



**SPECIAL REPORT**

**MAJOR OPPORTUNITIES AND  
CHALLENGES TO U.S. EXPORTS OF  
ENVIRONMENTAL GOODS**

Senator Ron Wyden

December 9, 2009



## Summary

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As the United States and its trading partners seek to reduce emissions of greenhouse gases, mitigate climate change, and protect the environment, demand for environmental goods designed to address these challenges will rise. The U.S. has experienced an overall trade deficit in these environmental goods but has an opportunity to substantially increase production and exports of these goods to satisfy domestic and foreign demand.

According to the U.S. Department of Commerce,<sup>1</sup> the global market for environmental goods and services (EGS) grew by over 20 percent between 2002 and 2007 to \$660 billion. The U.S. is the world's largest producer and consumer of EGS, generating \$282 billion in revenues and \$40 billion in exports, and supporting 1.6 million jobs. Growing export markets for U.S. EGS is an opportunity to create and sustain many new U.S. jobs.

Foreign trade barriers and other actions by overseas governments appear to be preventing U.S. producers from taking full advantage of the opportunities that the growing EG sector provides. Ignoring the challenges to increasing U.S. production and exports of EG could be a substantial missed opportunity to U.S. economic growth and job creation.

Key highlights of this report show:

- Global EG trade more than doubled between 2004 and 2008.
- The U.S. trade deficit of EG is growing substantially.
- U.S. exports of EG are growing substantially.
- U.S. exporters of EG are concentrated in just a few states and in just a few products.
- Trade barriers in the fastest growing markets are a key constraint to increasing U.S. EG exports.
- U.S. tariff rates on EG are much lower than those applied by the rest of the world.
- U.S. EG exporters are losing overseas market share to foreign producers, especially to China.

This report focuses on environmental goods (EG), and not on environmental services. It builds upon previous research that examines trade in environmental goods by looking into key aspects of the global EG market, the U.S. EG trade balance, U.S. state-level EG exports, and potential barriers constraining growth to U.S. EG exports.

## Background

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Environmental goods and services (EGS) cover a wide range of products and services that cut across many different industry sectors. Although there is not a clear internationally accepted definition, EGS are generally defined as goods and services associated with environmental protection. Goods and services include those related to air, water, or soil pollution control and prevention; waste management; environmental monitoring and recycling; and renewable energy, among others.<sup>2</sup>

Members of the World Trade Organization (WTO) continue efforts to reach consensus on what constitutes an environmental good. In April 2007, a group of WTO members, including the U.S., submitted a list of 153 environmental goods for discussion in the WTO.<sup>3</sup> The list was derived from a larger list of more than 400 products that had been proposed over the previous two years. In a joint proposal submitted to the WTO in December 2007, the U.S. and European Union (EU) called on all WTO members to eliminate tariffs no later than 2013 on a narrower list of 43 environmental goods identified by the World Bank as broadly being “climate friendly.”<sup>4</sup> The focus of this paper is on these 43 environmental goods.

On November 19, 2009, several Members of the Senate Committee on Finance (Sens. Wyden, Crapo, Kerry, and Stabenow) urged the Obama administration to consider pushing for a plurilateral agreement within the WTO to reduce trade barriers to environmental goods. On December 1, 2009, at the WTO Ministerial in Geneva, U.S. Trade Representative Ron Kirk signaled support for such a plurilateral, as did the Trade Minister of Japan, Masayuki Naoshima.<sup>5</sup>

The 43 environmental goods are identified at the WTO-recognized six-digit code level of the Harmonized Commodity Description and Coding System (HS) and can be categorized into seven product groups:<sup>6</sup>

- (1) Air Pollution Control (APC)
- (2) Management of Solid and Hazardous Waste (SHW)
- (3) Renewable Energy Plant (REP)
- (4) Heat and Energy Management (HEM)
- (5) Waste Water Management and Potable Water Treatment (WWM)
- (6) Cleaner or More Resource Efficient Technologies and Products (CRET)
- (7) Environmental Monitoring, Analysis, and Assessment Equipment (EMAA)

## Methodology

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In contrast to past studies that have examined U.S. trade of a broader group of environmental goods, this paper examines the U.S.-proposed list of 43 environmental goods (henceforth referred to as “EG”) in the context of global trade, the U.S. trade balance (including state-level exports), U.S. market share in global markets, and trade barriers in foreign markets.

Trade data for the latest 5-year period (2004-08) were obtained from the U.S. International Trade Commission and from Global Trade Information Service Inc.’s Global Trade Atlas online database. Bound and applied tariff rates of WTO members were obtained from the WTO’s Tariff Download Facility.

The available data on environmental goods trade have limitations. For example, at the six-digit HS level, products such as clean energy technologies or components are often included in a broader basket of goods, all of which may not be used exclusively for environmental purposes. Likewise, some products classified as environmental goods may be used for both environmental and non-environmental purposes. Such “dual-use” problems may therefore overstate or understate international EG trade. This may be especially true for state-level export data because of the high level of aggregation. The data presented in this report should therefore be viewed as illustrative of broad trends and potential trade patterns of environmental goods.

## Global Trade

Global EG exports more than doubled to \$215 billion between 2004 and 2008. Roughly 70 percent of global EG exports are products associated with producing energy from renewable sources, reflecting in part the prominence of renewable energy technologies vis-à-vis other “green” products included in the list of 43 environment goods (figure 1).

The top 10 global EG exporters account for almost 70 percent of global EG exports and are concentrated in Europe, Asia, and North America.

Among top global EG exporting countries, China has experienced the most dramatic growth, with exports increasing by 490 percent between 2004 and 2008 to \$27.4 billion. Germany is the largest exporter of environmental goods, accounting for 16 percent of global EG exports in 2008, followed by China (13 percent), Japan (9 percent), the United States (9 percent), and Italy (6 percent) (figure 2).

The fastest growing exporters in terms of percentage growth between 2004 and 2008 include Peru (increase of 540 percent), China (493 percent), Norway (352 percent), the Czech Republic (239 percent), and Korea (220 percent). In terms of value growth over the period, the fastest growing exporters include China (increase of \$22.7 billion), Germany (\$19.6 billion), the United States (\$7.7 billion), Italy (\$5.5 billion), and Japan (\$4.4 billion).

The top global EG importing countries are among the top global EG exporters and experienced significant import market growth between 2004 and 2008.

