strongly sup-

port RoHS and REACH, arguing that too many substances about which too little is known have been used and released into the environment for too long.²² Many EU member states also pushed for each of the three policies. In the 1990s, several environmental leader states wanted to move EU waste management policy further away from landfilling practices toward increased producer responsibility for the recovery, recycling, and environmentally

regulations to the EU level through EU processes designed to harmonize standards within the internal market.²³ Furthermore, firms from member states with more stringent domestic regulations often work with their national governments to upload policies to the EU level so their competitors are subject to similar requirements.

Similarly, member states have often led by example on hazardous substances management. Like many environmental



An employee checks shredded iron in a European e-waste recycling facility.

port sound disposal of e-waste. In this respect, WEEE is a continuation of earlier EU policy on recycling and increased producer responsibility.

EU member states are also free to enact national environmental policies that are stricter than EU policy as long as these national policies comply with existing EU law (primarily the principle of free movement of goods within the EU internal market). As such, member states may regulate additional products that are not specifically listed under the WEEE directive. Much European policy on extended producer responsibility was pioneered by Germany, the Netherlands, Denmark, and Sweden. Officials in these countries have worked to “trade up” their stricter national

groups, by the late 1990s officials from green leader countries, including Austria, Denmark, Germany, the Netherlands, Sweden, and the United Kingdom, were voicing dissatisfaction with the slow pace of EU chemical assessment and regulation and its lack of precaution.²⁴ In 1999, member states requested that the European Commission develop a new strategy for more effective chemical management, which initiated the policy process leading to the creation of REACH.²⁵ Some states, including Denmark, the Netherlands, and Sweden, have adopted national phase-out goals for hazardous substances that they are pursuing concurrent to EU goals. Sweden also adopted a goal of becoming a “mercury-free society,” which includes

an intention to ban the use of mercury completely as of 2007.²⁶

Many member-state representatives worked closely with the Directorates-General (DG) Environment staff in the European Commission on WEEE, RoHS, and REACH. Leader states used the common technique of placing national experts

in DG Environment staff and advisory positions to assist in the development of background documents and policy proposals. DG Environment, under the leadership of commissioners Ritt Bjerregaard (Denmark, 1995–1999) and Margot Wallström (Sweden, 1999–2004) also focused much political attention on

chemical safety and the management of e-waste.

In the European Parliament, the Committee on the Environment, Public Health and Consumer Policy repeatedly spearheaded efforts to strengthen environmental standards related to WEEE, RoHS, and REACH.²⁷ As such, this commit-

PROCEDURES FOR EU ENVIRONMENTAL POLICYMAKING

The 1992 Treaty on European Union, also known as the Maastricht Treaty, divides EU policies into three main areas (called “pillars”). Within each of the three pillars, different levels of EU authority were established. Most environment-related policy issues fall within the first pillar, where policy is developed in collaboration between the European Commission, the Council of Ministers, and the European Parliament.

The European Commission (the Commission) is the executive body of the EU. The Commission has four main roles:

- it has exclusive power to propose new legislation, including new environmental legislation, to be considered by the Council of Ministers and the European Parliament;
- it manages and implements all EU policy and the EU budget;
- it enforces EU law and can initiate legal action against member states in the European Court of Justice; and
- it represents the EU internationally.

The current Commission (2004–2009) is led by Commission President José Manuel Barroso of Portugal. Bureaucratically, the Commission is organized into Directorates-General (DGs) responsible for particular policy areas. DG XI is responsible for environmental issues.

The Council of Ministers (the Council) consists of government representatives from all member states. On first pillar issues, the Council passes EU law together with the European Parliament under the co-decision procedure. On such issues, the Council operates under a qualified majority voting system where each member state has a fixed number of votes roughly determined by its population (see the table at the end of this box on page 13). To pass a vote by qualified majority voting, the following two conditions must apply: The proposal must be supported by 255 out of 345 votes

(73.91 percent), and the proposal must be backed by a majority of member states. In addition, a member state may request verification that the member states that constituted a qualified majority represent at least 62 percent of the total EU population.

The European Parliament (Parliament) cannot introduce new legislation—that is the prerogative of the European Commission. It passes EU environmental law together with the Council. Direct elections were introduced in 1979, and Members of the European Parliament (MEPs) are elected every five years. For the period 2004–2009, there are 732 seats in Parliament. Parliamentary seats are distributed among member states roughly according to population size. Parliament is spread out over Strasbourg (plenary sessions), Brussels (committee meetings), and Luxembourg (staff offices). In Parliament, the Committee on the Environment, Public Health and Consumer Policy considers all environmental policy issues.

