INTERNATIONAL TRADE in ENVIRONMENTAL GOODS

2012 REPORT

LOSING THE ENVIRONMENTAL GOODS ECONOMY TO CHINA

By

Senator Ron Wyden

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Summary

This fourth report about trade flows in environmental goods, "*Losing the Environmental Goods Economy to China*," is a continuation of my office's efforts to analyze global trade in environmental goods. Its key findings:

In 2011:

- The U.S. trade deficit in environmental goods with China reached an all-time high.
- Driven by rising imports from China, the overall U.S. deficit in environmental goods grew by 87 percent.
- U.S. imports of solar cells and modules from China grew in value by 135 percent in 2011; solar cells alone grew by nearly 300 percent.
- Exports of solar cells and modules from China to the U.S. grew by over 300 percent by volume. (Taking the U.S. from a nearly $2 billion trade surplus in solar energy products in 2010 to over $1.5 billion deficit in 2011.)
- U.S. imports of utility scale wind towers from China grew by over 100 percent.
- In each of the largest and fastest-growing markets throughout the world, U.S. exporters of environmental goods are rapidly losing market share to China.

"Losing the Environmental Goods Economy to China" also finds that:

- Between the years 2005 and 2010, China's market share of environmental goods in the E.U., the biggest regional market for such products, increased sevenfold (to 21 percent), while U.S. market share shrank during the same period.
- In other regional export markets of environmental goods, Chinese market share generally doubled (Africa, Asia, and Middle East) or tripled (NAFTA, Latin America).
- E.U. and Japanese exporters of environmental goods are also losing market share to China in most major markets in the world.

Introduction

Why a report on the trade of environmental goods?

As more and more nations and citizens embrace environmentally friendly policies and practices, the demand for environmental goods and services – products and services that contribute to a cleaner and more sustainable environment – grows. In fact, between 2005 and 2010, the global export market for environmental goods alone doubled and reached an estimated $298 billion in 2011.

Much of the technology behind environmental goods – like solar panels and wind turbines – was, and continues to be, developed in the United States. Therefore, not only is global demand for environmental goods on the rise, Americans are manufacturing cutting edge products to meet that demand. As long as U.S. manufacturers have a level-playing field to compete in that growing market, exporting environmental goods presents a significant opportunity to sell more American-made products, grow American manufacturing and create more good-paying American jobs.

Since becoming Chairman of the Senate Finance Committee's Subcommittee on International Trade, Customs and Global Competitiveness, I have focused on ensuring a level-playing field exists for U.S. producers, especially manufacturers of environmental goods. Since 2009, I have issued an annual report examining the major opportunities and challenges facing U.S. exports of environmental goods. While the initial goal was to examine a wide array of challenges and opportunities facing these U.S. exports abroad, the work has increasingly focused on China's unprecedented rise in the global market for environmental goods. This year's report shows the broader trend in trade flows of environmental goods while highlighting specific areas – such as solar goods – in which the U.S. is "*Losing the Environmental Goods Economy to China*."

How is the U.S. losing the environmental goods economy to China?

In recent years, the Chinese Government has undertaken an aggressive strategy to capitalize on the growing market for environmental goods by making China a leading producer of environmental goods. Plans issued by the Chinese Government have detailed this strategy. For example, a 2007 report released by China's National Development and Reform Commission (NDRC) outlined efforts to "speed up the development and deployment of hydropower, wind power, solar energy, and biomass energy; . . . {and} increase market competitiveness" by directing local authorities to "allocate the necessary funds to support renewable energy development."

"Losing the Environmental Goods Economy to China" finds that China's strategy has been working for China. In just the last five years, China rose from playing a minor role in the global market for environmental goods to become the dominant actor in the world's biggest and fastest growing markets. Exports of environmental goods from the U.S. and other similarly-positioned countries are not growing at a rate commensurate with the technology their industries hold, the productivity of their workforce and the overall growth in global demand, because they appear crowded-out by China's exports. China has neither

a technological advantage nor any clear comparative advantage in terms of the production of environmental goods, yet China's environmental goods exports are experiencing a rate of growth far afield of its competitors, which are losing to China.

What makes this report timely?

While "*Losing the Environmental Goods Economy to China*" does not examine the reasons behind China's rapid growth in the world market for environmental goods, its findings track recent complaints that U.S. solar manufactures and producers of utility scale wind towers have filed with the International Trade Commission (ITC) and the U.S. Department of Commerce. The report's findings correct the contention that the U.S. continues to enjoy a trade surplus with China in solar products. Overall, it supports the assertion that China's environmental goods industries are experiencing rapid growth that industries located in other countries appear unable to duplicate, suggesting that China's competitiveness is significantly due to its violation of norms and rules of international trade.

Why do trade rules matter?

Since the Second World War, the world's advanced economies – led by the United States – set out to establish a rules-based trading system that would promote innovation, competition and efficiency in a way that facilitates rising living standards. This global, rules-based trading system is designed to prevent trade wars by establishing clear, enforceable standards for all of the world's participants. Its rules ensure that competition is based – not on the amount of assistance a government provides its industries – on each industry's ability to innovate quality products and produce them efficiently.

Congress and the Administration's work to promote trade and help American producers gain from foreign markets not only follows the rules of the global trading system, it requires other participants in the trading system to follow the rules as well. The system breaks down when the world's participants fail to abide by its rules. That is especially true when the country that appears to be breaking the rules has the world's second largest economy.

Reports

"Major Opportunities and Challenges to U.S. Exports of Environmental Goods 2009:" Released in December 2009, the report showed that while the global market for environmental goods was quickly growing, U.S. producers were beginning to lose market share to China. The report identified trade barriers in fast-growing markets abroad that constrain U.S. environmental goods exports.