The United States is the largest import market of EG, accounting for 13 percent of global EG imports in 2008, followed by Germany (10 percent), China (9 percent), Spain (6 percent), and France (4 percent) (figure 3).

Figure 1

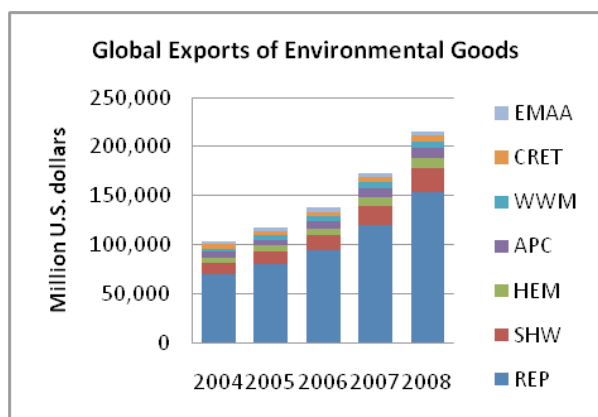
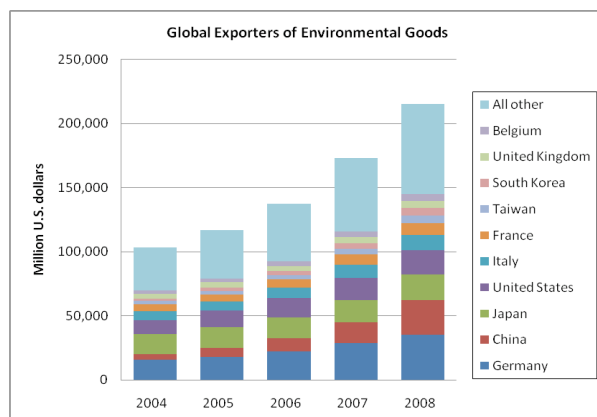


Figure 2



**Product Key:**

EMA: Environmental Monitoring, Equipment  
 CRET: Cleaner or More Resource Efficient Technologies  
 WWM: Waste Water Management and Treatment  
 APC: Air Pollution Control

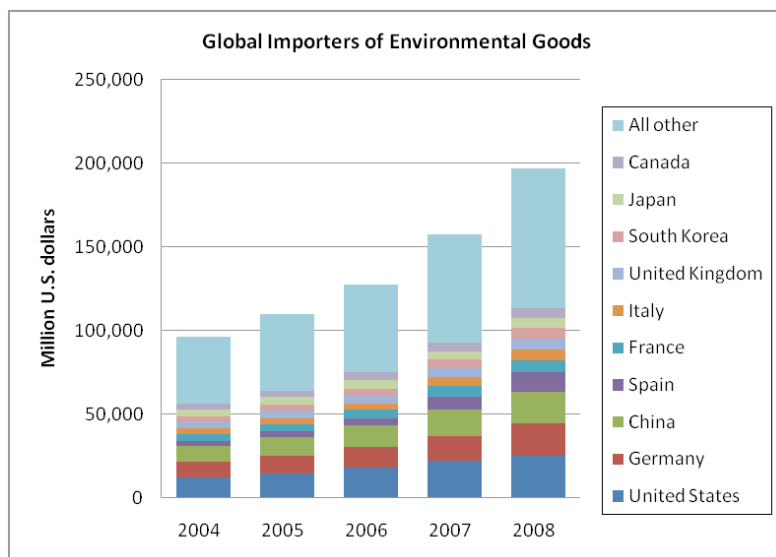
HEM: Heat and Energy Management  
 SHW: Management of Solid and Hazardous Waste  
 REP: Renewable Energy Products

## Global Trade (cont'd)

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The fastest growing import markets in terms of percentage growth between 2004 and 2008 include India (increase of 419 percent), Indonesia (348 percent), Spain (294 percent), and Kazakhstan (262 percent). In terms of value growth over the period, the fastest growing import markets include the United States (increase of \$13 billion), Germany (\$9.7 billion), China (\$9.2 billion), Spain (\$8.9 billion), and France (\$3.3 billion).

*Figure 3*



## U.S. Merchandise Trade Balance

In the last 5 years, the U.S. EG trade balance deteriorated substantially (figure 4). The U.S. trade deficit in these goods increased 350 percent to nearly \$6.8 billion. Almost all of the increase in the U.S. trade deficit is the result of increased U.S. demand for renewable energy products (REP) principally being met by increased imports from Asia and the EU. Between 2004 and 2008, the U.S. trade deficit in renewable energy products increased by 1,400 percent to \$5.7 billion. Despite a widening U.S. trade deficit, the United States ran a trade surplus in several product categories of EG, including products associated with air pollution control (APC), water waste management (WWM), heat and energy management (HEM), and solid and hazardous waste management (SHW) (figure 5).

The United States runs a trade deficit with all its major trading partners, including NAFTA partners, the EU, and Asia (figure 6). The U.S. trade deficit with NAFTA partners doubled to \$1.4 billion between 2004 and 2008, while the deficit with the EU increased by 350 percent to \$4.1 billion, and with Asia by 409 percent to \$3.6 billion. In contrast, the U.S. trade balance with Latin America improved during the period, resulting in a U.S. trade surplus of \$1.8 billion in 2008.

As illustrated in figures 7–10, the composition of the U.S. trade balance varies by region.