The European Court of Justice is located in Luxembourg and is tasked with ensuring uniform interpretation and application of EU treaties and legislation. The active role of the court in interpreting EU law and promoting EU policies is generally recognized as a driving force behind European integration. The court is made up of 27 judges and 8 advocates general who serve 6-year renewable terms of office. For the sake of efficiency, however, the court rarely sits as the full court, but usually sits as a “Grand Chamber” of just 13 judges or in chambers of 5 or 3 judges. The role of the advocates general is to present reasoned opinions on the cases brought before the court in a public and impartial manner.

Under **the co-decision procedure**, the Commission develops and submits a legislative proposal to the Council and Parliament, which consider it inde-

pendently during a “first reading” when they may adopt any amendments they see fit. In the Council, the proposal is first discussed in a working group before member state representatives vote on a “common position” based on the formula of qualified majority. In Parliament, the proposal is discussed and voted on by the Committee on the Environment before it is debated and voted on by the full plenary. Both in the committee and plenary, a simple majority is required (that is, a majority of members taking part in the vote). If the Council and Parliament agree on identical proposals, it becomes law.

If there are disagreements between the Council and Parliament after the first reading, however, Parliament in committee and plenary must conduct a “second reading” within three months of the issuance of the Council’s common position. During the second reading, Parliament can accept the Council’s common position by simple majority. However, Parliament can decide to once more reject the Council’s common position and also adopt additional amendments. In both these cases, an absolute majority (that is, a majority of all members in the committee and plenary) is necessary.

If the Council and Parliament are unable to reach an agreement following the second reading, a “conciliation committee” with equal number of members from Parliament and the Council is created and given the task of developing a compromise text—to be approved by both the Council (based on a qualified majority) and Parliament (based on a simple majority) in a “third reading.” If the Council and Parliament agree at this time, a new law has been adopted. However, both the Council and Parliament can reject the compromise proposal, which would cause the proposal to fail. The Commission can also elect to withdraw its proposal at any time.

tee generated and helped to organize a great deal of EU-level support for WEEE, RoHS, and REACH. Committee members, Green Party Members of the European Parliament (MEPs), and other MEPs from numerous EU countries also pressed for strong legislation during parliamentary plenary reviews of legislative proposals

during the co-decision procedures with the Council of Ministers.²⁸

WEEE, RoHS, and REACH do more than raise national regulatory standards across EU member states; they also greatly increase the responsibilities of private sector entities. Traditionally, waste management and the assessment of chemicals were the responsibility of public authorities. In contrast, WEEE, RoHS, and REACH shift much of the responsibility for e-waste management and the generation of risk assessment data onto producers and users. WEEE increases the responsibility of producers of electronic and electrical products to recycle their own products after they have been used. RoHS mandates that producers remove regulated hazardous substances from a long list of products. REACH increases the responsibility of the chemical industry to generate extensive data about existing chemicals and provide such data to authorities for assessment and regulation.

The European chemical industry is Europe's third largest manufacturing industry—directly employing 1.7 million people—and it has been particularly active in the policy process.²⁹ In fact, it has been said that REACH “attracted more hostility from industry than any other item of EU environmental legislation in 30 years.”³⁰ Major chemical companies such as Bayer, BASF, and Shell Chemicals initially rejected outright the idea of creating a registration, evaluation, and authorization scheme for existing chemicals.³¹ They argued that it would be too economically and administratively burdensome, threatening their international competitiveness.³² As demonstrated by a change in policy position over time, the European chemical industry has moved away from opposing REACH per se to trying to reduce industry requirements, as it became clear that a proposal would go forward.

