Unpacking the Packaging Problem: An International Solution for the Environmental Impacts of Packaging Waste

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Introduction

From the vinyl tube that contains toothpaste, to the paper box breakfast cereal comes in, to the plastic bag groceries are placed in, packaging plays an innate and important role in the lives of most every human on earth. All materials used for packaging good are derived from natural resources such as oil, metal ores, sand, and trees, which are processed and converted into plastic, aluminum, metal, glass, wood and paper for both our health and convenience. Once the goods within the packaging have been consumed, the packaging ceases to be useful and is discarded as waste, headed towards a future as reused or recycled packaging materials, or, in most cases, as landfill or incinerator fodder. Depending on the political climate, regulatory capacity, and severity of environmental fallout, different nation-states and international bodies have formulated varying solutions to combat the proliferation of packaging waste.

This paper focuses on the issue of packaging and the international and national solutions aimed at the remediation of the negative environmental consequences of packaging waste. The first section on “Packaging and Packaging Waste” provides an explanation of what packaging is and the benefits human society has derived from it, from the consumer who finds packaging a convenient and sanitary way to carry goods from store to home to the producer who finds it an efficient means of marketing its product and meeting retailers’ theft-proofing needs. Then, a description of packaging waste is provided as background as to why it is such a very visible and voluminous problem in today’s global economy, which has resulted in packaging becoming part and parcel of the consumer lifestyle but overwhelming the environment’s natural cycles and capacity to absorb and process wastes.
The second section of this paper focuses on the “Environmental Impacts of Packaging Waste,” which include energy consumption, greenhouse gas emissions, natural resource depletion, and pollution of waterways – which are resultant impacts of the manufacturing, consumption, and disposal of packaging wastes into virgin land, landfills and incinerators. Because packaging is a human invention, these environmental consequences are solely the work of humans. This is why the third section of this paper on “The Potential Solutions to the Packaging Waste Problem” describes laws and regulations that have been adopted throughout the world to deal with the environmental harms caused by packaging wastes. From recycling and reuse laws such as bottle bills and product take-back regulations, to reduction policies such as empty-space laws and landfill and plastic bag bans, there presently are both national and international laws that seek to solve the packaging waste problem around the world.

The fourth and last section of this paper makes recommendations addressing “The Need for a New International Packaging Convention.” Because the European Union presently has in force effective regulations for the prevention, reuse and recycling of packaging waste in the European Union (E.U.), this paper proposes that an assembly of nation-states should use them as models for a new binding international law convention that would expand their jurisdictional and geographic scope. Other existing international law conventions, such as the Basel Convention and the Kyoto Protocol, which, respectively, regulate the transboundary movement of hazardous wastes among certain parties around the world and climate changing greenhouse gas emissions, may also provide models for a new international packaging convention, although alternatively they could be expanded to directly affect and regulate the production, transport, and disposal of packaging waste by incorporating currently existing non-binding international declarations or strategic plans of action.
Packaging & Packaging Waste

No debate exists as to whether there are negative consequences to the environment caused by wastes from discarded packaging from consumer products used by humans. Packaging for consumer products is created by human society to cater to its own needs. The more developed the society, the more packaging wastes are manufactured and consequently disposed of. The solutions to reduction of packaging wastes, therefore, must burden human society and those companies in industrialized nation-states that manufacture most consumer products and accompanying packaging materials.

Packaging

Packaging consists of “all products made of any materials of any nature to be used for the containment, protection, handling, delivery and preservation of goods … from the producer to the user or the consumer.”¹ It is not a modern technology. Indeed, packaging has been around since the 18th Century. Napoleon’s army stored food in cork-stoppered glass jars, and the English navy preserved supplies in tin cans opened by hammer and chisel.² These and similar human packaging innovations around the world throughout human history have contributed to society’s ability to store food and to reduce food waste when traveling over long distances.

In today’s global consumer culture, consumers around the world purchase food, drinks, and other products in paper, plastic, glass, and metal packages. Packaging is both a natural and

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unnatural byproduct of commerce in that “we require food, clothing, shelter, culture, and comforts, and packages help deliver them.”

3 Packaging provides such services as convenience, communication of product information, marketing, safety, and protection from theft, spoilage and breakage. 4 Packaging provides a physical barrier between a product and the “natural” environment, ensuring that a product stays sanitary and uncontaminated, and allowing for safe and efficient transportation and for conveying to potential consumers useful and often government-mandated product information and instructions.

These benefits that product packaging can provide demonstrate how packaging has developed in recent years in response to social and economic changes affecting consumers. Citizens of modern society in developed countries enjoy higher living standards, often in increasingly urban areas, with smaller-sized working families that have less time to prepare food. Consumers in these countries therefore, demand an increase in consumer goods that cannot be grown or manufactured locally, and therefore, must be contained in individual packages, which are then packed together in bulk and transported (using yet more packaging). 5

Demand for packaging is not limited to industrialized nations, however. In rural, less-modernized areas of the developing world, food and other goods are purchased in used newspapers, organic materials such as leaves and husks, or previously-used containers, while in modern, urban centers of the developing world, products often are wrapped in previously-unused glass containers or plastic shopping bags.

3 Id., at 6.
4 Id., at 10.
Packaging is commonly divided into three general categories. “Primary” packaging surrounds the actual product that is consumed by the consumer. Examples include soda bottles and disposable paper coffee cups. “Secondary” packaging goes outside the primary package and is used to group larger quantities of primary packaged merchandise for distribution and display. Examples include paper wrapping that contain six-packs of glass-bottled beer and plastic rings that hold six aluminum cans of soda. Lastly, “Tertiary” or “Transport/Transit” packaging surround the primary and secondary packaging of goods, and are used to group packages into larger loads for transport, and the loading and unloading of goods. Examples include “paper or plastic” grocery shopping bags, wood pallets, corrugated cardboard cartons, and Styrofoam “peanuts” used for package filler.

Packaging for consumer products today uses many different types of materials. The most common forms used are paper, plastic, glass, steel and aluminum, while wood and other materials like hemp, ceramics, and mixed materials are utilized to a lesser degree. In the industrialized world, wood-based products – paper, containerboard or corrugated box materials, boxboard, solid-wood packaging materials, molded pulp, and wood shavings – are the most commonly used packaging materials in terms of weight in the municipal waste stream. In 2001 in the United Kingdom, paper and board made up 43 percent of packaging materials by weight.

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6 Id.
7 Imhoff, supra note 2, at 10.
9 Id.
10 For example, the “Tetra Pak” typically consists of 75 percent paper, 20 percent polyethylene plastic, and 5 percent aluminum, and packages beverages.
12 Id., supra note 2, at 80.
packing 25 percent of all goods. In the U.S., nearly 60 percent of the food packaging industry is paper-based.

Plastics, produced with refined crude oil, on the other hand, were used in 53 percent of all goods packaged, though containing 20 percent of all packaging by weight. In the U.S., plastic accounts for 20 percent of the packaging of food and other goods, with plastic bottle production resulting in 1.5 million tons of waste per year.

Glass containers, made of a mixture of sand, soda ash, limestone, and cullet (recycled crushed glass melted at 2700 degrees Fahrenheit), were used to a greater extent before the 1970s, but they are now being replaced by plastic packaging. In the U.K. in 2001, glass containers only accounted for 10 percent of all goods packaged.

Packaging Waste

Wherever there is a packaged product, there is packaging waste. Once the products contained within packages are consumed, the packages themselves lose their protective, containment or transportation function, and are often discarded as packaging waste. Packaging waste, like packaging, is also not a modern concept or problem. For as long as packaging materials have been used for containment, protection, handling, delivery, and presentation

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14 Imhoff, supra note 2, at 11.
16 Imhoff, supra note 2, at 21.
17 Id., at 16.
purposes, and the “holder discards or intends or is required to discard”19 them, packaging waste has existed, creating an increasingly significant cause of harm to the environment and an increasingly large and expensive problem for human society.