Figure 4

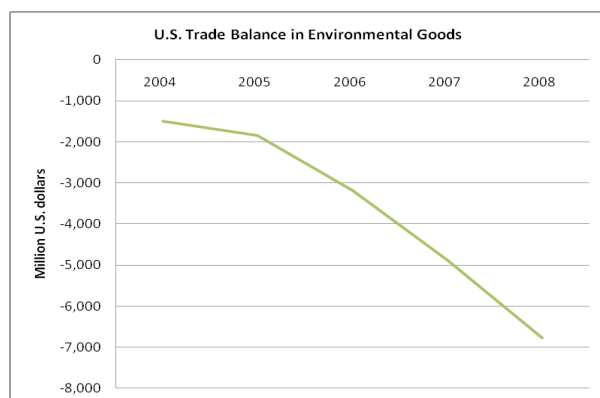


Figure 5

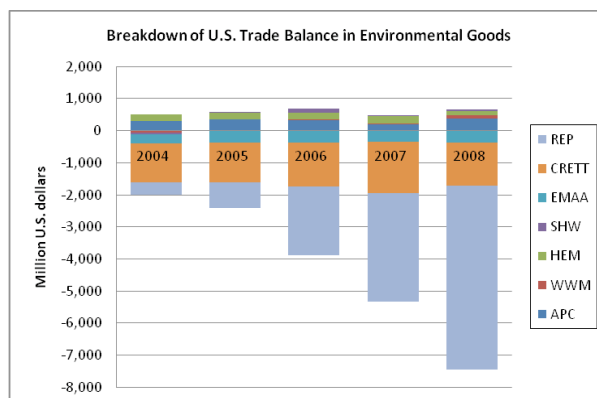
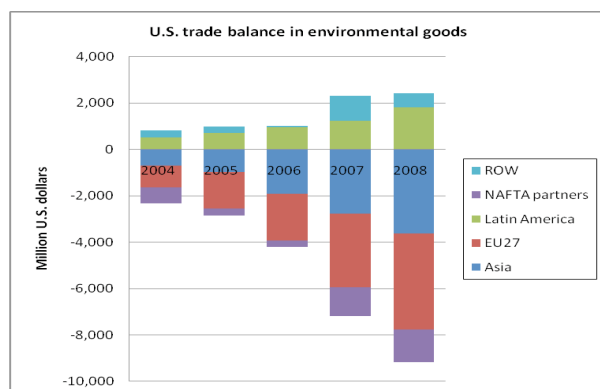


Figure 6



### Product Key:

REP: Renewable Energy Products  
 CRET: Cleaner or More Resource Efficient Technologies  
 EMAA: Environmental Monitoring, Equipment  
 SHW: Management of Solid and Hazardous Waste  
 HEM: Heat and Energy Management  
 WWM: Waste Water Management and Treatment  
 APC: Air Pollution Control



## U.S. Merchandise Trade Balance (cont'd)

Figure 7

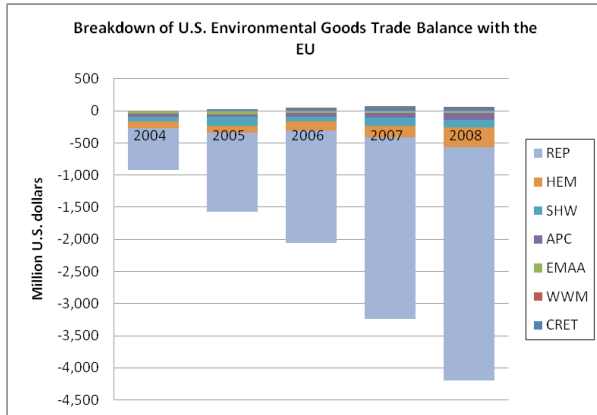


Figure 8

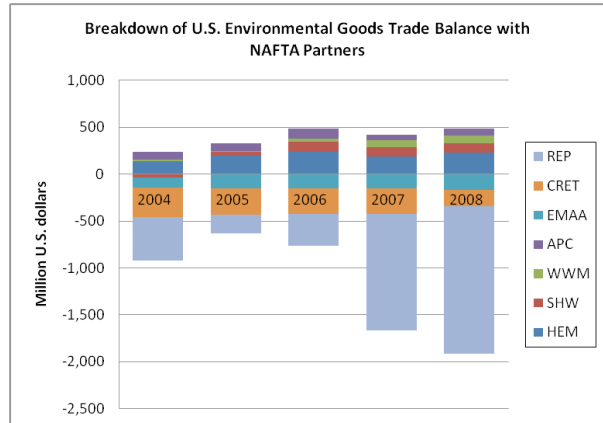


Figure 9

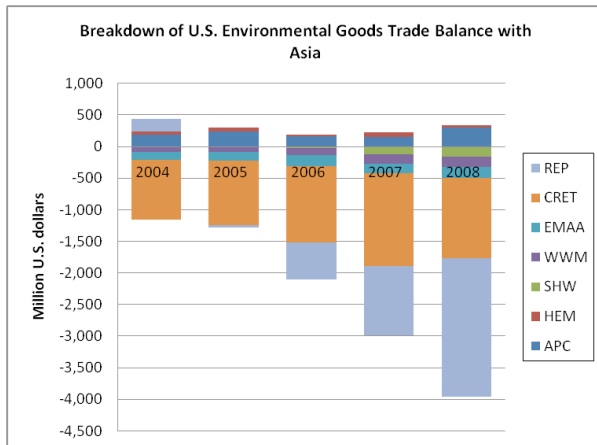
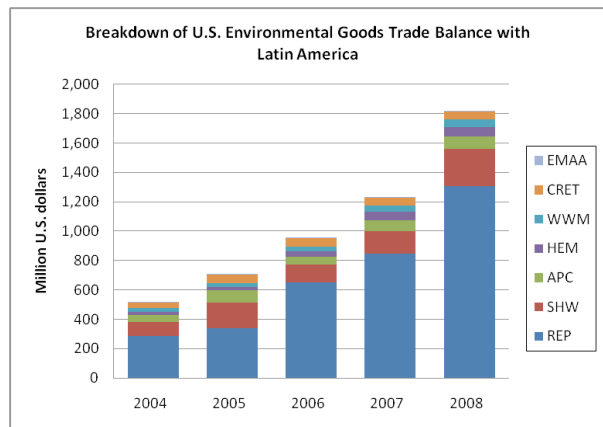


Figure 10



### Product Key:

REP: Renewable Energy Products  
 CRET: Cleaner or More Resource Efficient Technologies  
 EMAA: Environmental Monitoring, Equipment  
 SHW: Management of Solid and Hazardous Waste  
 HEM: Heat and Energy Management  
 WWM: Waste Water Management and Treatment  
 APC: Air Pollution Control

## U.S. Exports

Despite a widening U.S. EG trade deficit, U.S. EG exports increased 70 percent to \$18.4 billion between 2004 and 2008 (figure 11). Renewable energy products (REP) account for almost three-quarters of U.S. EG exports. Solid and hazardous waste management (SHW), primarily membrane landfill liners, accounts for 10 percent of U.S. EG exports, and air pollution control (APC), primarily biomass boilers, accounts for 5 percent. In terms of growth rates, waste water management (WWM) and heat and energy management (HEM) products increased the most, at 151 percent and 109 percent, respectively.