Much has been said about economic costs of the new EU policies, particularly regarding REACH. In 2001, the European Commission estimated an additional cost of €2.1 billion over 11 years for the chemical industry as a result of REACH.³³ In contrast, an industry estimate projected additional costs of €7.8

billion.³⁴ Other industry-commissioned studies predicted 2.35 million job losses and a 6.4 percent reduction in German gross domestic product (GDP) alone. The studies also estimated the cost to the French chemical industry at €29 billion to €54 billion over 10 years and 670,000 jobs.³⁵ These studies, however, have been widely attacked as being based on “false economics” in their calculations of direct and indirect costs.³⁶ REACH defenders also stress that environmental and human health benefits must be considered, and that benefits should be included from stimulated innovation and reduced costs of cleaning up contaminated sites and managing wastes that come as a result of proactive regulation.³⁷

Some EU bodies such as the Commission's DG Enterprise, and EU parliamentary committees, such as the Committee on Industry, Research and Energy and the Committee on Internal Market and Consumer Protection, have shared many of the financial concerns expressed by chemical industry officials.³⁸ The industry also receives support from high-level politicians from countries with large chemical industries and from many conservative and socialist MEPs. In general, compared to REACH debates, there has been less private sector opposition to WEEE and RoHS. Those debates centered more on practical aspects of implementation—such as the design of national organizations for collection and e-waste management, than on their general desirability.³⁹ Nevertheless, the concerns and lobbying activity of private sector stakeholders were integral to the development of all three hazardous substances and e-waste policies.

The EU's Global Reach

Expansion of EU hazardous substances and e-waste policy under WEEE, RoHS, and REACH already influences firms and political actors beyond the EU's borders—from the United States to China and elsewhere. The EU's growing membership, economic size and population, together with its recent inclination to enact ambitious and comparatively high environmen-

Number of votes per member state in the Council of Ministers	
Country	Votes
Germany	29
United Kingdom	29
France	29
Italy	29
Spain	27
Poland	27
Romania	14
Netherlands	13
Greece	12
Czech Republic	12
Belgium	12
Hungary	12
Portugal	12
Sweden	10
Bulgaria	10
Austria	10
Slovakia	7
Denmark	7
Finland	7
Ireland	7
Lithuania	7
Latvia	4
Slovenia	4
Estonia	4
Cyprus	4
Luxemburg	4
Malta	3
Total	345



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Electronic circuit boards contain toxic substances, such as mercury, cadmium, and lead, so recycling facilities must handle them with care.

tal policy standards, yield both international economic and political influence.

International Markets and Economic Influence

With a population of nearly 500 million and an annual market of about \$11 trillion there are few large multinational companies that do not operate or sell their products in the EU. Regulatory standards set in Brussels can have significant implications for international production and trade. If non-EU firms want to continue to sell their products in the EU, they will have to comply with EU product rules and standards. Most firms operating in multiple markets prefer to produce their products to as few different standards as possible, and they often follow the highest regulatory standard. This is particularly likely for products where major producers compete across markets. For example, if HP or Dell needs to redesign their laptops or substitute chemicals used in their production to meet EU standards, WEEE, RoHS, and REACH may also affect laptops made and bought outside the EU.

This international market-based influence of WEEE, RoHS, and REACH reflects a broader change in global standard setting. Historically, many product standards for consumer and environmental protection were set in the United States because of the size of the U.S. economy and the stringency of early U.S. standards.⁴⁰ Whereas U.S. chemical policy in the 1970s and the early 1980s often acted as an inspiration for European policymaking, the EU has taken over the role as leader in chemical policy development.⁴¹ The EU is increasingly replacing the United States as the de facto setter of global product standards and the center of much global regulatory standard setting is shifting from Washington, DC, to Brussels.⁴² New EU policies—and similar policies being enacted in response in other parts of the world—are also engendering responses in international markets.

In other words, the importance of WEEE, RoHS, and REACH extends far beyond the EU border through processes of international economic integration and trade. One U.S. engineer recently noted that RoHS “is probably the biggest change in electronics in 50 years” for the United

States (and global) electronics business.⁴³ A recent report also suggests that the costs to U.S. firms for complying with REACH are far lower than the benefits of continued and expanding transatlantic trade.⁴⁴ This suggests they must adjust and absorb the costs of doing so. In addition, a rapidly growing market in consulting services to help producers comply with the growing array of national and international regulations has emerged. Such services are likely to quickly diffuse information about the new EU chemical and waste policies and the responsibilities they place on firms operating in or exporting to the European market.

International Political Influences

Policy ideas and information about environmental and human health risks travel across borders. They do so in part because individuals and organizations with similar values and interests import and export information and ideas for strategic purposes. For example, policymakers, regulators, and environmental or consumer advocates might ask why, if certain substances are deemed too risky for use in Europe, are they still being used in the United States or China? Similarly, if firms can afford to collect their used electronic products in Europe for recycling and/or disposal, some actors will ask why they oppose such responsibilities in the United States or elsewhere. In fact, such questions are already being asked, and the politics of chemical and e-waste management already show signs of change well beyond EU borders.