Society has used various methods to deal with packaging waste. Packaging wastes may be discarded into landfills, incinerated and converted to energy, or, in certain nations, recovered through reuse, repair, remanufacturing, and recycling. Certainly, packaging wastes does not presenting the same grave threats to the environment posed by greenhouse gas emissions, and is not a problem that is likely to cause imminent environmental danger. In fact, in the industrialized world, packaging waste only accounts for 15 percent of the total waste burden.20

However, packaging waste has become a problem in modern society because in today’s global economy, “packaging is part and parcel of lifestyles that have become almost completely disconnected from earth’s natural cycles and capacity to process our industrial wastes,”21 and due to its large volume, packaging waste tends to be very visible.22

Today, in the U.S. alone, nearly 30 percent of total non-energy resources are consumed in the U.S. for packaging.23 About 32 percent, or 75 million tons, of the gross weight and one-half of the volume of municipal solid waste in America is composed of containers and packaging materials, which comes to nearly 300 pounds per American per year.24 In the European Union, 66 million tons of packaging waste – 5 percent of total waste, 17 percent of municipal solid waste.

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20 Imhoff, supra note 2, at 11.
21 Id., at 6.
23 Imhoff, supra note 2 at 11. The other 70 percent is consumed for construction and infrastructure demands.
24 Id., at 9, 20.
waste by weight and between 20 and 30 percent by volume – were generated in 2002,\textsuperscript{25} and in
the United Kingdom alone, almost 9.3 million tons of packaging waste – 5.1 million tons from
households – were produced in 2001, with approximately 70 percent of primary packaging used
for food and drink and discarded after one use.\textsuperscript{26}

Recent trends in the economies of the industrialized world explain why so much
packaging waste is produced and consumed. Because packaging makes consumption of goods
more convenient and predictable, packaging of a consumer product often allows consumers to
purchase goods beyond the reach of local manufacturers, growers, and retailers. As a result,
consumer goods must travel increasing distances, and the packages in which they travel must be
more durable and dense, using a greater amount of tertiary packaging such as wooden pallets to
support an increased global transport infrastructure.\textsuperscript{27} These facts, combined with changes in
food consumption habits (such as the dramatic drop in expected time to prepare a meal in
America from 2 hours and 30 minutes in 1930 to 15 minutes in 1990 and the rise of “fast food”
establishments) has resulted in each American, on average, eating one in every two meals outside
the home.\textsuperscript{28}

As a result, there has been an increase in the demand for packaging for consumer
products, especially single-use containers that are discarded once the food or beverage contained
inside has been consumed. In fact, in the U.S., more than 150 billion single-use beverage

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\textsuperscript{25} Commission of European Communities, “Report from the Commission to the Council and the European
\textsuperscript{26} Waste Online, “Packaging recycling information sheet”,
\url{http://www.wasteonline.org.uk/resources/InformationSheets/Packaging.htm} (last accessed May 18, 2007).
\textsuperscript{27} Imhoff, \textit{supra} note 2, at 13.
\textsuperscript{28} Id., at 13 (citing Food Marketing Institute, 1996), 19.
\end{flushright}
containers are sold annually, and 320 million take-out cups are used everyday.  

This shift from bulk- to single-use packages has allowed consumers to eat or drink in small servings and to prevent spoilage, as the goods contained within travel increased distances “from field to table”.  

Packaging and packaging waste have also increased due to the need for national retail chain stores to prevent shoplifting through “jumbo clear pack” packaging, and the “competitive ‘arms race’ in which one company adopts larger, more elaborate packaging solely to compete with another company’s larger, more elaborate packaging, in the struggle to win the attention of consumers.”  

The increase in the amount of packaging produced, consumed and disposed as waste is only expected to increase as developing nations industrialize and gain additional economic power and as their consumers increasingly demand packaged products.  China in recent years has become the world’s largest market for disposable plastic and containers, and South Korea and Japan have been overwhelmed with packaging wastes that have proliferated as their economies have rapidly industrialized and their landfills have increasingly filled up more quickly. Consequently, in these developing countries drastic regulations have been implemented to curb non-biodegradable packaging materials and to enforce empty-space ratios in packaging. As explained in the next section, many different types of negative environmental impacts follow from the world-wide increase in packaging and packaging wastes.  

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29 Id., at 10.  
30 Id., at 13.  
31 Id., at 12-13.  
32 Id., at 10, 49. Empty-space laws require a specified maximum ration of product to empty space within a product’s container, thereby minimizing the total bulk volume and mass of a product’s packaging.
Environmental Impacts of Packaging Waste

The global economy and consumer culture that created this rise in resource consumption and production of wastes from packaging for consumer products arguably has surpassed the “fine line between necessary and excess packaging.”33 While primary packaging is necessary as the “skin of commerce” to deliver an actual product safely and conveniently without breakage or spoilage, product packaging has often become “excessive” in the amount and types of materials used in order to market, brand and pique the interest of consumers in a “marketing arms race” so that they buy and buy a particular product again and again.34 The various types of materials used for packaging, and the amounts of natural resources required to produce them, have several significant adverse impacts on the environment.

The most significant input into all packaging materials is energy. Production of packaging from raw materials into finished products requires energy to be consumed, with resultant emissions of harmful pollutants and greenhouse gas emissions into the atmosphere and, possibly, also the discharges of harmful pollutants into water bodies. For example, the smelting of virgin aluminum into packaging material consumes enough energy – 182 Btus per gram of raw material, the highest amount of energy required to make packaging materials – to earn it the nickname “congealed energy,” as ingots are “heated, cold rolled, rolled again, transported, punched, formed, washed, painted, coated, filled, topped, boxed, palletized, and so on as they serve the ever-expanding beverage industry.”35 The U.S. steel industry’s total emissions of pollutants into the air, which take the manufacturing of steel packaging into account, ranks

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33 Id., at 13.
34 Id., at 12-13.
35 Id., at 15, 29.
second only to car exhaust emissions. Virgin glass packaging uses much less energy to produce – 8 Btus per gram of raw material – but is produced from melting sand, ash, limestone and cullet (recycled crushed glass) in furnaces at high heats (to 2,700 degrees Fahrenheit). Steel packaging materials are made in energy-intensive blast furnaces where iron ore is converted to pig iron, and coal is converted into coke. The heating of raw materials to produce glass and steel packaging emits carbon dioxide and other greenhouse gases, contributing to overall global greenhouse gas emissions. Production of plastics also contributes to climate change because, aside from the plasticizers, additives and other pollutants released during manufacturing and incineration of plastics, plastics production consumes a great amount of energy – 88 Btus per gram of raw material for virgin high density polyethylene (HDPE) plastic. The E.U. found that 80 million tons of carbon dioxide equivalent, or approximately 2 percent of total greenhouse gas emissions in Europe, are emitted from packaging consumption by E.U. member nations annually. Overall, if carbon dioxide emissions are allowed to “continue to grow at the pace of the last 30 years for the next 50 years, we will pass the doubling level – an atmospheric concentration of carbon dioxide of 560 parts per million – around mid-century.”