Top U.S. EG export products are REP, and include products related to electrical power production, like turbines that produce electricity, photovoltaic (PV) system controllers, and PV cells to generate electricity. The fastest growing exports in terms of growth rates between 2004 and 2008 include heat pump systems (increase of 452 percent), desalination plants (377 percent), tanks for conversion of waste to gas (207 percent), wind turbine towers (167 percent), and solar batteries (158 percent).

The fastest growing exports in terms of value growth during the period include turbines (increase of \$1.5 billion), PV system controllers (\$1.3 billion), PV cells for electricity generation (\$783 million), heat pump systems (\$760 million), and landfill liners (\$449 million).

Five U.S. states account for almost half of U.S. EG exports and half of total U.S. growth of EG exports: Texas (13 percent of total U.S. EG exports in 2008), California (12 percent), New York (9 percent), Illinois (8 percent), and Ohio (6 percent) (figure 12).

Figure 11

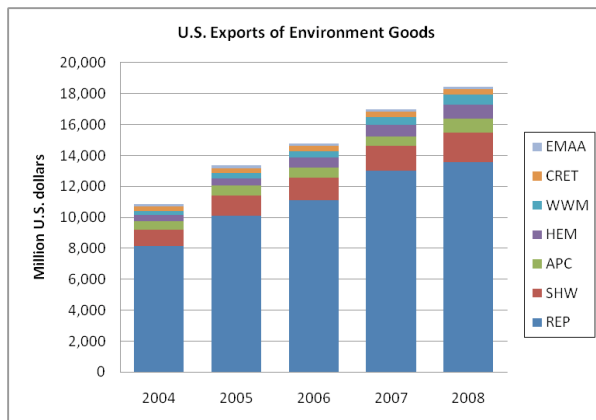
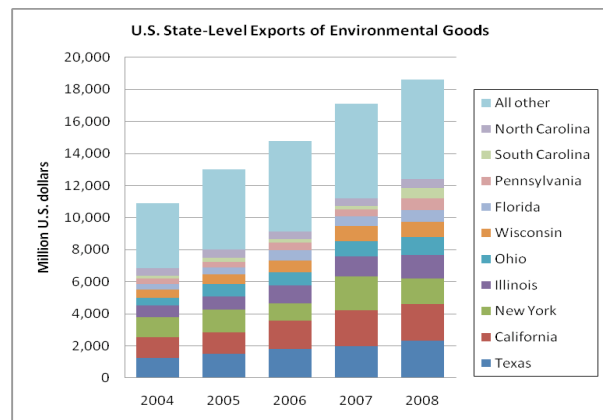


Figure 12



### Product Key:

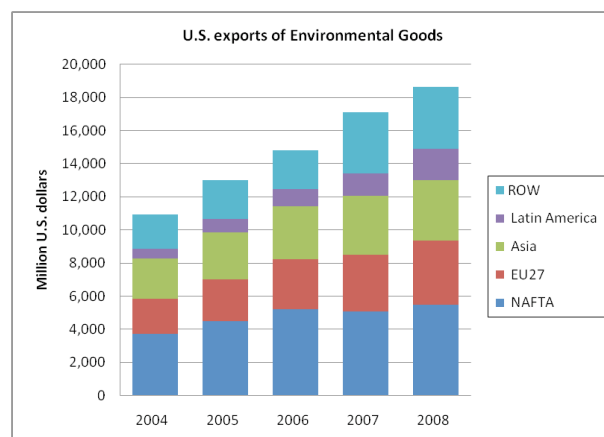
REP: Renewable Energy Products  
 CRET: Cleaner or More Resource Efficient Technologies  
 EMAA: Environmental Monitoring, Equipment  
 SHW: Management of Solid and Hazardous Waste  
 HEM: Heat and Energy Management  
 WWM: Waste Water Management and Treatment  
 APC: Air Pollution Control

## U.S. Exports (Cont'd)

The top regional markets for U.S. EG exports are NAFTA, the EU, Asia, and Latin America (figure 13). Despite running trade deficits with major regional trading partners, U.S. EG exports to regional markets have increased substantially since 2004.

The top five country markets for U.S. EG exports are Canada (44 percent increase since 2004), Mexico (54 percent increase), Germany (119 percent increase), the United Kingdom (91 percent increase), and China (64 percent increase). Of these export markets, the United States enjoys a trade surplus with only Canada.

Figure 13



## U.S. Imports

U.S. EG imports more than doubled to \$24.8 billion between 2004 and 2008. Imports of renewable energy products, primarily wind and solar systems and components, accounted for three-quarters of U.S. EG imports (figure 14). The top ten EG exporters to the U.S. market accounted for 80 percent of total U.S. EG imports in 2008 (figure 15).

Figure 14

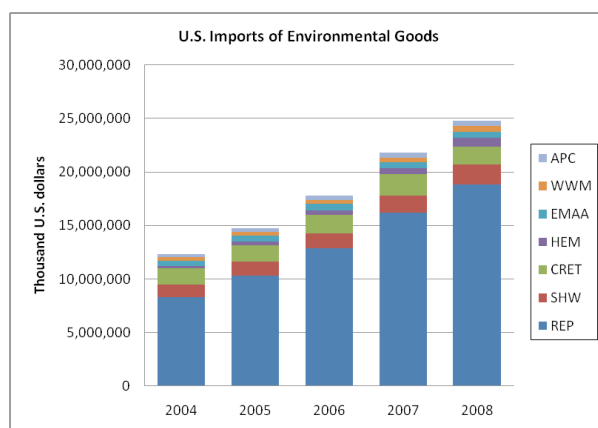
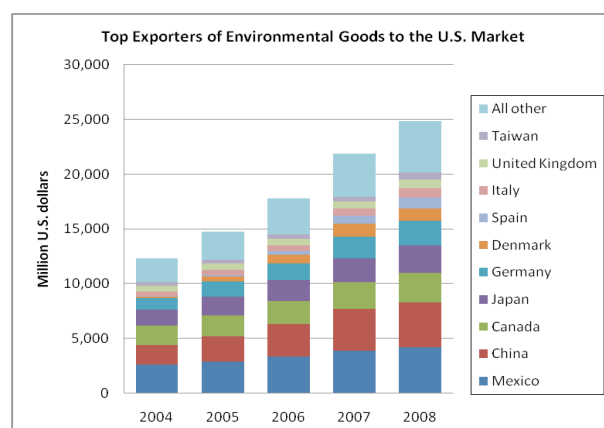


Figure 15



### Product Key:

EMAA: Environmental Monitoring, Equipment  
 CRET: Cleaner or More Resource Efficient Technologies  
 WWM: Waste Water Management and Treatment  
 APC: Air Pollution Control

HEM: Heat and Energy Management  
 SHW: Management of Solid and Hazardous Waste  
 REP: Renewable Energy Products

## Barriers to Trade in Environmental Goods

Despite growing international trade in EG, considerable trade barriers exist. This is particularly true in developing countries that would benefit from the deployment of environmental goods to help mitigate climate-related challenges. In addition, high tariff rates in major emerging markets that have experienced significant market growth in recent years may act as an impediment to increased U.S. EG exports.