Many non-EU governments look to the EU for policy guidance about hazardous substances and e-waste management. For example, in 1998, Japan enacted legislation on the recycling of household appliances that requires industry to establish a recovery and recycling system for discarded products.⁴⁵ Yet the EU is now tackling the issue of e-waste more broadly. Because much of Japanese environmental legislation tends to follow EU legislation, Japan may look to the EU for further policy guidance on how to improve hazard-

ous substances and e-waste management. China—the world's largest producer of cellular phones and color TVs—is in the process of developing and implementing RoHS-like legislation, which, after some delays, is scheduled to enter into force in 2007.⁴⁶ China has also expressed interest in copying ideas underpinning REACH. In addition, South Korea is in the process of finalizing its own national RoHS legislation modeled after the EU's.⁴⁷

European actors also want other jurisdictions to adopt similar chemical and waste policies. Now that EU standards have increased, European officials, European environmental organizations, and European firms have shared interests in exporting EU standards to other countries and in uploading such standards into international agreements. Political scientist David Vogel argues that such shared interests lead to coalitions of environmen-

tal actors and firms—"Baptists and bootleggers"—that use market forces to "trade up" regulatory standards.⁴⁸ This is consistent with a long-standing EU strategy, dating from the first Environment Action Programme in 1973, of active engagement in international forums to achieve goals that could not be obtained solely at a regional level.⁴⁹ As such, the EU can be expected to pursue the uploading of its new chemical and waste management policies in a host of international forums.

In the United States, recycling legislation is largely left to the discretion of states. Some states with a high concentration of high-tech industries such as California, Florida, New York, Oregon, Texas, Virginia, and Washington have taken legislative measures on e-waste that go beyond federal U.S. regulations with an eye toward the latest European policy developments.⁵⁰ In 2003, California passed an electronic waste recycling act that bans the sale (after 1 January 2007) of electronic devices that are prohibited under RoHS. In 2006, New York City Council members debated whether to require producers of a long list of electronic products to set up a city-wide take-back system.⁵¹ Several U.S.-based companies, including Apple, AT&T, HP, IBM, and Motorola, are also involved in WEEE management in the United States and internationally.⁵² In addition, California and other states looking to strengthen their chemical policies are closely following developments in REACH.

The EU and the United States are the two main global producers and users of chemicals: Europe accounts for more than one-third and the United States accounts for one-fourth of global chemical production with extensive transatlantic trade in chemicals.⁵³ Furthermore, the EU and the United States are also large generators of e-waste. Together, the U.S. government and industry organizations have lobbied intensively against these EU policy developments, targeting the European Commission, the European Parliament, and national politicians and policymakers.⁵⁴ Yet while U.S.-based firms have lobbied European officials extensively over REACH and other proposals, they

THE IMPLEMENTATION OF THE WEEE DIRECTIVE

The waste electrical and electronic equipment (WEEE) directive outlines general requirements for mandatory collection and recycling of e-waste. Each EU member state is responsible for designing and implementing the collection and recycling schemes necessary to implement the directive, and member states have significant flexibility in national implementation. Two alternative national implementation models have developed in collaborations among European governments and the private sector: a monopolistic national collective system or a competitive national clearinghouse system.

Under a collective system, one system is responsible for the collection, recycling, and financing of all activities for implementing the WEEE directive. These activities are often carried out under the auspices of companies that are owned by one or more trade associations and are operating on a not-for-profit basis. Companies are organized by product categories and tasked with achieving maximum recycling efficiency of their products and identifying markets for recycled material. Supporters of national collection systems argue that they are simple in design and take advantage of economies of scale.

Under a clearinghouse system, several producers, recyclers, and waste management organizations provide collection and recycling services. The role of the national coordinating body is to operate a register of all producers and define allocation, reporting, and monitoring procedures to implement the WEEE directive. The central coordinating body determines and assigns obligations to producers, who can select among multiple firms offering collection and recycling services. Clearinghouse

systems are intended to avoid a single, monopolistic system and to use market dynamics to reduce overall costs.