Greenhouse gases which contribute to global warming are also emitted in the energy required to transport packaging materials. Since World War Two, global transport activity has reportedly increased 25-fold, and this increase in global trade has increased the uses of fossil-
fuels, contributing to global warming.\textsuperscript{43} Ocean shipping, which uses 411 Btus per ton-mile, carries approximately 80 percent of all the world’s goods traded internationally, most commonly using fossil fuels with high levels of sulfur and carbon emissions. These emissions, in combination with emissions from air transport (which uses nearly 77 times more energy per ton per mile than ocean transport, or 31,609 Btus per ton-mile), rail transport (which uses 371 Btus per ton-mile), and truck transport (which uses 11 times more energy per ton per mile than ocean transport, or 4,359 Btus per ton-mile), results in an ever-increasing global warming problem.\textsuperscript{44}

A second environmental impact of packaging wastes is an increased demand for landfill space for packaging wastes. Landfilling, a process by which waste is secured into the ground such that contact between the waste and the surrounding environment, particularly groundwater, is avoided,\textsuperscript{45} is the preferred disposal method of disposal of municipal solid waste in industrialized nations because of its relatively low cost compared to other waste disposal methods and the fact that many forms of waste are suitable for it.\textsuperscript{46} The plastics industry argues that new landfill technologies utilize plastics' properties to make plastic liners that prevent pollutants from leaking into groundwater, thus making landfills environmentally-friendly.\textsuperscript{47} However, according to anti-landfilling advocates, landfills are “a flawed technology and a cancer on the land” because they “waste resources and compete directly with beneficial resource conserving enterprises such as reuse, recycling, composting,” thereby delaying but not

\begin{itemize}
  \item \textsuperscript{43}Imhoff, \textit{supra} note 2, at 22.
  \item \textsuperscript{44}Id., at 28.
  \item \textsuperscript{45}Action Center PA, “The Basics of Landfills,” \url{http://www.ejnet.org/landfills/} (last accessed May 22, 2007).
\end{itemize}
eliminating groundwater pollution and producing significant amounts of greenhouse gas emissions\(^48\) – 32 percent of total methane emissions in the E.U., for example.\(^49\) In addition, many older landfills leak polluting substances uncontrollably and concentrate methane in combustible amounts.

In most parts of the developed world, packaging constitutes as much as one-third of the non-industrial solid waste stream, and as the developing countries race to raise their living standards, more countries are seeing significant growth in their packaging waste headed to landfills.\(^50\) Statistics show that even though between 1990 and 1996 the amounts of wastes going into landfills declined by more than 17 percent (by weight), total landfill capacity has actually steadily risen.\(^51\) Increased amounts of packaging wastes that fill up landfills increase the demand for additional landfill capacity, and increase the amount of groundwater pollution and methane gas emissions landfills produce. This is especially true if certain trends continue, such as 500 million virgin-wood pallets (used to transport goods in the U.S.) – enough to frame 300,000 houses – being sent each year to landfills after only one use, and the rise of non-biodegradable and non-recyclable plastics and other synthetic materials (such as polystyrene) used for packaging since the 1970s, replacing uses of glass containers with the increased predominance of single-use disposable packaging.\(^52\)

An increase in packaging wastes also results in an increased amount of wastes being burned by way of incineration, which also has negative environmental consequences.


\(^{49}\) Paul T. Williams, *supra* note 46, at 174.

Environmental activists argue that although incineration of wastes generates some energy in addition to the energy produced by coal-burning electrical plants, it still captures far less energy than is saved by recycling of wastes, while emitting harmful greenhouse gases and toxins into the air and sending a byproduct of incineration, toxic ash, to landfills to potentially pollute groundwater.\(^5\) Incineration of wastes contributes to global warming and air pollution in that it is a process by which combustible elements of wastes are converted into heat, water vapor, nitrogen, oxygen, carbon dioxide, and, depending on what is burned, harmful pollutants, such as carbon monoxide, acid gases (hydrogen chloride, hydrogen fluoride, sulfur dioxides, and nitrogen oxides), organic compounds (volatile organic carbon, dioxins and furans, and polychlorinated biphenyls, or PCBs), and heavy metals (lead, mercury, cadmium, chromium, and arsenic).\(^5\) Incineration also may pollute groundwater because the 40 percent of wastes that remain as ash after incineration (which ash contains high concentrations of heavy metals and dioxins) may be sent to landfills where the ash may potentially leach into the soil and pollute the groundwater beneath.\(^5\)

Production of packaging also requires the depletion of raw materials, another environmental impact of increased consumption of packaging. At the current rate of consumption of paper, building and packaging materials, and other wood-based products, a vast amount of the world’s forest biodiversity may be lost in the next 50 years as trees are cut and

\(^5\) Imhoff, \textit{supra} note 2, at 10, 16.
used to produce product packaging. In order for wood to become packaging materials such as boxes, bags and single-use beverage cups, trees must be cut from forests, ground into chips, pulped and bleached with chlorine-based compounds. Production of one ton of paper from virgin-wood consumes 98 tons of wood, water, energy, and chemical resources; and pulp and paper manufacturing are responsible for 11 percent of the total volume of water used in industrial activities throughout Organization for Economic Cooperation and Development (OECD) countries. The production of the 500 million replacement wood pallets required annually for the U.S. consumer product distribution scheme at any given time consumes 40 percent of all hardwoods and 10 percent of all lumber that is chopped down in the U.S.

Wood-based products are not the only packaging materials that deplete non-renewable natural resources. Aluminum is produced from mined bauxite ore, which is hauled internationally from remote regions to aluminum production plants in countries with abundant hydropower, requiring the consumption of fossil fuels and emission of pollutants inherent in transport. One ton of bauxite ore is required to create a half ton of aluminum oxide, which in turn produces a quarter ton of aluminum metal.

Plastics and other synthetic materials such as polystyrene also cause harm to the environment in that they are derived through a process by which crude oil is refined and converted into lightweight packaging products. In the U.S. alone, 270 million tons of oil and gas are consumed to produce plastic packaging.

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56 Imhoff, supra note 2, at 9.
57 Id., at 8.
58 Id., at 15.
59 Id., at 83.
60 Id., at 15.
61 Id., at 16.
Lastly, packaging has an impact on the environment in the pollution of waterways throughout the world that results as a byproduct of the manufacturing and disposal of packaging. In Bangladesh, plastic bags have been banned because they are attributed to causing floods by blocking drains.\textsuperscript{62} Recently, researchers have found that invisible plastic particles pollute the world’s oceans by remaining in water for indefinite periods and becoming part of the food chain in gyres (areas with strong currents facilitated by strong winds, where plastic waste is pulled in and densely gathered into stagnant pools often containing five times more plastic than zooplankton and thereby causing the plankton to have plastic debris in their bodies).\textsuperscript{63} Because zooplankton sit at the bottom of the food chain, the plastic debris “snuff[ ] out the lowest common denominator in the food chain.”\textsuperscript{64} Packaging also pollutes waterways as a result of the frequent use of stamped or printed ink in packaging. Such inks contain toxic heavy-metal pigments (containing barium, copper and zinc), volatile organic compounds (VOCs) and petroleum.\textsuperscript{65} These toxins are harmful to the environment when they “end up polluting water that leaches from landfills, concentrate into toxic ash in incinerators, or become toxic sludge in a pulp de-inking facility.”\textsuperscript{66} In addition, processing virgin-wood for paper packaging involves the use of chlorine for bleaching purposes, which, on average, releases 10 to 35 tons of organochlorines daily, which can have adverse effects such as depressing human and animal reproductive fertility and immune response systems.\textsuperscript{67}

\textsuperscript{64} \textit{Id.}
\textsuperscript{65} Imhoff, \textit{supra} note 2, at 74.
\textsuperscript{66} \textit{Id.}
The Potential Solutions to the Packaging Waste Problem

Because the manufacturing and consumption of packaging impact the environment by their energy consumption and role in causing climate change, the amount of packaging material wastes sent to landfills and incinerators, the natural resources depleted by the production of packaging, and the pollution that production of packaging causes in the world’s waterways, programs to eliminate or at least reduce these harms increasingly have been proposed and implemented by both public and private entities.