According to the World Bank, lowering trade barriers on environmental goods would benefit low- and middle-income developing countries because these countries are also emerging as major EG importers to help mitigate climate-related challenges.<sup>7</sup> Bound and applied tariff rates on environmental goods in low-income and middle-income developing countries are significantly higher than those in high-income developed countries (figures 16 and 17). Likewise, in many of the most important regional markets for U.S. EG exports, bound and applied tariff rates are substantially higher than those in the United States (table 1).

Figure 16

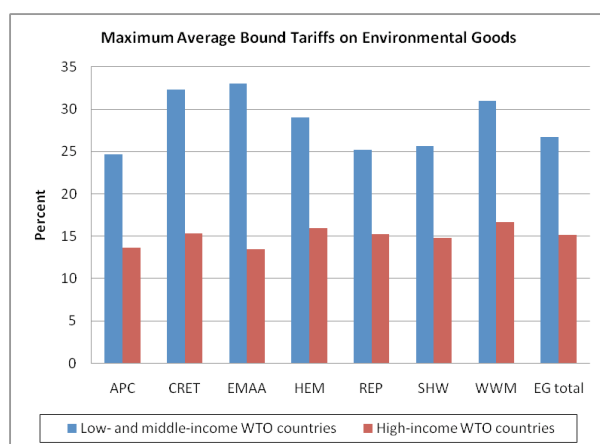


Figure 17

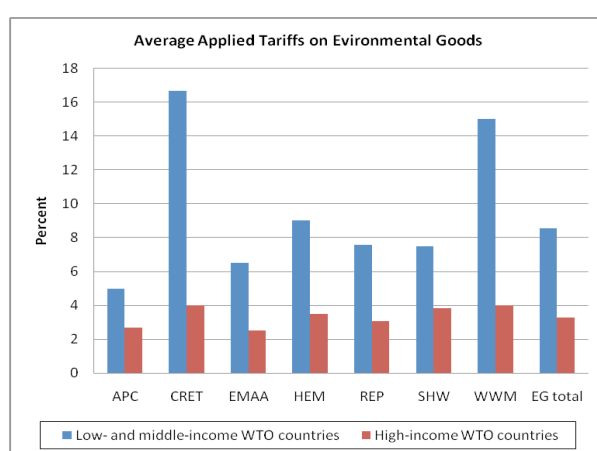


Table 1. Bound and Applied Tariff Rates on Environmental Goods

	Average maximum bound rates	Average applied rates
Region:	Percent	
Africa	32	9
Asia	21.5	7.5
NAFTA (Canada and Mexico)	22	6
EU	3	3
Latin America	41	6
Middle East	30	6
All other	17	3.5
United States	2.5	1.75

Note: WTO Average maximum bound and average applied tariff rates of the 43 environmental goods.  
Source: WTO Tariff Download Facility.

## Barriers to Trade in Environmental Goods (cont'd)

A recent World Bank study found that eliminating tariff and nontariff barriers to a narrower set of clean energy products in emerging markets could result in increased trade ranging from 3.6 percent to 63.6 percent, depending on the product and technology (table 2).<sup>8</sup>

Table 2. Change in Trade Volumes from Liberalizing Trade in Clean Energy Technologies

Technology option	Changes in trade volumes from elimination of tariffs	Changes in trade volumes from elimination of tariff and nontariff barriers
	<i>Percent</i>	
Clean coal technologies	3.6	4.6
Wind power generation	12.6	22.6
Solar power generation	6.4	13.5
Efficient lighting technologies	15.4	63.6
Total	7.2	13.5
Source: World Bank, <i>Warming Up to Trade? Harnessing International Trade to Support Climate Change Objectives</i> , June 2007, p. 51.		

Several nontariff barriers have been identified as impeding growth in EGS trade, including restrictive technical standards and labeling requirements; non-transparent government procurement; restrictions on professional services and ownership, and investment barriers related to intellectual property rights, among others.<sup>9</sup>

## Increased Demand, Declining U.S. Market Shares

Although U.S. EG exports have increased substantially in response to growing international demand, the United States faces declining export market shares in most regional markets, as well as the fastest-growing country import markets (tables 3 and 4). In contrast, China's global and regional market share of EG exports has increased considerably and coincides with declining export market shares among top EG exporters (figures 18–23).

Table 3. U.S. export market share of environmental goods by market, 2004–08

	2004	2005	2006	2007	2008
Region:	<i>Percent</i>				
Latin America	26.3	27.2	27.6	27.6	26.8
NAFTA partners	20.1	20.8	21.1	18.5	17.0
Middle East	15.7	15.5	10.5	19.7	15.3
Asia	9.4	10.2	10.2	9.3	8.1
Africa	8.3	7.9	7.5	5.6	4.6
EU	5.4	5.7	5.7	4.8	4.1
World	10.6	11.1	10.8	9.9	8.6
Note: Includes intra-regional trade.					
Source: GTIS, Global Trade Atlas online trade database.					

Table 4. U.S. export market shares of environmental goods in fastest growing import markets, 2004–08

	2004	2005	2006	2007	2008
Country:	<i>Percent</i>				
Germany	7.6	7.8	8.0	7.1	6.1
China	6.4	6.4	8.0	6.8	6.6
Spain	8.1	5.5	4.9	2.6	2.6
France	10.6	10.7	7.0	5.8	6.1
Italy	7.3	8.8	6.9	6.2	5.1
United Kingdom	16.0	12.7	12.5	10.6	9.9
Korea	13.3	13.2	12.6	11.5	11.0
Japan	21.7	23.8	23.5	19.7	16.5
Canada	68.0	67.2	66.6	62.4	56.5
Netherlands	11.5	11.7	11.8	8.2	6.9
India	12.7	13.4	10.3	7.9	6.3
Russia	5.7	4.7	4.5	4.7	3.4
Source: GTIS, Global Trade Atlas online trade database.					