"U.S. Trade in Environmental Goods Addendum:" Released in May 2010, this report updated the 2009 report and demonstrated that mainstream estimates of trade in environmental goods were significantly overstated. This report was the first to estimate U.S. trade flows of "*real"* environmental goods. Because trade figures are generally calculated by tracking a group of products that are similarly categorized in the Harmonized Tariff Schedule, other trade reports have included categories of goods that – while similar to environmentally friendly goods – are not helpful to the environment. For example, the category of electricity generators found in the tariff schedule could include generators that burn gas and those that use photovoltaic solar technology. It is important and helpful to distinguish these two technologies to determine the type of trade that policy makers work to facilitate to promote environmentally friendly practices. By examining trade flows on a narrower set of goods, the report (and subsequent reports examining this set of merchandise) provided the most accurate assessment of trade in "*real"* environmental goods. The results of the May 2010 report were cited extensively and form the basis of estimates of renewable energy exports in President Obama's *Renewable Energy and Energy Efficiency Export Initiative*, a component of the President's *National Export Initiative.*

"Major Opportunities and Challenges to U.S. Exports of Environmental Goods 2010:" Released in December 2010, this report continued earlier analysis on the global market for environmental goods and demonstrated China's growing dominance in the environmental goods sector in nearly every important global market. It also identified tariff barriers to U.S. environmental goods in the Asia Pacific region that could be dismantled to promote U.S. exports.

"China's Grab for Green Jobs:" Released in October of 2011, this report looked exclusively at the market for solar panels. The report showed that U.S. imports of solar panels and components from China catapulted by over 1,500 percent between 2006 and 2010. Furthermore, it highlighted that over the course of the previous 12 months, imports of solar panels and components surged an additional 300 percent.

"Losing the Environmental Goods Economy to China:" Released in February 2012, this report shows China's continued and growing dominance in this sector. The following report picks up where last December's report ended and shows that many of the trends are now more dramatic and support the growing concern among domestic producers that China's growing presence is likely a result of its abuse of global trade rules.

Recent Developments

September 2010. The United Steel Workers filed a Section "301" petition asking the Obama Administration to investigate a myriad of subsidies that were identified in the petition and which allegedly provide Chinese producers unfair advantages that are inconsistent with China's World Trade Organization (WTO) obligations. This 301 petition relied on *Major Opportunities and Challenges to U.S. Exports of Environmental Goods 2009.*

October 2010. Forty-three Senators expressed strong, formal support to President Obama for the 301 petition submitted by United Steel Workers in September 2010. The Obama Administration successfully challenged certain subsidies that China provides its wind energy producers and continues to investigate the other allegations contained in the Steelworkers' petition.

December 2010. The Obama Administration established the *Renewable Energy and Energy Efficiency Export Initiative*, a multi-agency effort to significantly increase exports of environmental goods related to renewable energy production and energy efficiency.

March 2011. China's National People's Congress approves the Twelfth Five-Year Plan. This plan establishes spending and preferential tax and procurement policies designed to promote industries related to solar, biomass and wind energy technology.

September 2011. As imports of Chinese solar panels dramatically surged into the U.S., President Obama was urged to take appropriate measures to prevent Chinese manufacturers from unfairly harming U.S. solar cell and panel producers. The following month, the administration provided the WTO with evidence of 200 potentially illegal Chinese subsidies that China failed to report to the WTO, despite requirements to do so.

October 2011. The Oregon- and California-based company, SolarWorld, along with six other U.S. solar manufacturers filed a complaint with the U.S. Department of Commerce and the ITC against the perceived dumping practices by solar manufacturers from China and the subsidies provided by China to its solar industry. In December 2011, the ITC made a unanimous preliminary determination that U.S. solar producers were harmed by surging Chinese imports, which advanced the investigation of the case. It is possible that U.S. producers of solar cells and panels will be provided import relief from surging Chinese imports in early 2012.

November 2011. Leaders of the Asia Pacific Economic Council (APEC), which was hosted by President Obama in Hawaii, adopted the *Honolulu Declaratio*n that committed members to ensuring that tariff rates on environmental goods would not exceed five percent. In many instances, APEC members were assigning tariffs on environmental goods that exceeded 30 percent. This was welcome news because, in of November of 2009, I and three other Senators called on the Administration to conclude such an agreement.

January 2012. Pursuant to a complaint filed by producers of utility scale wind towers, the U.S. Department of Commerce initiated an investigation on imports from China and Vietnam and whether they are illegally subsidized or are being dumped into the United State. On February 10, 2012, the ITC preliminarily determined that these imports are threatening American producers with injury, advancing the investigation and moving closer to providing U.S. producers with import relief.

Background, Methodology and Data Sources

Environmental goods and services cover a wide range of products and services that cut across many different industrial sectors. Although there is not an internationally accepted definition, environmental goods and services are generally defined as goods and services associated with environmental protection, including those related to air, water, or soil pollution control and prevention; waste management; environmental monitoring and recycling; and renewable energy, among others.

Like the earlier reports compiled by my office, this report focuses on 43 environmental goods categories (using the six-digit Harmonized Commodity Description and Coding System (HS)) identified by the World Bank as broadly being climate friendly. U.S. import and export data are derived from the ITC.