Most national collection and recycling systems for e-waste that were in place before the WEEE directive were designed as collective systems, which are also the preferred option for many smaller member states (where relatively small volumes of e-waste make it hard to create an economically viable market for multiple competing systems). In contrast, several member states with relatively large markets and high levels of e-waste have elected to design clearinghouse systems, attempting to capture cost savings through market-based competition.

Article 7 of the WEEE directive sets timetables and numerical recovery and recycling targets for product categories outlined in Annex 1A. These must be met by each member state. Initial recovery targets, with a deadline of 31 December 2006, range from 70 percent to 80 percent by weight. Recycling targets range from 50 percent to 75 percent by weight. Periodically, new targets and timetables will be set by the European Parliament and the Council of Ministers. The European Commission monitors implementation. It can take political action, such as publicizing non-compliance, and legal action, such as pursuing a judgment against non-compliant member states in the European Court of Justice, if it deems a member state to be in breach of its requirements.

SOURCE: European Commission, *Implementation of the Waste Electric and Electronic Equipment Directive in the EU* (Luxembourg: Office for Official Publications of the European Communities, 2006).



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A refrigerator wasteland in Copenhagen, Denmark.

typically do not carry the same political influence in Brussels and other European capitals as they do in Washington, DC.

Despite this interest in EU policy developments from U.S. states, municipalities, and firms, the U.S. federal government and some industry organizations have been fierce critics of WEEE, RoHS, and, in particular, REACH. Reflecting some of their major criticisms, the U.S. State Department and the United States Mission to the European Union distributed a report by the National Foreign Trade Council in 2003 on several EU policy developments, including WEEE, RoHS, and REACH, that argued:

The EU has invoked the precautionary principle, a non-scientific touchstone, to justify its identification and assessment of such risks as well as its enactment of technical measures to manage and eliminate them. By doing so, it has effectively banned U.S. and other non-EU exports

of products deemed hazardous, stifled scientific and industrial innovation and advancement and, in the process, has ignored a basic reality, namely that a certain amount of risk is unavoidable in every day life.⁵⁵

Needless to say, the European Commission and many European politicians and policymakers strongly reject these claims. EU officials assert that the precautionary principle is not “non-scientific” but an indispensable principle for guiding decisionmaking on risk under conditions of uncertainty regarding effective environmental and human health protection. WEEE, RoHS, and REACH are also designed to stimulate technical innovation

to reduce the use of hazardous substances and make recycling and disposal of e-waste easier. In addition, the European Commission argues that all recent EU legislation is compatible with the rules of the World Trade Organization.

Although the Bush administration and the U.S. chemical industry continue in their strong opposition to much EU environmental policymaking, a growing number of other countries, U.S. states, and private firms are looking to the EU for inspiration and practical suggestions for better management of hazardous substances and e-waste. Once WEEE, RoHS, and REACH are fully operational, they are likely to further influence international production and regulatory standards. REACH, for

Table 1. Product categories and examples of products covered by WEEE and RoHS

Product categories	Products
Large household appliances	Refrigerators and freezers, Electric stoves, Microwaves, Washing machines and dryers, Air conditioners
Small household appliances	Vacuum cleaners, Irons, Toasters, Coffee Machines, Clocks
Information technology and telecommunications equipment	Personal computers, Laptop computers, Phones, Cellular phones, Calculators
Consumer equipment	Televisions, Radios, Video cameras, Audio amplifiers, Musical instruments
Lighting equipment	Luminaries for fluorescent lamps, Straight fluorescent lamps, Compact fluorescent lamps, Low pressure sodium lamps, High intensity discharge lamps
Electrical and electronic tools	Drills; Saws; Sewing machines; Equipment for turning, milling, sanding, grinding, sawing, cutting, shearing, drilling, making holes, punching, folding, bending or similar processing of wood, metal and other materials; Tools for riveting, nailing or screwing or removing rivets, nails, screws, or similar uses.
Toys, leisure, and sports equipment	Electric trains and car racing sets; Video games; Computers for biking, diving, running, rowing, etc; Sports equipment with electric or electronic components; Coin slot machines
Automatic dispensers	Automatic dispensers for hot drinks, hot or cold bottles or cans, solid products, money, and all other kinds of products

SOURCE: Council Directive 2002/96/EC on waste electrical and electronic equipment (WEEE), Annexes 1A and 1B.

example, will generate massive amounts of information about chemicals and is likely to improve the ability to comparatively assess the risks of various chemicals. Environmental advocates in the United States, China, and many other places will pay close attention to such information.