## Increased Demand, Declining U.S. Market Shares (cont'd)

Figure 18. Export Market Shares in Latin America

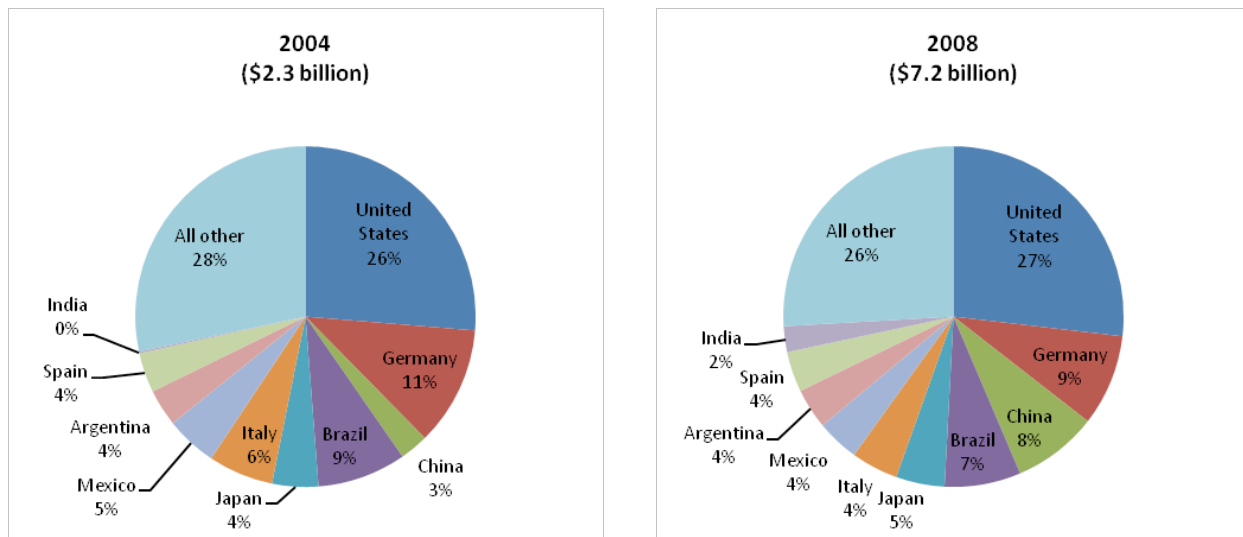
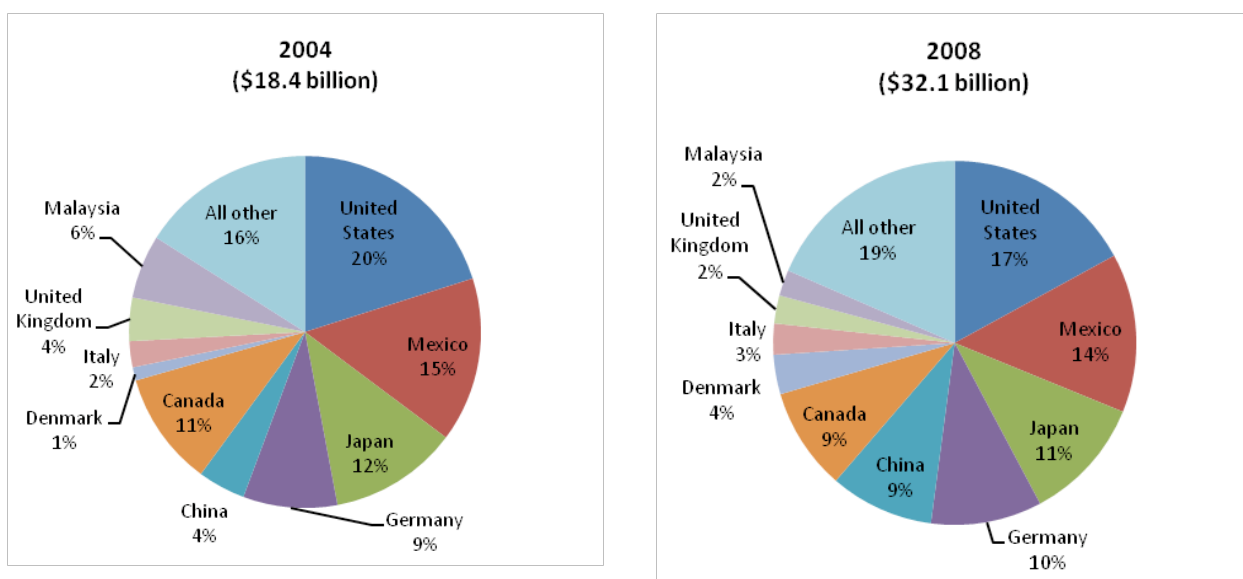