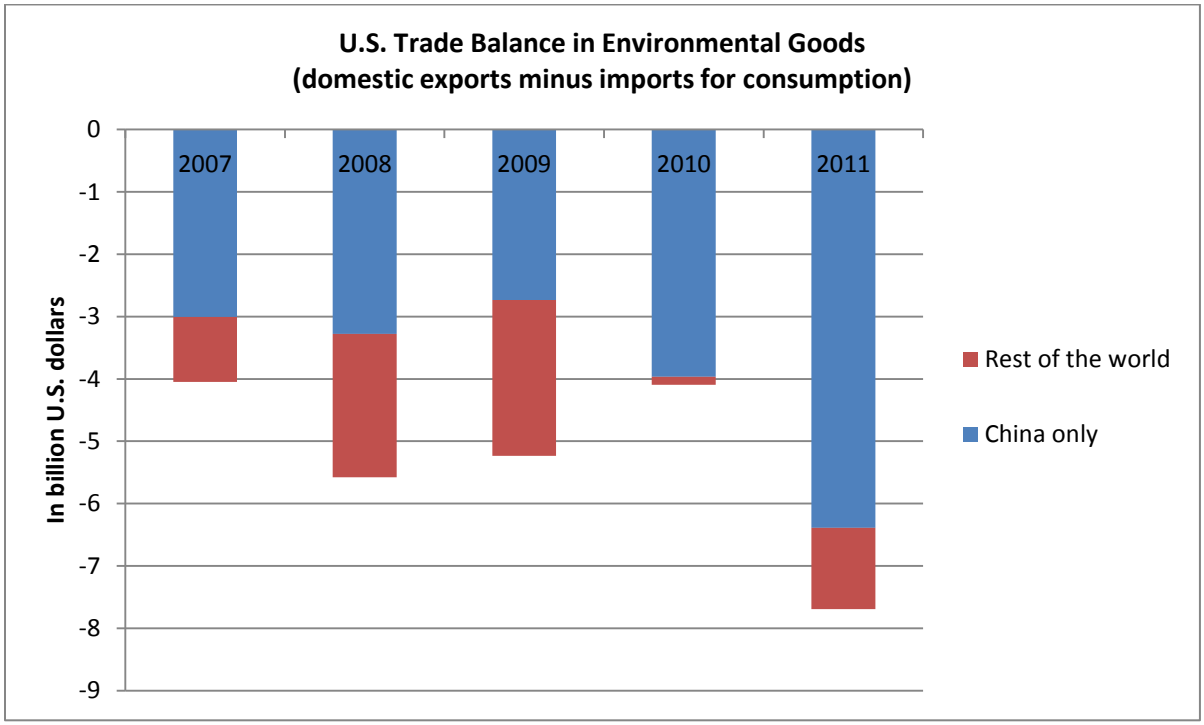
Export market shares are based on trade data for the 43 HS 6-digit product groups. Data for the latest six-year period (2005–10) were obtained from Global Trade Information Service's Global Trade Atlas online database and analyzed with assistance from the Congressional Research Service. The database relies on information reporting by each individual country, so 2010 is the latest year for which there is full-year data.

Figure 6, which shows the trade balance in 'solar technology,' utilized official data from the ITC and data from an August 2011 report by Greentech Media (GTM), *U.S. Solar Energy Trade Assessment 2011: Trade Flows and Domestic Content for Solar Energy-Related Goods and Services in the United States* (GTM report). Because certain product category tariff classifications, such as for polysilicon and solar manufacturing equipment, also include non-solar-related items, solar-specific 2011 trade values for these categories were estimated by applying the observed 2010 ratio of GTM's solar-specific estimates to total 2010 trade on a category specific basis to the 2011 data. For solar manufacturing equipment, ranges in the GTM report were averaged. The GTM report included U.S. exports of polysilicon and plant equipment to determine that the United States enjoyed a trade surplus in the solar industry in 2010.

U.S. Merchandise Trade Deficit of Environmental Goods

The "trade deficit" indicates the amount by which a country's imports exceed its exports and represents an outflow of domestic currency to foreign markets. Figure 1 shows that while the U.S. trade deficit in environmental goods fell in both 2009 and 2010, in 2011 – thanks largely to a sharp increase in imports from China – it rose by 87 percent to reach an all-time high.

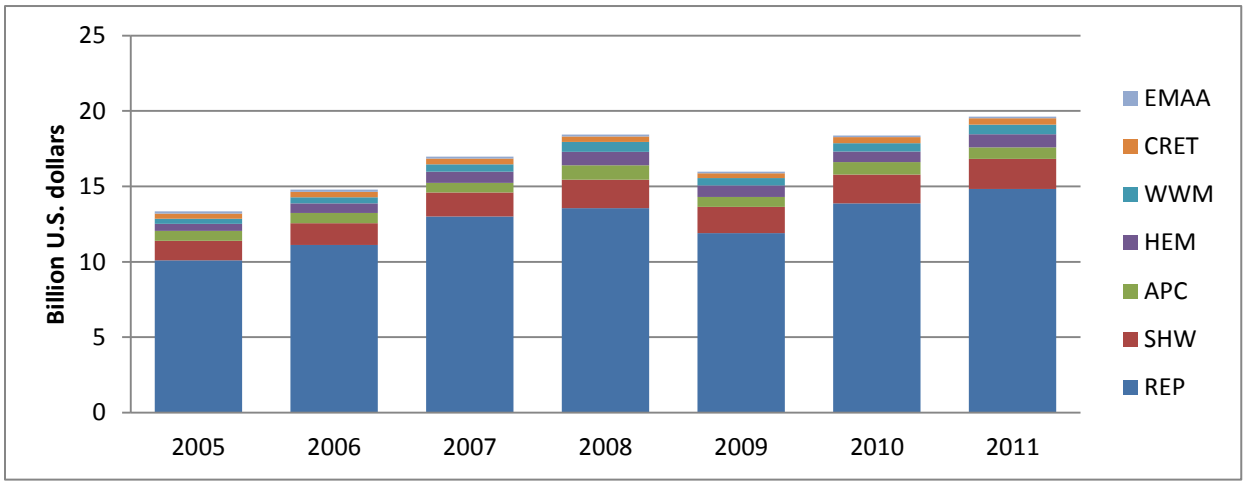
Figure 1. U.S. Trade Balance in Environmental Goods



U.S. Exports of Environmental Goods 2005-2011

Figure 2 provides a closer look at U.S. exports of environmental goods through 2011 showing that the sector has experienced slow but steady growth. Overall, U.S. exports of environmental goods have grown a total of 47.1 percent since 2005, despite a dip in 2009 following the global financial crisis. While this may be seen as positive news, this growth is tepid when considering that the overall global growth of this sector has rapidly expanded during this period of time.