These programs seek to “Reduce,” or limit, the amount of packaging that ends up as wastes at the production end, “Recycle,” or reprocess, packaging wastes into new, useable materials, and “Reuse,” or continue the utility of, packaging in the future after its original initial use. Collectively known as “the 3 R’s,” these broad categories of solutions to the packaging waste problem are targeted towards either the “upstream” or “downstream” ends of the packaging chain. International and national environmental laws and regulations aimed at the “downstream” end of the packaging lifecycle address post-consumption problems associated with disposal of packaging, such as littering, collection, recycling, landfilling, and incineration, while those targeted towards the “upstream” end of the packaging chain attempt to regulate problems of packaging at its design and manufacturing stage. Since the environmental harms that results from the “downstream” and “upstream” components of the packaging chain are

wholly caused by human action or inaction, laws and regulations increasingly are being adopted to regulate packaging-related actions at either one or both ends of the packaging lifecycle.

**Downstream Solutions: Reuse and Recycle**

Many nations have adopted reuse laws that require “packaging, which has been conceived and designed to accomplish within its life cycle a minimum number of trips or rotations, [to be] refilled or used for the same purpose for which it was conceived, with or without the support of auxiliary products present on the market enabling the packaging to be refilled.”

One type of reuse law is the standardized “Bottle Bill,” whereby all bottled beverages produced and/or sold in the nation or municipality are required to be returnable, with consumers paying a deposit on each bottle purchased, which is refunded upon return of the bottle. In order for beverage bottles to be reusable, the materials used in the bottles need to be made sturdier to withstand increased transport, washing and handling. Opponents of bottle bills argue that this approach requires increased amounts of materials during production of reusable bottles, and additional amounts of energy during the manufacturing, transport, and refilling of bottles. However, supporters counter that the “downstream” benefits generated from reuse of beverage bottles, such as reduction in litter, reduced waste disposal costs, overall conservation of natural resources and energy, and creation of new businesses and jobs, outweigh the “upstream” costs.


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70 Imhoff, *supra* note 2, at 79.
the “Packaging Directive” (which is discussed below), through its bottle bill, which requires beverages sold in bottles nationwide to be manufactured so as to be reusable and refillable.\footnote{BottleBill.org, “Bottle Bills Work!”, \url{http://www.bottlebill.org/} (last accessed May 22, 2007).} Since refillable glass bottles have the most efficient materials-to-use ratios, the law has resulted in the country producing less packaging waste per capita than any of its European neighbors; so much so that 70 percent of wine and liquor bottles are recycled.\footnote{Id.}

In the U.S.A., 11 states have enacted and implemented bottle bills (none of which have ever been repealed over the last 35 years) under which a deposit, based on a container’s refund value (between 5 to 10 cents each) provides an incentive to consumers to return containers generally for recycling, not reuse.\footnote{Imhoff \textit{supra} note 2, at 16.} Advocates claim that “hundreds of billions of beverage containers” have been recycled as a result of this “proven, sustainable method of capturing beverage bottles and cans for recycling,” and therefore, more states should enact similar bottle bills.\footnote{Id.}

Perhaps the most significant and widespread means by which the environmental problems associated with packaging wastes is addressed are beverage container and other packaging material recycling laws, which require the “reprocessing in a production process of the waste materials for the original purpose or for other purposes including organic recycling but excluding energy recovery.”\footnote{Id., at 79.} Recycling is generally considered the most favorable answer to the packaging waste problem worldwide. Recycling plastics benefits the environment in that for every pound of virgin plastic replaced with recycled plastic, 2 to 3 pounds of greenhouse gases

\footnote{BottleBill.org, “Bottle Bills Work!”, \url{http://www.bottlebill.org/} (last accessed May 22, 2007).}

\footnote{Imhoff \textit{supra} note 2, at 16.}

\footnote{Id.}

\footnote{Id., at 79.}

\footnote{Id., at 79.}

\footnote{Id., at 79.}
are not emitted and a decrease in demand for landfill space results.\textsuperscript{77} Recycling glass saves 25 to 30 percent of the energy used to produce virgin glass packaging, and manufacturing aluminum packaging from recycled materials reduces energy consumption by 2000 percent.\textsuperscript{78}

Normally, recycling services are provided by municipal or national governments throughout the industrialized world. Such services entail the collection, sorting, recovering, and reprocessing of recyclable materials. The materials which are collected and recycled under these programs commonly include paper, glass, plastic, aluminum and other metal packaging, but recently, certain international, national and local jurisdictions such as the state of California\textsuperscript{79} and the E.U.\textsuperscript{80}, have come to include disposed products themselves, such as spent batteries, waste oils, end-of-life vehicles, home appliances, computers and other electronics, or “e-waste.”

Nationwide recycling laws have varied results. Glass accounts for a 33 percent recycling recovery rate in the U.K. in 2003, while other European nations with more developed collection infrastructures have higher glass recycling rates of 80 to 90 percent.\textsuperscript{81} Although Japan and Brazil have the highest aluminum recycling rates (72 and 61 percent respectively), most nations in the world have aluminum recovery rates of around 50 percent.\textsuperscript{82} In the U.K., 24 percent of all aluminum packaging wastes, and 42 percent of all steel packaging wastes, were recycled in

\textsuperscript{77} Reed McManus, “Master of Plastic”, \textit{Sierra}, January/February 2007, at 22.
\textsuperscript{78} Imhoff, \textit{supra} note 2, at 15-16.
\textsuperscript{79} \textit{Id.}, at 52.
\textsuperscript{81} Waste Online, “Packaging recycling information sheet”, \url{http://www.wasteonline.org.uk/resources/InformationSheets/Packaging.htm} (last accessed May 18, 2007).
\textsuperscript{82} Imhoff, \textit{supra} note 2, at 15.
2002. Due to the ease of recycling steel – since it is relatively easy to separate through magnetic extraction, it is completely recyclable – up to a quarter of new steel cans are made from recycled steel.

The feasibility of the recycling of plastics depends on what type of resin a particular kind of plastic is composed of. Polyethylene terephthalate (PET) is the most commonly recycled plastic resin type. However, plastics are increasingly composed of mixed resin types, have high volume-to-weight ratios, and lack end markets for recycled products made from both single and multiple types of chemical compounds, making them increasingly non-recyclable. Today, approximately 40 different types of plastics are used in consumer products, with each type of plastic having different properties, so, in order to create a recycled plastic that is similar in quality to virgin plastic, an automated 20-step energy-intensive process is required to separate plastics from non-plastics, and then to sort plastics from each other by type and grade. Thus, in the U.S., plastic packaging has grown five times faster by weight than the plastics recovered for recycling, and in the U.K., only 23 percent of plastics packaging was recycled in 2003. In fact, because of its high calorific content, incineration for energy recovery may be the most efficient recovery method for plastics.

Another “downstream” solution to the packaging waste problem is to shift the burden of packaging disposal from the public to the private sector that generates the packaging. Such

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84 Id.
85 Id., at 16.
86 Id., supra note 2, at 10.
87 Reed McManus, “Master of Plastic”, Sierra, January/February 2007, at 22.
88 Id., supra note 2, at 10.
90 Id.
approaches are often referred to as an “Extended Producer Responsibility” (EPR) scheme, whereby “upstream” packaging manufacturers are held financially accountable for the “downstream”, post-consumer or “end-of-life” phase of their products, under the rationale that doing so “would dictate an economic imperative to become less wasteful in the first place and create a positive feedback loop for the manufacture of more economically recyclable products.”91

The European Union’s Directive 94/62/EC of 20 December 1994 on Packaging and Packaging Waste provides that Member States must implement preventive measures “to prevent the formation of packaging waste” by using approaches such as “projects to introduce producer responsibility to minimize [sic] the environmental impact of packaging.” The Directive also requires the European Commission to “present proposals for measures … to ensure that new packaging is put on the market only if the producer has taken all necessary measures to minimize its environmental impact.”92 Implementation of the Directive varies by member states of the European Union with different approaches to EPR.