Figure 19. Export Market Shares in NAFTA partners



## Increased Demand, Declining U.S. Market Shares (cont'd)

Figure 20. Export Market Shares in Asia

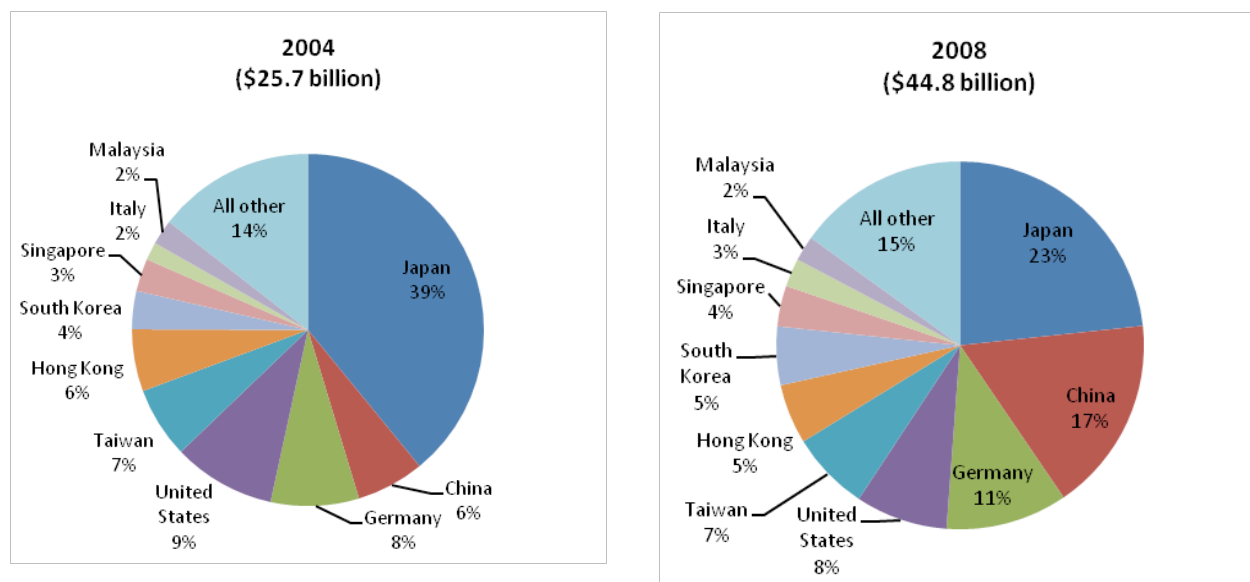
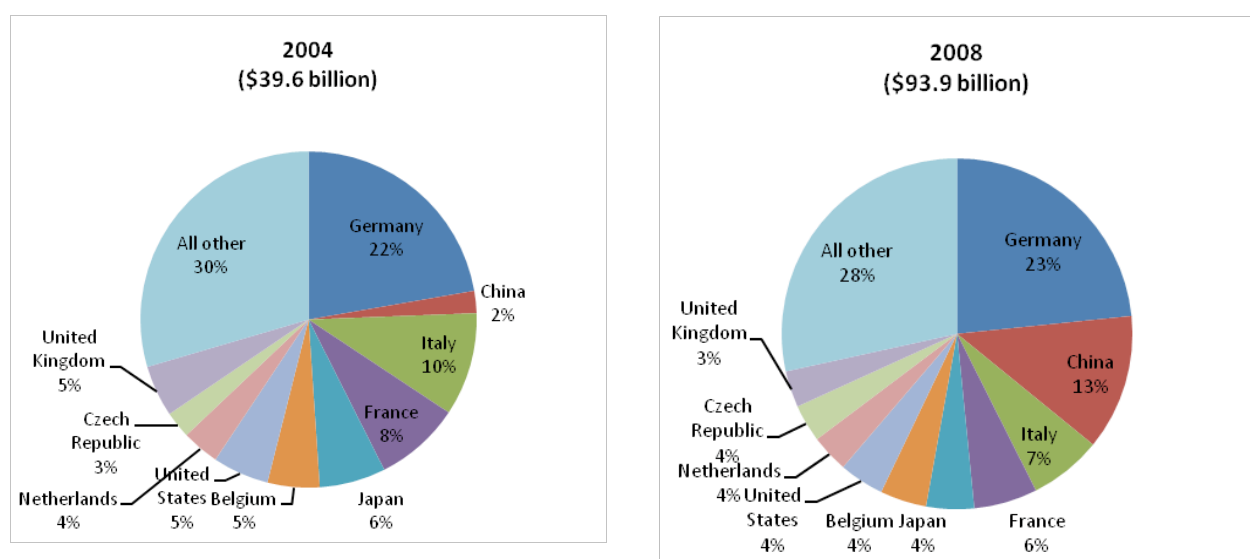


Figure 21. Export Market Shares in the EU





## Increased Demand, Declining U.S. Market Shares (Cont'd)

Figure 22. Export Market Shares in the Middle East

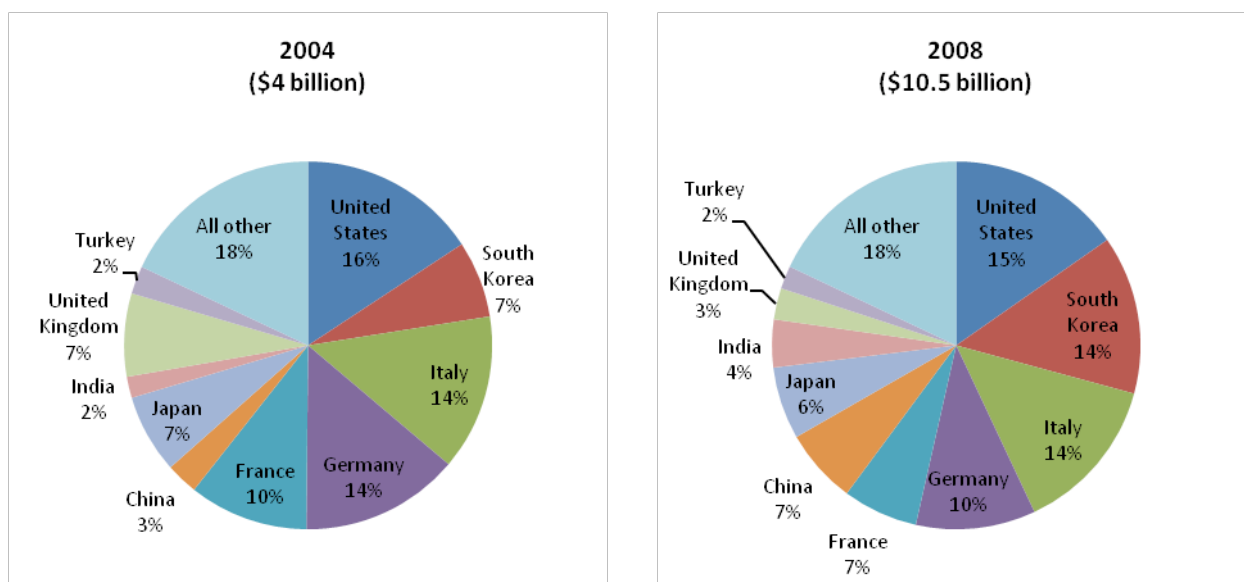
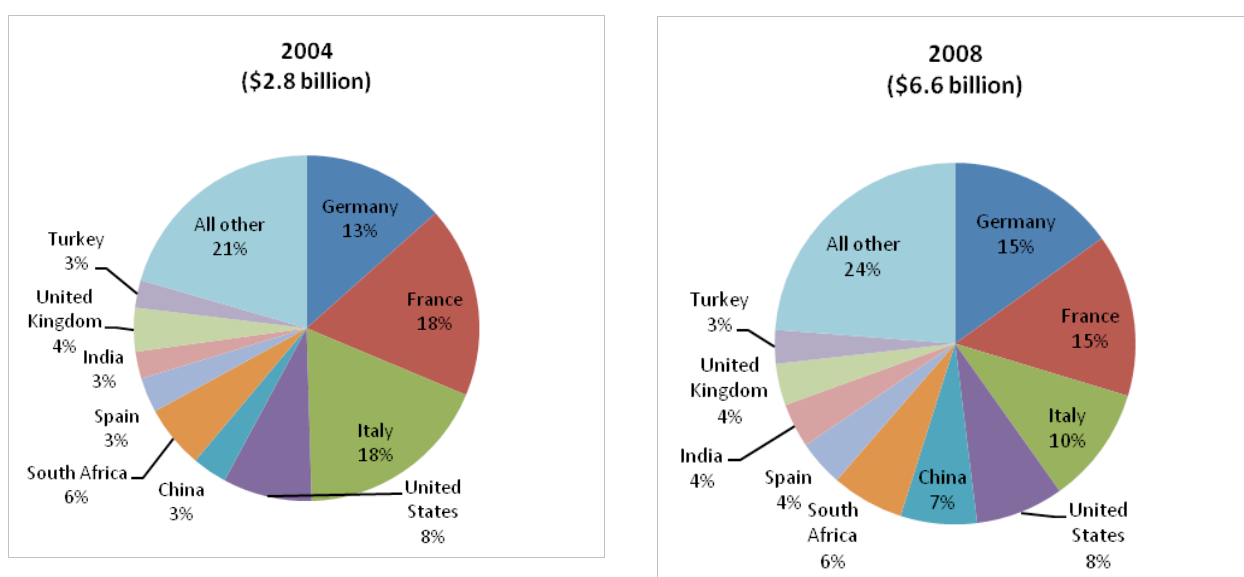