Figure 2. U.S. Exports of Environmental Goods

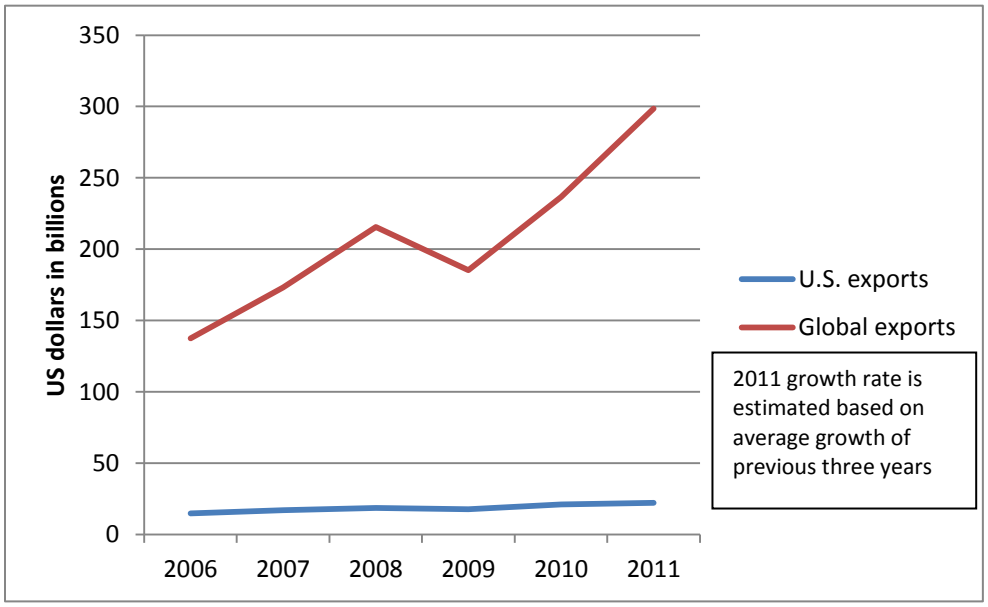


Key

EMAA	Environmental monitoring, analysis and assessment equipment
CRET	Cleaner or more resource efficient technologies and products
WWM	Waste water management and potable water treatment
HEM	Heat and energy management
APC	Air pollution control
SHW	Management of solid and hazardous waste and recycling systems
REP	Renewable energy plant equipment

Despite some recent growth in U.S. exports, a comparison with global growth numbers (figure 3) reveals that the U.S. producers trading environmental goods are falling behind at an ever greater pace. While U.S. exports rose to a little more than $22 billion by 2011, worldwide exports have recovered from a dip during the global financial crisis and grew to the record high of almost $300 billion in 2011.

Figure 3. Exports of environmental goods



U.S. Imports and Exports of Solar Panels

An examination of trade in solar equipment provides an acute example of how, left unchecked, an American industry fairs in the face of likely unfairly traded imports from China. This is particularly remarkable given the fast-growing global market for solar technology.

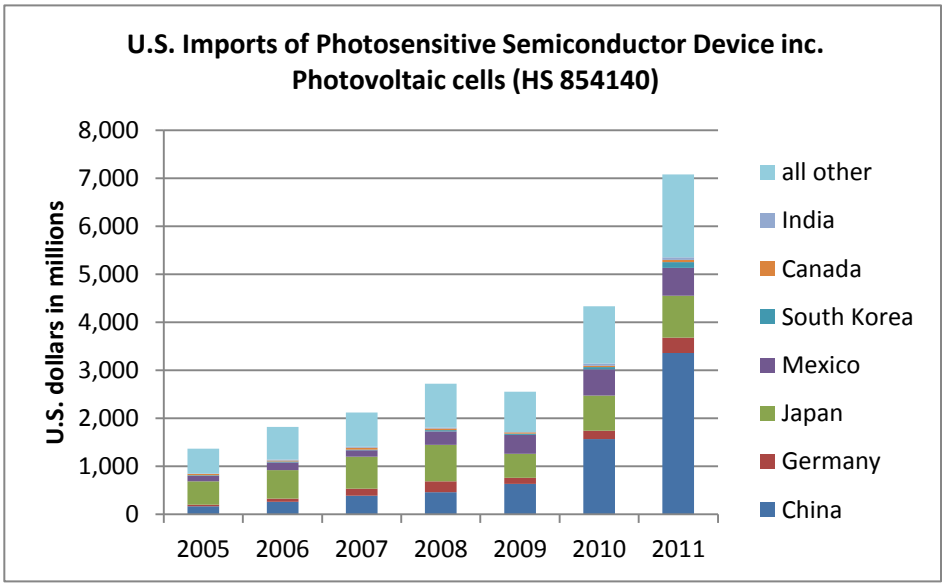


Figure 4. U.S. General Imports of Solar Panel Equipment

Although solar technology has long been developed and advanced in the U.S., U.S. imports of solar equipment, such as cells, modules, and finished photovoltaic panels, are steeply rising. Between just 2009 and 2011, U.S. imports from China grew by more than 500 percent, totaling $3.4 billion (figure 4). Given that China's Five Year Plan specifically called for advancing its solar technology industry, among others, it is important to ask: "Is the American solar industry merely the first casualty of China's latest Five Year Plan?"

U.S. exports of solar equipment more than doubled between 2005 and 2010 but experienced a decline of almost 10 percent in 2011 (figure 5). In 2011, China imported only a small and declining amount of U.S. solar equipment ($98 million) included in the U.S.'s $2.96 billion in exports. This decline may be due to a number of factors, including oversupply and the internalization of the supply chain within China.