Conclusion

Like the burning of fossil fuels, the use of chemicals and heavy metals has radically improved human life, making it considerably less “nasty, brutish, and short,” even as they pose severe ecological and human health risks. The same can be said for the growing use of electronic products, which results in mountains of e-waste. A critical question before public, private, and civil society actors concerns how best to preserve and enhance the tremendous gains in human well-being made for many of us from the use of chemicals, heavy metals, and modern technology, while engendering more environmentally and socially sustainable outcomes. From a European perspective, “better living through chemistry”—to cite the old DuPont slogan—will require higher regulatory standards to more effectively manage chemical hazards and e-waste.

Ongoing EU efforts to deepen economic and political integration, raise regulatory standards, and promote sustainable development are guided by a series of EU-wide strategies, action programs, and policies adopted in recent years. Critics have argued, however, that some of these efforts may not be compatible.⁵⁶ For example, EU economic policies tend to promote Western-style consumption while EU environmental policy supports waste minimization and recycling. In this respect, the EU—and all member states—faces the

critical challenge of formulating and implementing a coherent strategy for promoting economic growth that is socially and environmentally sustainable. Nevertheless, as the EU seeks to do this, policymakers, regulators, corporate managers, environmental and consumer activists, and consumers not just in Europe but across the globe will be affected.

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NOTES

1. European Environment Agency, *The European Environment—State and Outlook 2005* (Luxembourg: Office for Official Publications of the European Communities, 2005); A. Iles, “Mapping Environmental Justice in Technology Flows: Computer Waste Impacts in Asia” *Global Environmental Politics* 4 no. 4 (2004): 76–107; the Basel Action Network, <http://www.ban.org>; and the Silicon Valley Toxics Coalition, <http://www.svtc.org>.

2. C. Bretherton and J. Vogler, *The European Union as a Global Actor*, second edition (New York: Routledge, 2006); N. J. Vig and M. G. Faure, eds., *Green Giants? Environmental Policies of the United States and the European Union* (Cambridge, MA: MIT Press, 2004); J. Carmin and S. D. VanDeveer, *EU Enlargement and the Environment: Institutional Change and Environmental Policy in Central and Eastern Europe* (London: Routledge, 2005); A. Weale et al., *Environmental Governance in Europe: An Ever Closer Ecological Union?* second edition (Oxford: Oxford University Press, 2003); A. Jordan and D. Liefnerink, eds., *Environmental Policy in Europe: The Europeanization of National Environmental Policy* (New York: Routledge, 2004).

3. A directive is binding with regard to the results it sets out to be achieved, but gives flexibility to national authorities to choose the specific forms and methods for implementation. A regulation sets out more specific rules and requirements for implementation that must be followed identically by all member states.

4. Council directive 2002/96/EC on waste electrical and electronic equipment (WEEE); Council directive 2003/108/EC amending Council directive 2002/96/EC on waste electrical and electronic equipment (WEEE).

5. Council directive 2002/95/EC on the restriction of the use of certain hazardous substances (RoHS) in electrical and electronic equipment.

6. D. Vogel, *Trading Up: Consumer and Environmental Regulation in a Global Economy* (Cambridge, MA: Harvard University Press, 1997).

7. J. Carmin and S. D. VanDeveer, note 2 above.

8. Central Intelligence Agency, *The World Factbook, 2006*, available at <https://www.cia.gov/cia/publications/factbook/index.html>. Population figures are from July, 2006.

9. A. Weale et al., note 2 above; A. Jordan and D. Liefnerink, eds., note 2 above.

10. European Commission, *A European Union Strategy for Sustainable Development* (Luxembourg: Office for Official Publications of the European Communities, 2002): 35.

11. Governments at the World Summit on Sustainable Development (WSSD) in Johannesburg in 2002, agreed that by 2020 human-made chemicals should be “used and produced in ways that lead to the minimization of significant adverse effects on human health and the environment.” United Nations, *Report of the World Summit on Sustainable Development* (Johannesburg, South Africa, 2002): paragraph 23.

12. European Commission, note 10 above, page 15.

13. United Nations Conference on Environment and Development, “Declaration on Environment and Development” (Rio de Janeiro, 1992): principle 15.

14. European Commission, *Communication from the Commission on the Precautionary Principle* (Brussels: European Commission, 2000).