In Germany, which had, under its “Ordinance on the Avoidance of Packaging Waste,”93 developed EPR regulations prior to the adoption of the European Union’s Packaging Directive, private industry is responsible for packaging to the end of its lifecycle, incurring the costs of collecting, sorting, and recycling packaging waste they originally generated.94 The ordinance

91 Imhoff, supra note 2, at 46.
requires retailers to install bins that encourage German consumers to return excessive primary or secondary packaging at the point-of-sale, imposes mandatory deposits on non-refillable containers, and excludes incineration of packaging wastes for energy recovery as an option.\footnote{95} In order to manage the infrastructure of this EPR law, the German government established a nonprofit entity to collect fees by licensing a “Green Dot” logo printed on all products that meet packaging regulations, for which manufacturers purchase licenses so that a for-profit entity may collect, separate, recycle and process packaging wastes.\footnote{96} Despite an initial implementation cost to the government of $30 per person per year, Germany’s EPR regulations resulted in a decrease in packaging consumption by 7 percent between 1991 (when the Ordinance was originally adopted) and 1995 due to packages being made lighter and free of unessential packaging, an increase in refillable and concentrated packaging, and use of less composite plastics and more easily recycled materials.\footnote{97}

In the U.K. and the Netherlands, EPR takes the form of “shared producer” responsibility. Under this market-based approach, materials producers, packaging manufacturers, and sellers for recovery and recycling of packaging waste share the “downstream” costs of packaging wastes that they produced or sold, according to a certain percentage obligation associated with economic activity.\footnote{98} In the U.K., under the 2005 Producer Responsibility Obligations (Packaging Waste)

\footnote{http://www.epa.gov/swerrims/international/factsheets/pdfs/200610-packaging-directives.pdf (last accessed May 22, 2007), at 2-3.}
\footnote{96 Imhoff, supra note 2, at 46.}
\footnote{97 Id., at 47.}
Regulations, parties meet their shared obligation by registering and implementing a recovery program individually with the government or paying a membership fee to participate in an industry-sponsored recovery program. In addition, Packaging Recovery Notes (or PRNs), are issued generally to private entities that reprocess packaging waste; these Notes serve as evidence that the party converted waste into non-waste, and have economic value because they are traded to producers of packaging waste, allowing them to comply with their recycling obligations.

Under Japan’s EPR scheme (established by its “Basic Law for Establishing a Recycling-Based Society”), manufacturers and importers include costs of recovery, recycling, or reuse in the prices of their manufactured or imported products and consumers pay fees when their used product is taken back by the product’s manufacturer or importer. Seeking to combat the severe shortage of landfill space in Japan, the nation in 1997 enacted a “Container and Packaging Recycling Law” that subjects PET plastic, glass, paper and plastic containers, and other packaging wastes, to mandatory recycling, and requires manufacturers that produce containers

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and packaging materials to pay a fee for the cost of collecting, sorting, transporting and recycling their packaging materials.105

Under South Korea’s EPR law,106 a 2005 revision of its Resource Conservation and Recycling Facilitation Act of 1992 (RCRFA),107 consumers may return purchased items for free to the manufacturer or importer. In addition, this law requires that producers whose yearly outputs total more than 1 billion Won (approximately $870,000), and importers whose yearly imports total more than 300 million Won (approximately $260,000), must take back discarded home appliances and electronics, either by establishing a collection organization or paying a government recycling tax.108 Going further than Japan’s EPR requirements, South Korea’s RCRFA imposes stiff penalties, recycling fees, and recycling requirements for industry, fast-food establishments, and individual citizens. The law also requires manufacturers and importers of packaging materials and products in recyclable packaging materials to recycle their packaging wastes, or to pay a recycling fee to the Recycling Co-op Association, a non-governmental entity, to cover costs of take-back and recycling of the wastes they produce, under a formula based on the amount of collected recyclables they produce and sell. When they do not recycle their

wastes, recycling fees are imposed. The law requires fast-food establishments to make recycling bins available to customers to use to dispose their used paper containers and to recycle more than 90 percent of their used paper containers. If they do not do so, have heavy fines (up to 3 million Won, or nearly $2500) can be imposed on them for each violation. Individuals who generate higher amounts of non-recycled wastes pay higher fines, and are subject to a “volume-based waste collection fee system,” whereby they are not required to pay for disposal of their wastes, but are required to buy specially-designed plastic bags for separated recyclables, which are the only kind collected by waste collection trucks.

There have been numerous failed attempts in the United States to create voluntary national packaging and product take-back programs through enactment of federal or state “take back” laws that would require manufacturers of packaging waste to pay for the recycling and disposal of their products' packaging and of their discarded products. Such efforts have not gained ground in the U.S., which has generally lagged behind other industrialized nations in comprehensive and nationwide recycling regulations. The U.S. federal government appears to regard its role as an indirect advisor in the regulation of packaging and packaging wastes. However, many U.S. corporations involved in international trade of consumer products are voluntarily adopting EPR responsibilities due to European EPR requirements, and certain states, such as California, have adopted EPR regulations on their own.

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110 Id.
111 Id.
112 Reed McManus, “Master of Plastic”, Sierra, January/February 2007, at 23.
113 Imhoff, supra note 2, at 52.
Upstream Solutions: Reduce

Laws aimed at the “upstream” end of the packaging lifecycle focus on measures that essentially “prevent the formation of packaging waste” in the first place. One such measure is “source reduction,” whereby the use of materials, energy and waste in production of packaging is minimized by, among other methods, reformulating liquids into concentrates (thus reducing the size of packaging for the liquid product), otherwise reducing the size of a product's packaging, changing from one-way to refillable containers, or eliminating shrink wrap as a secondary packaging material.

A means of source reduction that aims to reduce the amount of raw materials and energy used to produce and transport products is referred to as “lightweighting,” or making packaging materials lighter and more flexible than heavier, rigid packaging. However, environmentalists argue that lightweighting materials leads to increased use of plastics that are generally not recyclable and are incinerated or sent to landfills, or, if recyclable, seldom recycled.

Source reduction also may include recycled-content mandates, requiring manufacturers of packaging to substitute materials that are high in post-consumer recycled content, for virgin metal, glass, paper, or, especially plastic, in packaging containers. Some jurisdictions, such as the state of California, offer disposal fee discounts for packaging containing at least 50 percent recycled-content in all rigid plastic packaging containers, regardless of the statewide recycling

115 Imhoff, supra note 2, at 54.
116 Id. at 55.
117 Id.
rate. New York has tried but failed to pass legislation requiring a minimum of 45 percent post-consumer recycled-content in all packaging materials.

Significant new source reduction methods include so called “empty space” laws that mandate a limit to the ratio of a product to the empty space around it within its container, with the intent of preventing deceptive marketing practices and reducing overall amounts of packaging material for each product. For example, under South Korea’s empty space law standards have been enacted to reduce void space, such that no more than 15 percent of void space is allowed for packages containing processed foods, and no more than two layers may wrap the product. The U.K.’s 1998 Essential Requirements Regulations specifies, among other things, requirements for “minimization of packaging volume and weight, and the design and use of packaging in a manner that permits its reuse and recovery.” Under Japan’s “Basic Law for Establishing a Recycling-Based Society,” businesses are required “to improve the

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119 Imhoff, supra note 2, at 42, 54.
120 Id., at 86.
design of products, packaging and container materials to reduce the amount of materials that would be discarded as waste.”  