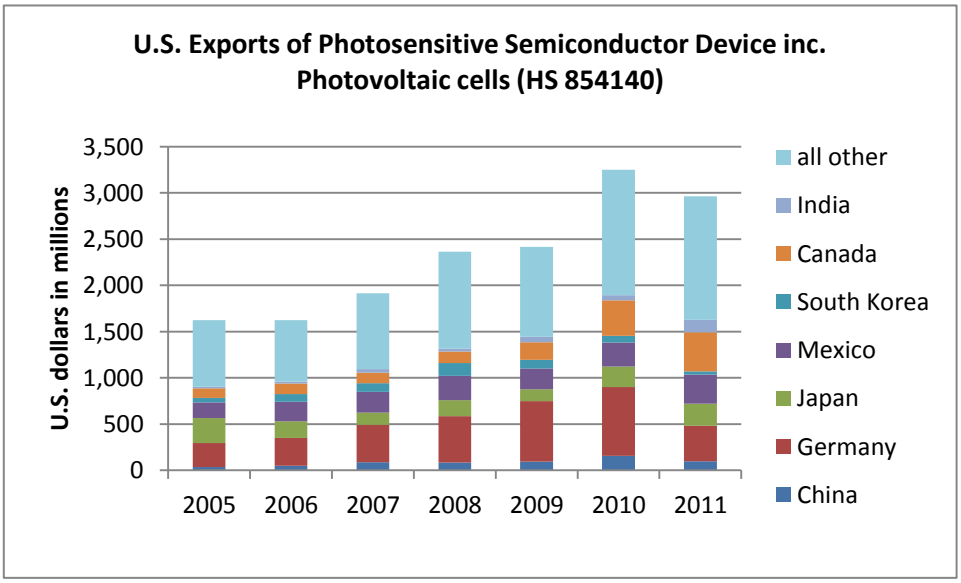
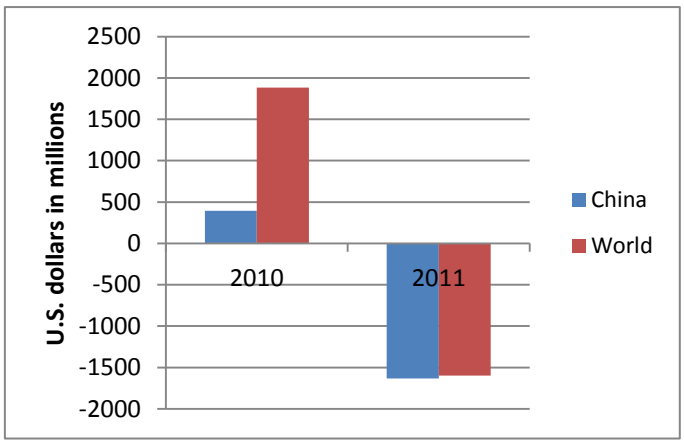


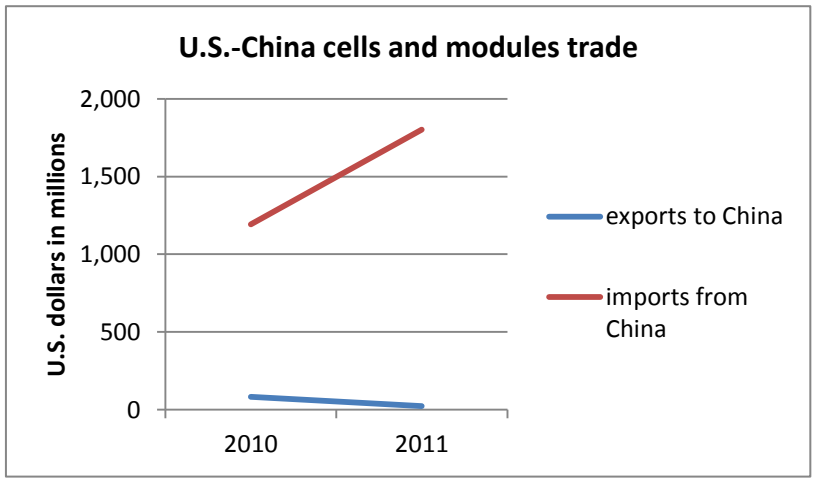
Figure 5. U.S. Exports of Solar Panel Equipment

Figure 6. U.S. Balance of Trade in Solar Technology



The balances of trade in solar products between both the United States and China and the United States and the world dramatically reversed course from 2010 to 2011. As a result, and by the broadest measure, the U.S. now faces a trade deficit in solar products and technology, both with China and the world (figure 6).

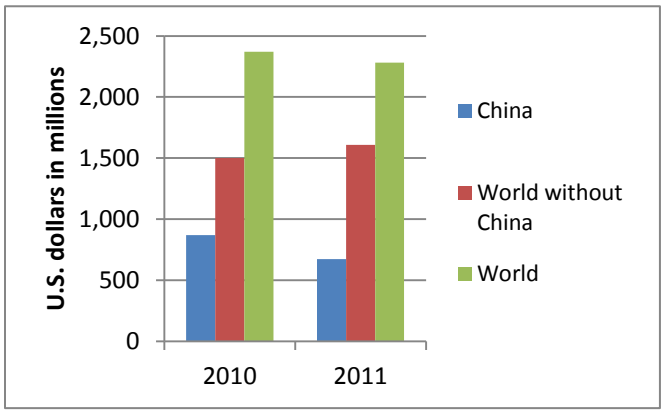
Figure 7. U.S. Trade Balance for Solar Cells and Modules



A leading cause of this reversal is the massive surge in U.S. imports of solar cells and modules from China. These imports more than doubled from 2010 totals, increasing from nearly $1.2 billion to more than $2.84 billion (figure 7).

Further, exports of products for which the U.S. enjoyed a significant trade surplus in 2010 – polysilicon and solar manufacturing equipment – declined in 2011, with polysilicon falling by nearly $100 million globally and $200 million to China (figure 8).