15. T. Petry and R. Meads, “An Analysis of the Proposed REACH Regulation,” *Regulatory Toxicology and Pharmacology* 44 no. 1 (2005): 24–32.

16. N. Eckley and H. Selin, “All Talk, Little Action: Precaution and its Effects on European Chemicals Regulation” *Journal of European Public Policy* 11 no. 1 (2004): 78–105.

17. D. Wilson, “EU Members Dragging their Heels on WEEE,” *Electronics Supply & Manufacturing*, April 2005, <http://www.my-esm.com/print/showArticle.jhtml?articleID=159908581> (accessed 15 November).

18. European Commission, *Implementation of the Waste Electrical and Electronic Equipment Directive in the EU* (Luxembourg: Office for Official Publications of the European Communities, 2006): iii; and D. Wilson, *ibid.*

19. European Commission, “Electronic and Electrical Waste: Commission Takes Legal Action Against Eight Member States,” press release, 11 July 2005; Perchards, *Transposition of WEEE & RoHS Directives into National Law of EU Member States and Corresponding Industry Activities*, 7 April 2005.

20. European Commission press release, *ibid.*; The *Financial Times* editorial, *Wasting Time on Waste: The UK Trails in Carrying out EU Law on Electrical Recycling*, 7 June 2006; Environmental Data Services (ENDS), “WEEE Regime Promised for April 2007,” *ENDS Report* 379, (August 2006), 36–37.

21. A. Weiner, “Sparks Flying,” *Evening Gazette (UK)*, 4 July 2006.

22. European Environmental Bureau, *New EU Chemicals Policy, Key Elements of the New Legislation, The View of Environmental NGOs* (Brussels, 2002); World Wide Fund for Nature (WWF), *A New Regulatory System for Chemicals in Europe: A Step Towards a Cleaner, Safer World?* (Brussels, 2002); D. Pesendorfer, “EU Environmental Policy Under Pressure: Chemicals Policy Change Between Antagonistic Goals?” *Environmental Politics* 15 no. 1: 95–114; WWF and European Environmental Bureau staff members in discussion with the authors, November, 2003.

23. D. Vogel, note 6 above.

24. ENDS, “Early Disputes over New Review of EC Chemicals Policy,” *ENDS Report* 279, (April 1998), 39–40.

25. European Commission, *White Paper on a Strategy for a Future Chemicals Policy* (Brussels: European Commission, 2001); R. Nordbeck and M. Faust, “European Chemicals Regulation and Its Effect on Innovation: An Assessment of the EU’s White Paper on the Strategy for a Future Chemicals Policy,” *European Environment* 13 no. 1 (2003): 79–99; K. Geiser and J. Tickner, *New Directions in European Chemicals Policies: Drivers, Scope and Status* (Lowell, MA: Lowell Center for Sustainable Production 2003); DG Environment officials in discussion with the authors, November, 2003.

26. N. E. Selin and H. Selin, “Global Politics of

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Mercury Pollution: The Need for Multi-Scale Governance," *Review of European Community & International Environmental Law* 15, no. 3 (2006): 258–269.

27. C. Burns, "The European Parliament: The European Union's Environmental Champion?" in A. Jordan, ed., *Environmental Policy in the European Union: Actors, Institutions and Processes* second edition (London: Earthscan, 2005): 87–105. The formal name of the Parliament's Environment Committee is the Committee on the Environment, Public Health and Consumer Policy.

28. I. Schörling, "The Greens Perspective on EU Chemicals Regulation and the White Paper," *Risk Analysis* 3, no. 2 (2003): 405–409; I. Schörling and G. Lund, *REACH—The Only Planet Guide to the Secrets of Chemicals Policy in the EU. What Happened and Why?* (Brussels: I. Schörling, 2004); Green MEP and representatives of the European and American chemicals industry in discussion with the authors, November, 2003; Representative of the European Commission in discussion with the authors, April 2004 and October 2006.

29. European Commission, note 25 above; Representatives of the European and American chemicals industry, DG Environment officials, and DG Enterprise officials in discussion with the authors, November, 2003; A representative of the European Commission, in discussion with the authors, April 2004 and November 2005.

30. ENDS, "REACH Caught up in EU's Competitiveness Agenda," *ENDS Report* 346, November 2003: 51–53.

31. European Chemical Industry Council (CEFIC), *Strategy for a Future Chemicals Policy—Expectations for the European Chemical Industry: Workability and Competitiveness* (Brussels: CEFIC, 2003); J.-P. Montfort, "The Commission White Paper on a Strategy for a Future EU Chemicals Policy: The View of European Companies of American Parentage," *Risk Analysis* 23 no. 2 (2003): 399–404.