Figure 23. Export Market Shares in Africa



## Conclusion

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As the global community pursues policies to reduce greenhouse gas emissions, mitigate climate change, and protect the environment, the appetite for goods and services that are needed to support these policies is growing. This is a welcome development for the U.S. manufacturers of EG and the overall American economy. However, it appears that the U.S. is not fully seizing the economic opportunities that this situation provides. The available trade data demonstrate that U.S. producers have not kept pace with increasing domestic demand for EG, revealing lost opportunities for job creation and economic growth.

Growing foreign market demand for EG presents a ripe opportunity for U.S. producers. Although U.S. EG exports have increased, American firms continue to lose market share in the world's most important overseas markets. Chinese firms, on the other hand, enjoy a growing share of nearly every world market.

The trade data suggest that many foreign producers, particularly the Chinese, are equally—if not more—competitive than U.S. producers of EG are. Additional study is warranted into why U.S. producers may not be as competitive as their overseas counterparts, particularly since the EG sector is of growing importance to the U.S. economy. The EG sector has the potential to create and sustain U.S. manufacturing jobs that have disappeared in recent years.

Reducing foreign trade barriers to U.S. EG, particularly in emerging markets, is an obvious way to increase U.S. EG exports in the near term, since tariffs in many of these markets are disproportionately high. As tariff and nontariff barriers to these goods are reduced and eliminated more broadly through the multilateral trading system, any tariff advantage the U.S. achieves through a more limited negotiation will be eroded. Ultimately, U.S. policy makers need to understand the constraints that exist to domestic producers of EG, whether it is trade barriers, the business climate, access to an adequately skilled workforce, government policy, or lack thereof.

Because trade data related to EG are limited, further efforts are warranted to differentiate goods that clearly serve an environmental aim and those that do not. This report suffers to a certain degree because of these data limitations, however the overall trends presented in this paper are expected to hold true even once more precise information becomes available.

These issues deserve the attention of the U.S. Congress if it aims to assist U.S. producers to take full advantage of the opportunities that the growing environmental goods sector provides.

## End Notes

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<sup>1</sup> U.S. Department of Commerce (DOC), Office of Energy and Environmental Industries (OEI), “Industry Facts,” available at <http://web.ita.doc.gov/ete>, accessed Dec. 1, 2009.

<sup>2</sup> Asia-Pacific Economic Cooperation (APEC), EGS Information Exchange website, available at <http://egs.apec.org/>; DOC, OEI, “Industry Facts.”

<sup>3</sup> “Continued Work Under Paragraph 31 (III) of the Doha Ministerial Declaration,” non-paper by Canada, the European Communities, Japan, Korea, New Zealand, Norway, the Separate Customs Territory of Taiwan, Penghu, Kinmen and Matsu, Switzerland, and the United States of America. Committee on Trade and Environment Special Session, JOB(07)54, April 27, 2007.

<sup>4</sup> “Proposal for a Result Under Paragraph 31 (III) of the Doha Ministerial Declaration,” non-paper by the European Communities and the United States. Committee on Trade and Environment Special Session, JOB(07)193, December 3, 2007.

<sup>5</sup> “USTR Explores Smaller Environmental Goods Tariff Initiative in WTO,” *Inside U.S. Trade*; “Kirk Offers General Support for Tariff Cuts on Environmental Goods, No Mention of New U.S. Initiative,” *Inside U.S. Trade*, December 2, 2009; “Japan—‘Antidumping’ and Environment,” *Washington Trade Daily*, December 2, 2009.

<sup>6</sup> Product categories are derived from those used to group the larger list of 153 environmental goods submitted to the WTO for discussion in 2007.

<sup>7</sup> World Bank, “Warming up to Trade? Harnessing International Trade to Support Climate Change Objectives,” June 18, 2007, p. 75, available at [http://www-wds.worldbank.org/external/default/WDSPContentServer/WDSP/IB/2007/07/05/000310607\\_20070705152626/Rendered/PDF/402170REVISED01and1Climate01PUBLIC1.pdf](http://www-wds.worldbank.org/external/default/WDSPContentServer/WDSP/IB/2007/07/05/000310607_20070705152626/Rendered/PDF/402170REVISED01and1Climate01PUBLIC1.pdf).

<sup>8</sup> *Ibid.*, p. 76.

<sup>9</sup> DOC, OEI, “Industry Facts”; World Bank, “Warming up to Trade?” p. 76.