Figure 8. U.S. Trade Balance for Polysilicon

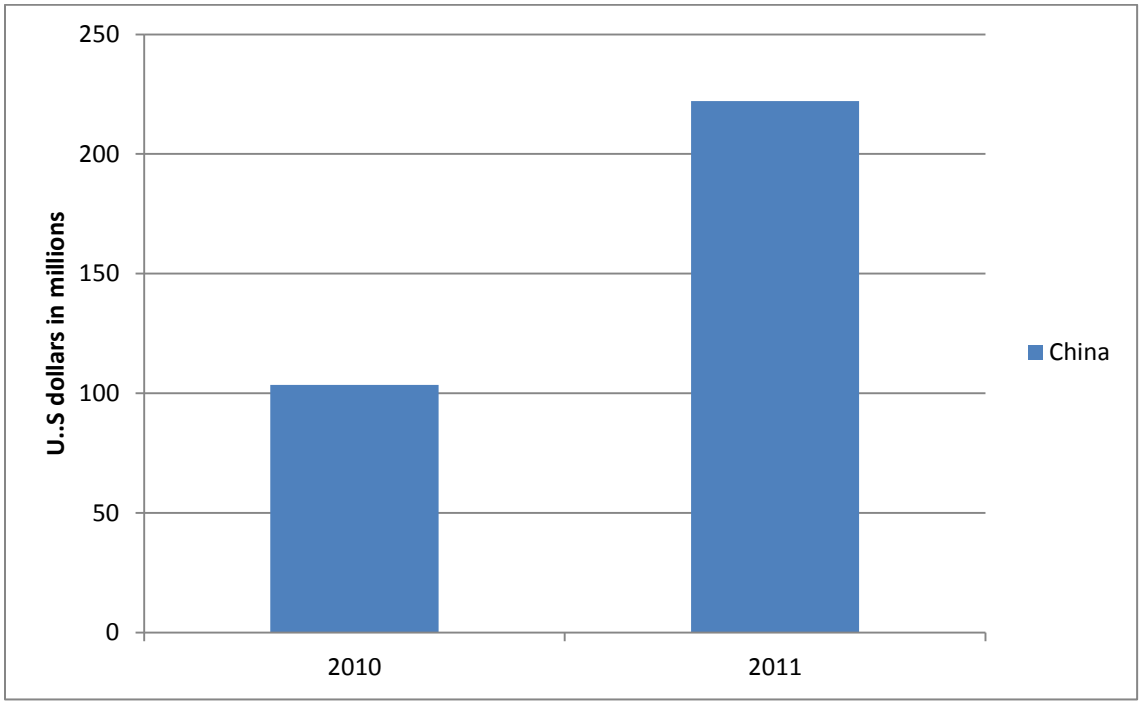


The reversal in trade flows is accompanied by an unprecedented deterioration in U.S. manufacturing capabilities. Over the past two years many domestic producers – across all regions of the U.S. – closed plants, undertook layoffs or went bankrupt. China's predicted increases in capacity and production in the solar cell, module and polysilicon sectors strongly suggests that American suppliers, and suppliers in other major economies, will experience additional and sustained solar product trade deficits and export market erosion into the foreseeable future, accompanied by further deterioration of their manufacturing base.

U.S. Imports of Wind Energy Equipment

Another segment of the environmental goods sector to watch is merchandise related to wind energy. U.S. imports from China of utility scale wind towers surged in 2011. This sector is worth watching to determine whether the competitiveness of the American wind energy industry erodes due to imports from China (figure 9).

Figure 9. Imports of Towers and Lattice Masts of Iron or Steel, Tubular and other Electric Generating Sets, Wind-Powered



Export Market Shares of Environmental Goods

The impacts of China's policies are not just evident in the U.S. market. Between 2005 and 2010 (the last full year for which data is available), China's exports of environmental goods increased substantially and captured a larger and growing share of the largest export markets, as well as the fastest growing markets (figure 10). During the same period, exports from mature supply chains found in the U.S., the E.U. and Japan declined to the same markets (figures 11-13).

Figure 10. China Export Market Shares by Largest and Fastest Growing Import Markets, 2005 and 2010