32. T. Petry, R. Knowles and R. Meads, "An Analysis of the Proposed REACH Regulation," *Regulatory Toxicology and Pharmacology* 44 no. 1 (2006): 24–32.

33. European Commission, *White Paper on a Strategy for a Future Chemicals Policy* (Brussels: European Commission: 2001).

34. R. Nordbeck, and M. Faust, note 25 above.

35. A. D. Little, *Economic Effects of the EU Substances Policy: Summary of the Research Project* (Wiesbaden: Arthur D. Little GmbH, 2003); Mercer Management Consulting, *The Likely Impact of the Future European Legislation in the Area of Chemical Substances* (2003).

36. International Chemical Secretariat, *Cry Wolf: Predicted Cost by Industry in the Face of New Regulations* (Göteborg: International Chemical Secretariat, 2004); I. Schörling, G. Lund, note 28 above; F. Ackerman and R. Massey, *The True Costs of REACH* (Copenhagen: Nordic Council of Ministers, 2004).

37. D. Pearce and P. Koundouri, "Regulatory Assessment for Chemicals: A Rapid Appraisal Cost-Benefit Approach," *Environmental Science & Policy* 7, no. 6 (2004): 435–449. One assessment estimates that Euro-

pean costs of PCB decontamination alone could be as high as €15 to €75 billion. See Kemikalieinspektionen, *REACH—En Ny Kemikalielag för en Giffri Miljö* (Stockholm, 2004).

38. IDG Environment officials, DG Enterprise officials, and Green MEP in discussion with the authors, November, 2003; Representative of the European Commission in discussion with the authors, November 2005 and October 2006.

39. European Commission, note 18 above.

40. R. Garcia-Johnson, *Exporting Environmentalism: U.S. Multinational Chemical Corporations in Brazil and Mexico* (Cambridge: MIT Press, 2000).

41. D. Vogel, "The Hare and the Tortoise Revisited: The New Politics of Risk Regulation in Europe," *British Journal of Political Science* 33, no. 4 (2003): 557–580; R. Brickman, S. Jasanoff and T. Ilgen, *Controlling Chemicals: The Politics of Regulation in Europe and the United States* (Ithaca: Cornell University Press, 1985).

42. D. Vogel, *ibid.*; O. Pohl, "European Environmental Rules Propel Change in U.S.," *New York Times*, 6 July 2004.

43. H. Bray, "Tech Firms Face EU Toxics Test: Limits on the Use of Hazardous Materials Pushes U.S. Electronics Makers to Innovate," *Boston Globe*, 1 June 2006.

44. F. Ackerman, E. Stanton, and R. Massey, *European Chemical Policy and the United States: The Impacts of REACH* (Medford, MA: Global Development and Environment Institute, Tufts University, 2006).

45. European Commission, note 18 above, page 16.

46. K. Betts, "China Tackles Toxic Electronics" *Environmental Science & Technology*, 1 October 2003, 351A.

47. See http://www.ides.com/articles/rohs_directive.asp (accessed 21 October 2006).

48. D. Vogel, note 6 above.

49. A. Weale et al., note 2 above, page 57.

50. European Commission, note 18 above, page 21–22.

51. S. Chan, "Manhattan: Electronics-Recycling Bill," *New York Times*, 31 October 2006.

52. European Commission, note 18 above, page 21.

53. European Commission, *White Paper on a Strategy for a Future Chemicals Policy* (Brussels: European Commission, 2001); American Chemistry Council, *The Business of Chemistry: Essential to Our Quality of Life and the U.S. Economy*, http://www.americanchemistry.com/s_acc/bin.asp?CID=288&DID=731&DOC=FILE.PDF (accessed 29 November).

53. American Chamber of Commerce to the European Union, 2003; United States Council for International Business, 2003; United States House of Representatives, 2004; Interviews with representatives of the American chemicals industry, November 2003 and April 2004.

54. National Foreign Trade Council, *Looking Behind the Curtain: The Growth of Trade Barriers that Ignore Sound Science* (Washington, DC: The World Trade Organization, 2003): 118–119.

55. D. Pesendorfer, note 22 above.

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