Another means by which the law may prevent the formation of packaging waste are restrictions, bans, and phase-out limits on certain kinds of packaging materials. In 1998, the U.S. Senate considered, but did not pass, a bill to phase-out all wood pallets imported into the U.S. Bans on plastic shopping bag bans, intended to reduce litter and demand for oil, are currently in effect in nations such as Rwanda, Bhutan, Bangladesh, and South Africa, and cities such as Paris, London, Mumbai, and San Francisco. An alternative to such bans are plastic shopping bag fees, which are imposed in Taiwan, Ireland and South Korea for the purchase and use of plastic bags in markets and shops. Under South Korea’s Decree No. 202, outlining its Rules on the Standards of Product Packaging Materials and Methods, expanded polystyrene foam and polyvinyl chloride (PVC) packaging are completely banned, and merchants must sell each paper shopping bag for 100 Won (approximately 9 cents) and each plastic shopping bag for 20 Won (approximately 2 cents), regardless of the expense of the goods they purchase, or face severe fines of up to 3 million Won (approximately $2500) for each violation.

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129 Imhoff, supra note 2, at 87.


Bans on disposal of certain types of wastes in landfills or by incineration also are imposed by some national governments or political subdivisions to limit the amount of packaging that eventually enters into the waste stream, so that scarce landfill space is not rapidly used up and to mandate the use and reuse of post-consumer materials in packaging production. The E.U.’s Council Directive 99/31/EC on the Landfill of Waste\textsuperscript{133} applies stringent technical requirements for waste and landfills, with the goal of preventing or reducing the adverse effects from the landfilling of wastes upon surface water, groundwater, soil, air and human health.\textsuperscript{134} Member States must ensure that landfills comply by not allowing such materials as liquid wastes, flammable wastes, explosive or oxidizing wastes, hospital and other clinical, infectious wastes, and used tires.\textsuperscript{135} In compliance with Directive 99/31/EC, the Netherlands bans landfilling and incineration of Waste Electrical and Electronic Equipment, or “WEEE” products.\textsuperscript{136} In Nova Scotia, under its Solid Waste-Resource Management Strategy, the landfilling and incineration of organic wastes were banned in 1998, such that in 2000, only 18 municipal landfills remained in Nova Scotia of the hundreds that existed in the late 1970’s.\textsuperscript{137} In Texas in early 2007, the York County Council passed a new waste management plan, in response to community concerns over the approval of landfills and incinerators in their neighborhoods, which prohibits disposal of any new construction and demolition materials in landfills, thereby eliminating by 2025 up to 325,000 tons of construction waste that would otherwise occupy precious landfill space.\textsuperscript{138}

\textsuperscript{135} Id.
At the international law level, packaging reduction and reuse and recycling laws come in the form of both “hard” and “soft” law. Amended in 2004 as Directive 2004/12/EC, the European Community (EC) Directive on Packaging and Packaging Waste 94/62/EC, commonly known as the “Packaging Directive,” is a comprehensive “hard” international recycling law that requires European Union member states to establish recycling targets and to producer responsibility systems to prevent the formation of packaging waste by requiring the “taking back” of materials generated by producers. This law “aims to harmonize national measures concerning the management of packaging and packaging waste in order … to prevent any impact thereof on the environment of all Member States as well as of third countries or to reduce such impact, thus providing a high level of environmental protection …” and “to ensure the functioning of the Internal Market.”

The E.U. Packaging Directive was adopted following an attempt by the European Parliament and the Council of Ministers to deal with diverging national legislation in several Member States resulting from an earlier directive (Directive 85/339/EEC), which sought to reduce the proliferation of liquid beverage packaging in Europe, but which instead created serious market problems because of its vague mandates and definitions. Because of its vagueness, Directive 85/339/EEC caused collection and recycling schemes funded by the sale of secondary raw materials to nearly collapse due to “cheap[er] secondary materials from countries

that provided funding for collection and recycling appear[ing] on the markets of other Member States where no such schemes were in place.”

In 2004, the E.U.’s Packaging Directive’s was amended to clarify various provisions. Both the 1996 and 2004 amended Directives stated two general priorities – first, to prevent production of packaging wastes at “upstream” sources, and second, to reduce the “downstream” disposal of packaging wastes through reuse, recycling and other forms of recovery, including incineration. Member States must take these preventive measures to “prevent the formation of packaging waste”, which may include programs “to introduce producer responsibility to minimise [sic] the environmental impact of packaging.” Thus, member nations have the option of seeking solutions that would shift the burden of packaging disposal from the public to the private sector that generates packaging wastes, under an EPR scheme, whereby “upstream” packaging manufacturers are held financially accountable for the “downstream”, post-consumer, “end-of-life” phase of the packaging of their products, under the rationale that doing so “would dictate an economic imperative to become less wasteful in the first place and create a positive feedback loop for the manufacture of more economically recyclable products.”

Member states must also take palliative measures in order to meet specified recovery and recycling targets. Specifically, by December 2008, no less than 60 percent of packaging wastes by weight must be recovered or incinerated at waste incineration plants with energy recovery.

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143 Id., at Art. 4(1).
144 Imhoff, supra note 2, at 46.
between 55 and 80 percent of packaging wastes by weight must be recycled,\footnote{146 \textit{Id.}, at Art. 6(1)(d).} and 60 percent of glass, 60 percent of paper and board, 50 percent of metal, 22.5 percent of plastics, and 15 percent of wood, packaging wastes by weight must be recycled.\footnote{147 \textit{Id.}, at Art. 6(1)(e)(i) - 6(1)(e)(v).} By 2002, the E.U. found that out of the 66 million tons of packaging wastes generated by Member States, 54 percent was being recycled, and that 25 million tons of greenhouse gas emissions were eliminated in the process, making recycling the most cost-effective alternative to reduce carbon dioxide equivalent emissions.\footnote{148 Commission of European Communities, “Report from the Commission to the Council and the European Parliament on the Implementation of Directive 94/62/EC on Packaging and Packaging Waste and its Impact on the Environment, as well as on the Functioning of the Internal Market,” SEC (2006) 1579 (2006), at. 5.}

“appropriate techniques for the final disposal of dangerous substances contained in waste destined for recovery.”

The Waste Framework Directive is different from the Packaging Directive in that it broadly focuses on “any substance or object” that a producer or possessor of waste disposes of or is obliged to dispose of pursuant to national waste reuse, recycling and recovery requirements. In particular, it requires Member States, among other things, to recover or dispose of waste “without risk to water air or soil, or to plants or animals,” “without causing a nuisance through noise or odours [sic],” and “without adversely affecting the countryside or places of special interest.” The Directive also requires member states to establish “an integrated and adequate network of disposal installations,” create waste management plans, and ensure that producers or possessors of wastes have them recovered or handled by themselves, or by public or private waste collectors. In addition, member states are required by the Directive to establish a permitting system for collectors, landfills, and recovery centers (incinerators), and in accordance with the “polluter pays” principle, to shift the cost of disposing waste to “the holder who has waste handled by a waste collector” and/or “previous holders or the producer of the product from which the waste came.”