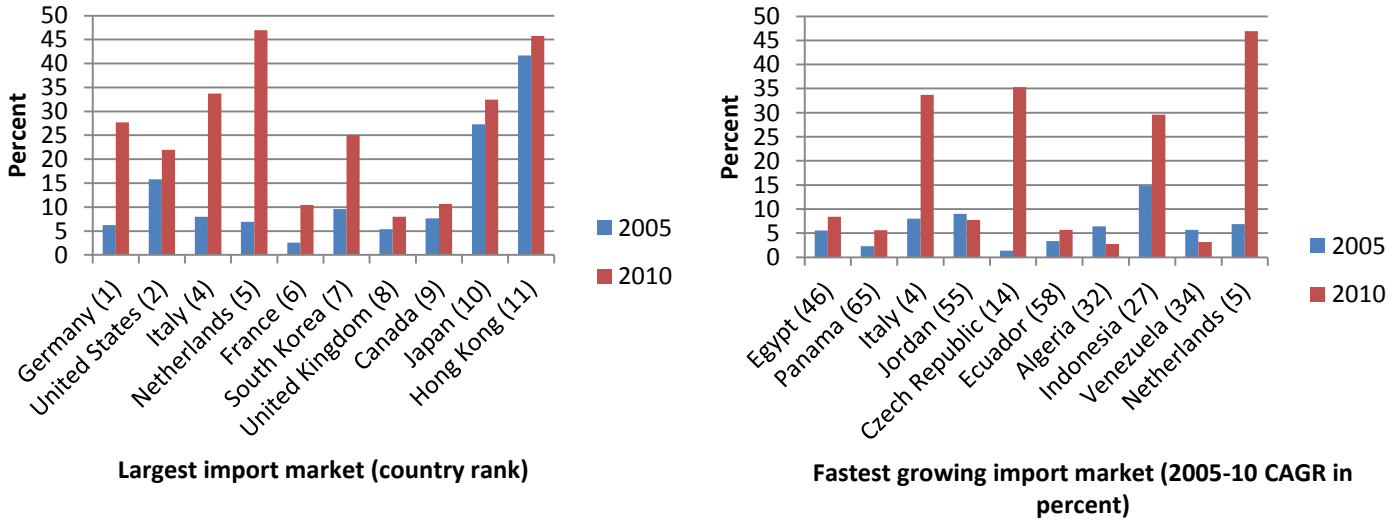
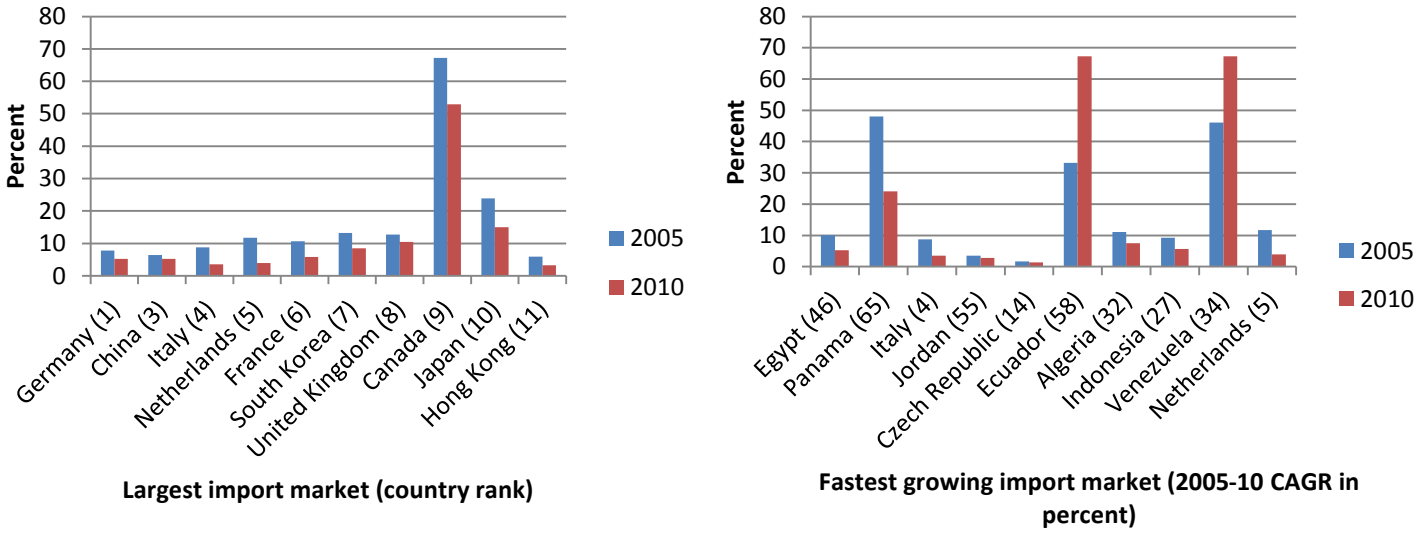


Figure 11. U.S. Export Market Shares by Largest and Fastest Growing Import Markets, 2005 and 2010



Export Market Shares of Environmental Goods (cont'd)

Figure 12. E.U. Export Market Shares by Largest and Fastest Growing Import Markets