151 Id., at Art. 3(1)(a).
154 Id., at Art. 5.
155 Id., at Art. 7.
156 Id., at Art. 8.
157 Id., at Arts. 9–11, 15.
Another binding international law, “The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal,”\(^{158}\) affects the transport, or “transboundary movement” and disposal of hazardous packaging wastes.\(^{159}\) The Convention affects those packaging waste materials that are “hazardous,” containing the heavy metals and hazardous waste properties listed in Annexes I and III from industrial processes listed in Annex I, and “other wastes,” or “wastes collected from households” or “residues arising from the incineration of household waste” that are subject to transboundary movement.\(^{160}\) Under the “prior informed consent” provisions of the Convention, parties to the Convention are obligated to inform other Parties of their intent to export hazardous wastes or other wastes to other Parties and prohibit the export of the two types of waste if the State of import fails to consent in writing to the movement of the waste into their borders.\(^{161}\) Outside of these duties, parties are also obligated to, among other things, ensure that the generation of hazardous and other wastes is minimized and that there are “adequate disposal facilities” in the importing nation.\(^{162}\) The Convention also prohibits the export of a hazardous waste if the exporting nation has the capacity to dispose of the waste within its borders, unless the importing nations will recycle, recover and reuse the imported hazardous waste.\(^{163}\) The Convention also mandates all hazardous and other wastes subject to transboundary movement to “be packaged, labeled, and transported in conformity with generally accepted and recognized international rules and standards in the field of packaging, labeling, and transport.”\(^{164}\) Although the Convention has detailed

\(^{159}\) Id., at Art. 1(1).
\(^{160}\) Id., at Art. 1(1)-1(2), Annexes I-III.
\(^{161}\) Id., at Art. 4(1)(c).
\(^{162}\) Id., at Art. 4(2)(c)-4(2)(d).
\(^{163}\) Id., at Art. 9.
\(^{164}\) Id. at Art. 4(7)(b).
requirements for export, transport, and prior informed consent with regard to hazardous wastes, it does not explicitly address the export and disposal of packaging wastes as do the European Packaging and Waste Directives mentioned above.

Beyond the E.U. packaging waste directives and the Basel Convention, no other hard law presently exists under international law to directly regulate the transport of packaging wastes or downstream or upstream ends of the packaging chain. However, some existing international "soft" law may influence state regulations on packaging wastes and may one day evolve into binding principles of international customary law, even though such soft law does not currently impose binding obligations under international law. For example, the 2002 International Law Association’s New Delhi Declaration of Principles of International Law Relating to Sustainable Development is a soft law instrument, intended as an international statement of principles that “may help to resolve conflicts related to sustainable development, and support the balanced integration of laws and policies at the intersection of international environmental, social and economic law.”165 Principle 1 (“The duty of State to ensure sustainable use of natural resources”) of the Declaration may be relevant to packaging waste problems in the industrialized and developing worlds, suggesting that the reduction and prevention of packaging wastes are integral to sustainable development, when it declares, “States are under a duty to manage natural resources … in a rational, sustainable and safe way so as to contribute to the development of their peoples … and to the conservation and sustainable use of natural resources and the

protection of the environment … under a duty to avoid wasteful use of natural resources and promote waste minimization policies.”

Two other existing international soft law instruments may be construed as relating packaging waste solutions to sustainable development. The first, Agenda 21, is a set of recommendations, which along with the Rio Declaration on Environment and Development, and the Statement of Principles for the Sustainable Management of Forests, was adopted in 1992 and reaffirmed in 2002 by more than 178 national governments at the United Nations Johannesburg Conference on Environment and Development. Agenda 21 is “a comprehensive plan of action to be taken globally, nationally and locally by organizations of the United Nations System, Governments, and Major Groups in every area in which human impacts on the environment.” Chapter 21 of Agenda 21 focuses on “environmentally sound management of wastes,” which was one of the environmental issues of “major concern to the signatories in maintaining the quality of the Earth's environment and especially in achieving environmentally sound and sustainable development in all countries.” Defining solid waste as “all domestic refuse and non-hazardous wastes such as commercial and institutional wastes, street sweepings and construction debris,” the plan calls for environmentally sound waste management that reaches “beyond the mere safe disposal or recovery of wastes that are generated and seek[s] to address the root cause of the problem by attempting to change unsustainable patterns of production and consumption.” Thus, this Chapter 21 of Agenda 21 could be interpreted to require nation-states to implement measures to prevent the formation of packaging waste, as mandated in the E.U. Packaging Directive, as it declares that “the framework for requisite action should be

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166 Id., at 1-2.
founded on a hierarchy of objectives” that are centered on four general areas, including minimization of waste, maximization of “environmentally sound waste reuse and recycling,” promotion of environmentally sound waste disposal and treatment,” and broadening of waste service coverage.170

Another relevant international soft law instrument is the International Declaration on Cleaner Production, a voluntary, public statement by its sponsor, the United Nations Environment Programme, of a general commitment to the strategy and practice of “Cleaner Production,” which the United Nations finds will “provide[] a significant contribution to achieving sustainable production and consumption” because it promotes “economic, environmental and health/safety benefits.”171 The Declaration was signed in 1998 in South Korea with 67 inaugural signatories and currently boasts a total of 1700 regional and national signatories.172 It declares that the signatories “believe that Cleaner Production and other preventive strategies such as Eco-efficiency, Green Productivity and Pollution Prevention are preferred options” and “understand Cleaner Production to be the continuous application of an integrated, preventive strategy applied to processes, products and services in pursuit of economic, social, health, safety and environmental benefits.”173 To this end, the signatories committed to take such actions as “encourag[ing] the adoption of sustainable production and consumption practices through our relationships with stakeholders”, establishing “awareness, education and training programmes [sic]”, “encourage[ing] the integration of preventive strategies” with tools such as environmental impact, life cycle, and cleaner production

168 Id., at Chapter 21.1.
169 Id., at Chapter 21.3 – 21.4.
170 Id., at 21.5.
172 Id.
assessments, and “promoting a shift of priority from end-of-pipe to preventive strategies in our research and development policies and activities.” The signatories also committed to “supporting the development of products and services which are environmentally efficient and meet consumer needs”, “encouraging new and additional finance and investment in preventive technology options, and promoting environmentally-sound technology cooperation and transfer between countries.” Therefore, the signatories have committed to sustainable production in order to reduce the environmental impacts of wastes, but have not been bound by any internationally-ratified requirements that would require them to do so.

The Need for a New International Packaging Convention

If one were to seek models for new international hard law with the purpose of the “protection of the environment and human health against [packaging waste’s] harmful effects,” one should not look too far from what the E.U. has done legislatively to address the packaging waste problem. The E.U. Directives 2004/12/EC and 2006/12/EC both are excellent models for a similar broad international law convention because the Directives have met the test of time, having been in place, in their current and previous incarnations, since 1985 and 1975, respectively. European courts and legislative bodies have over the years refined the two laws to come to more conclusive definitions of packaging, recycling, waste, and disposal, to set and update recycling and reduction targets, and to come to terms with the proper scope of regulations aimed at waste prevention and disposal. Expanding the scope of Directives 2004/12/EC and 2006/12/EC to other nations would also be an effective international approach to the world-wide packaging problem, because not only have countries outside Europe instituted similar

173 Id.
174 Id.
regulations, global companies such as Microsoft and WalMart, have voluntarily adopted product and packaging take back and source reduction policies to meet E.U. requirements, and advertise that their participation in these program indicate that they are good corporate citizens.\textsuperscript{176}

However, extending the scope of the Directives to nations outside the E.U. would not only pose jurisdictional problems, but would also face challenges the Directives continue to struggle with, even after amendments. For example, as was the case in the E.U., diverging national legislation may result from diverging national and continental economies if vague mandates and definitions are included in a new international packaging convention, which may create serious market problems in that collection and recycling schemes funded by the sale of secondary raw materials might fail, due to cheaper secondary materials from countries that provided funding for collection and recycling competing with those materials in states where no such schemes exist. Such a result might be avoided if a new packaging convention includes a prior informed consent approach, similar to that of the Basel Convention, that would require a nation exporting packaging wastes to another nation to provide notification to the importing country of the contents of packaging in an exported product or waste material and that would give the importing nation authority to ban the import of the packaging waste not meeting their recycling or reuse standards. If the new convention also contained a provision prohibiting a party nation from exporting packaging wastes to a non-party nation, the new packaging Convention could prevent profitable markets for packaging wastes in non-party countries should packaging waste recycling, recovery and source reduction efforts cost more for manufacturers and other “holders” of waste than simply exporting the wastes to another nation.

However, extending the scope of the E.U. Directives to nations outside the E.U. would encourage incineration for energy recovery as a disposal option for packaging and other wastes that meet recovery targets, because the EU Directives permit incineration of wastes for energy recovery. To the disappointment of anti-incineration environmentalists, this support of incineration by the E.U. seems inconsistent with the E.U.’s own hierarchy of waste management principles of prevention, recovery, and disposal, in that order, in that the costs of air and ground pollution from incineration may not outweigh the energy savings generated.\footnote{John Cross, Angie Leith, and Sara Hartwell, U.S. Environmental Protection Agency Office of Solid Waste, “Treaties, Directives, and Policies: The EU Packaging Directive,” October 2006, \url{http://www.epa.gov/swerrims/international/factsheets/pdfs/200610-packaging-directives.pdf} (last accessed May 22, 2007), at 3.}

Nations ratifying a new international packaging convention that follow an expanded set of E.U. Directives 2004/12/EC and 2006/12/EC would not only have to assume this same hierarchy of waste management, but also add to potential pollution by incinerating packaging wastes. Lastly, modeling a new international law on the E.U. Directives may not do what it is intended to do – that is, harmonize national packaging and packaging waste management measures, and prevent or reduce impacts on the environment from packaging wastes, while ensuring that the Internal Market functions properly by setting recycling and recovery targets so low that they may be achieved without government intervention due to voluntary efforts in the private sector. Indeed, most E.U. member states achieved or surpassed the E.U. Directives’ minimum recycling and recovery targets well ahead of their deadlines, so critics have sought unsuccessfully to increase the E.U.’s recycling goals and to require minimum packaging reuse targets and mandatory take back regulations and recycling fees.\footnote{Id.}
The international community could also address the packaging waste problem by taking the basic tenets of Agenda 21 and ratifying them into a new hard law convention, or integrating them into either the previously-mentioned Basel Convention and/or the Kyoto Protocol to the United Nations Framework Convention on Climate Change. Agenda 21’s four program areas – minimization of waste, maximization of environmentally sound waste reuse and recycling, promotion of environmentally sound waste disposal and treatment, and broadening of waste service coverage – are means by which the signatories to the Kyoto Protocol could fulfill their requirement to “reduce[e] their overall emissions of [greenhouse] gases by at least 5 per cent below 1990 levels in the commitment period 2008 to 2012” by “enhancing energy efficiency in relevant sectors of the national economy,” “reducing or phasing out [] market imperfections, fiscal incentives, tax and duty exemptions and subsidies in all greenhouse gas emitting sectors,” and “encouraging appropriate reforms in relevant sectors aimed at promoting policies and measures which limit or reduce emissions of greenhouse gases.” Indeed, as previously noted, reduction of packaging wastes decreases carbon dioxide emissions, and in the E.U. recycling and reuse of packaging wastes has been the most cost-effective means of doing so.

Thus, Kyoto Protocol signatories could make significant progress towards meeting the Protocol’s required greenhouse gas emissions reductions by meeting the goals of Agenda 21 to “stabilize or reduce the production of wastes destined for final disposal, over an agreed time-frame, by formulating goals based on waste weight, volume and composition and by inducing separation to facilitate waste recycling and reuse,” and by “strengthen[ing] and increas[ing] national waste reuse and recycling systems.” Signatories also could make progress these
reduction requirements by “creat[ing] a model internal waste reuse and recycling programme for waste streams, including paper, within the United Nations system,” and by “provid[ing] health-protecting, environmentally safe waste collection and disposal services to all people.

In order to prohibit the trans-boundary movement or trade of packaging wastes across borders, which, as noted above, would undermine any international packaging waste law by creating market problems in regional economies, the objectives of Agenda 21 could also be integrated into the Basel Convention. As mentioned above, the Convention’s “prior informed consent” provisions requires parties to inform other Parties of their intent to export hazardous wastes or other wastes to other Parties, prohibit the export of the two types of waste if the State of import fails to consent in writing to the movement of the waste into their borders, and ban the import of hazardous and other wastes if the importing nation does not consent because the wastes do not meet recycling or reuse standards.\(^\text{181}\) This approach would require a broadening of the scope of the Convention to directly cover disposed of product packaging as “hazardous” and “other” wastes, in addition to its present application to many recyclable materials included in its definition of “other wastes” under Article 1(2) subject to “disposal,” which, under Article 2(4) and Annex IV(B) includes recovery, reuse, and recycling operations.\(^\text{182}\)

In seeking to have any new international law convention addressing the problem of packaging waste enter into force – be it through broadening the geographical and jurisdictional scope of the E.U. Packaging Waste and Waste Framework Directives, or by integrating Agenda 21 into the Kyoto Protocol and Basel Convention, two general challenges will need to be

\(^{180}\)Id., at Art. 2.


\(^{182}\)Id., at Art. 1(2), 2(4), Annex IV(B).
overcome. For one thing, the United States lacks the leadership and political will that is necessary to expand the U.S.'s international environmental law obligations. The U.S. has yet to become a signatory of the Kyoto Protocol, but the federal governmental agency with responsibility for protection of the environment, the U.S. Environmental Protection Agency, even admits that “new ways to increase the recovery of secondary materials, including packaging and plastics in particular, are clearly needed” because “state and local government concern about packaging waste continues to grow, while new containers emerge that complicate recycling” and that “government reductions in recycling subsidies and a growing demand for secondary materials from abroad have placed increased pressures on domestic recyclers, especially plastics recyclers, who are competing fiercely for limited feedstock.”

Second, and more importantly, despite the leadership of some global corporations, many domestic corporate leaders and many average citizens worldwide remain apathetic or tolerant at best of any measures that would disrupt lifestyles that feed on products wrapped in glass, plastic, metal, or paper for convenience and ease of consumption. At present, recycling rates are declining worldwide after a significant increase in the 1990’s. This decrease, combined with rising waste collection costs, may undermine any support for measures to combat the proliferation of packaging wastes that currently is occurring among the public and corporations. Adding to this is the possibility that, outside of Europe, addressing the environmental impacts of packaging wastes may not be regarded by many persons as a proper subject for an international law convention. The solution to the pollution, resource depletion, and energy consumption

184 Imhoff, supra note 2, at 38, 40.
185 Id., at 39.
problems of packaging wastes may be perceived as being better solved through national or even state or local laws, as described above.

**Conclusion**

In conclusion, though packaging is a human invention and needed as an innate and important part of the lives of most every human being in the industrialized and developing worlds, the environmental consequences of the manufacturing and transportation of packaging and the disposal of packaging wastes do not solely impact humans, but the earth and its ecosystems that sustain all life on earth. All materials used for packaging good are derived from natural resources and benefit humans by providing sanitary and convenient means of consuming goods. However, once packaging ceases to be useful and is discarded as waste, it becomes a very visible problem.

A new international packaging convention is needed to address the packaging waste problem around the world. This paper recommends two different but complementary solutions. One solution would be a new international convention based upon the packaging and waste Directives already in place in the European Union to regulate the prevention, reuse and recycling of packaging waste. The other solution would be to integrate the relevant soft law provisions of Agenda 21 into the Basel Convention and the Kyoto Protocol to regulate the production, transport and disposal of packaging wastes within the context of limiting the transboundary movement of packaging wastes around the world and climate changing greenhouse gas emissions. Such binding international law conventions would help to solve the global packaging waste problem, and would not only move humanity towards cleaner air and water quality and waste disposal systems, but would also serve to conserve energy. This is important and needed
because conservation of energy through reduced disposal of packaging wastes is “a geostrategic imperative” towards a sustainable future, and would accommodate the likely opening up of “the global economic playing field to so many more people, all coming with their own versions of the American Dream – a house, a car, a toaster, a microwave and a refrigerator” all, of course, wrapped in its own packaging.\textsuperscript{186}