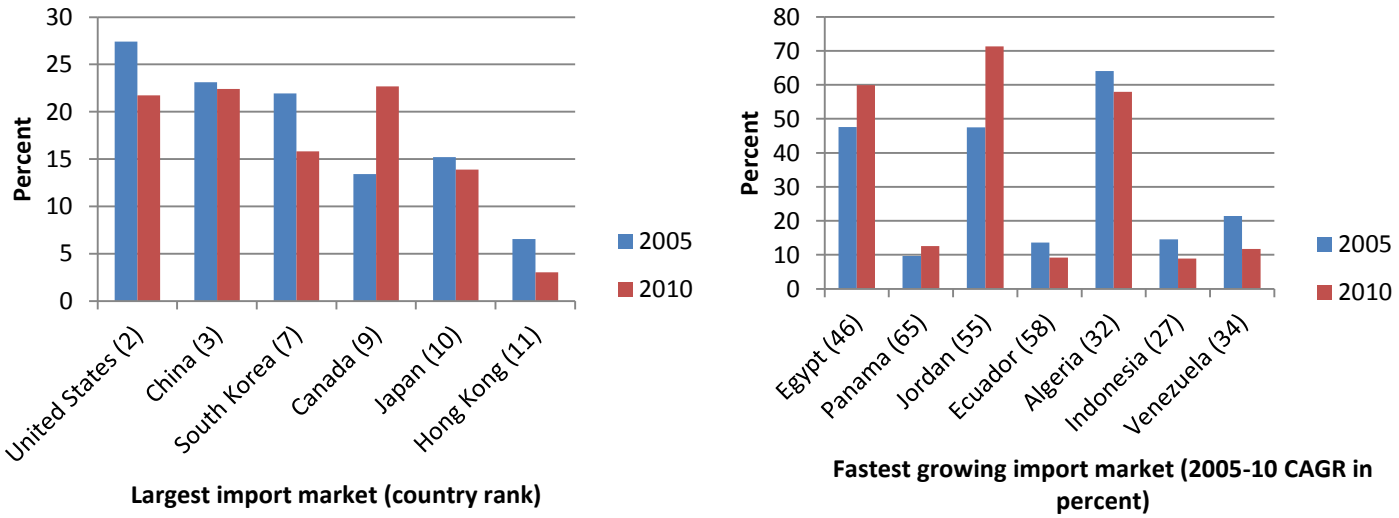
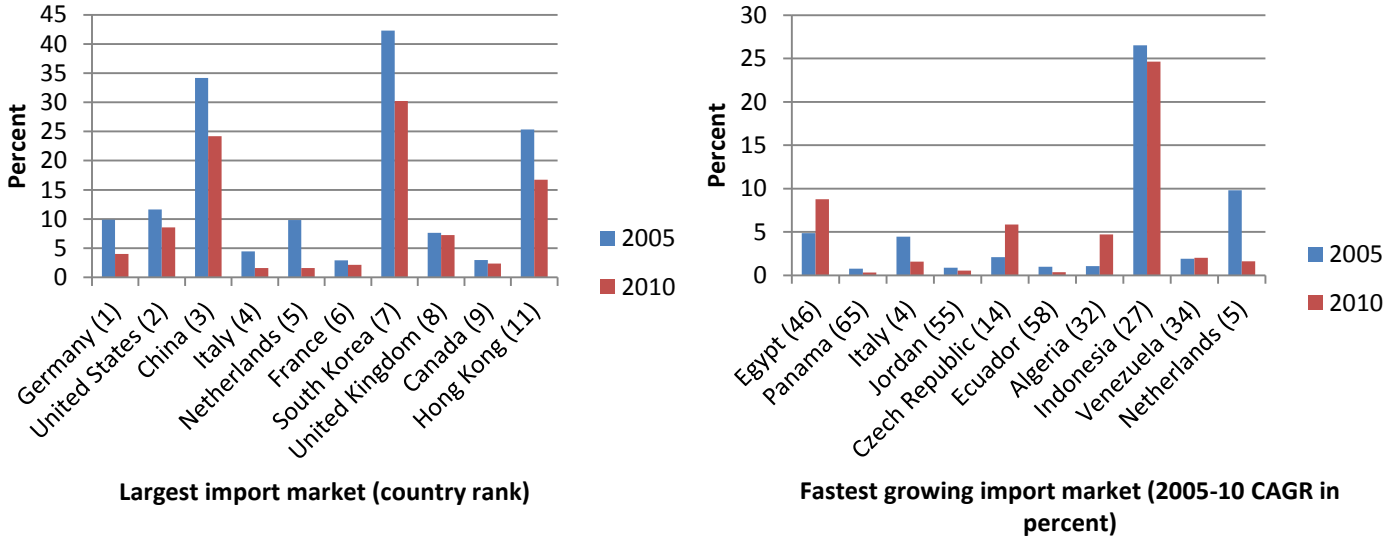


Figure 13. Japan Export Market Shares by Largest and Fastest Growing Import Markets



Regional Export Market Shares of Environmental Goods

China's regional market shares of environmental goods exports increased considerably during the 2005–10 period. During this same period of time, the U.S., E.U. member countries, and Japanese export market shares in most of the top regional markets declined.

Between 2005 and 2010, China's export market share in the E.U., the biggest regional market for environmental goods by volume, increased sevenfold, whereas U.S. market share decreased from six to four percent (figure 14). In other regional export markets (figures 15-19) such as in Asia or Africa (figures 15 and 16), Chinese market share doubled or even tripled (NAFTA (figure 18), Latin America (figure 19)) during the last five years whereas U.S. shares in those markets remained stable or shrank slightly.

Figure 14. Export Market Shares in the EU

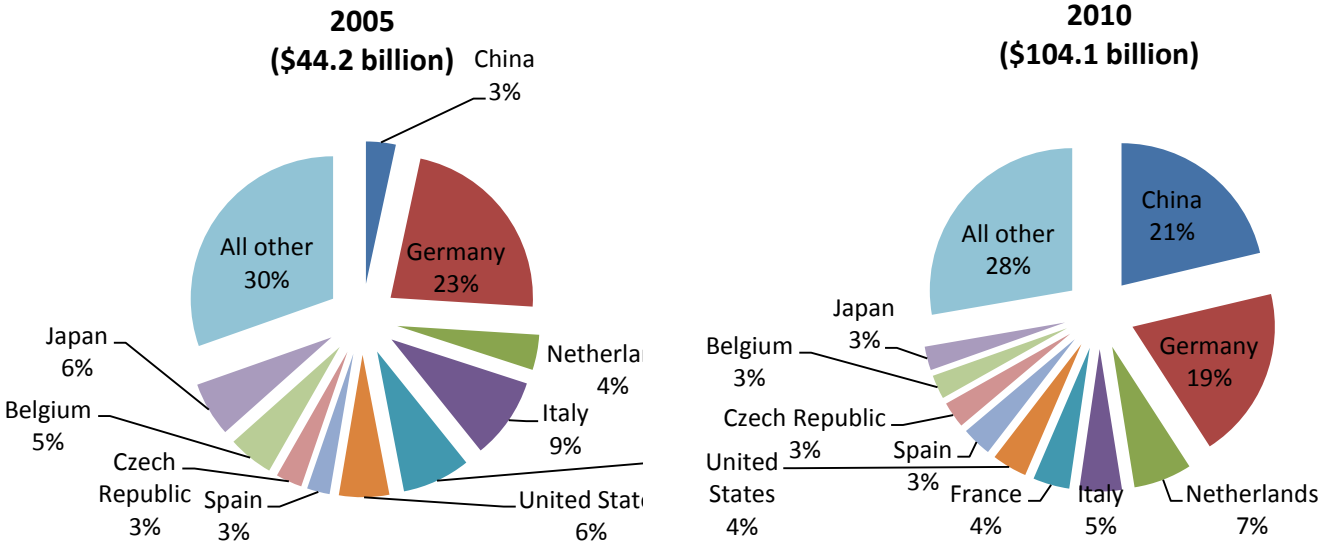


Figure 15. Export Market Shares in Asia

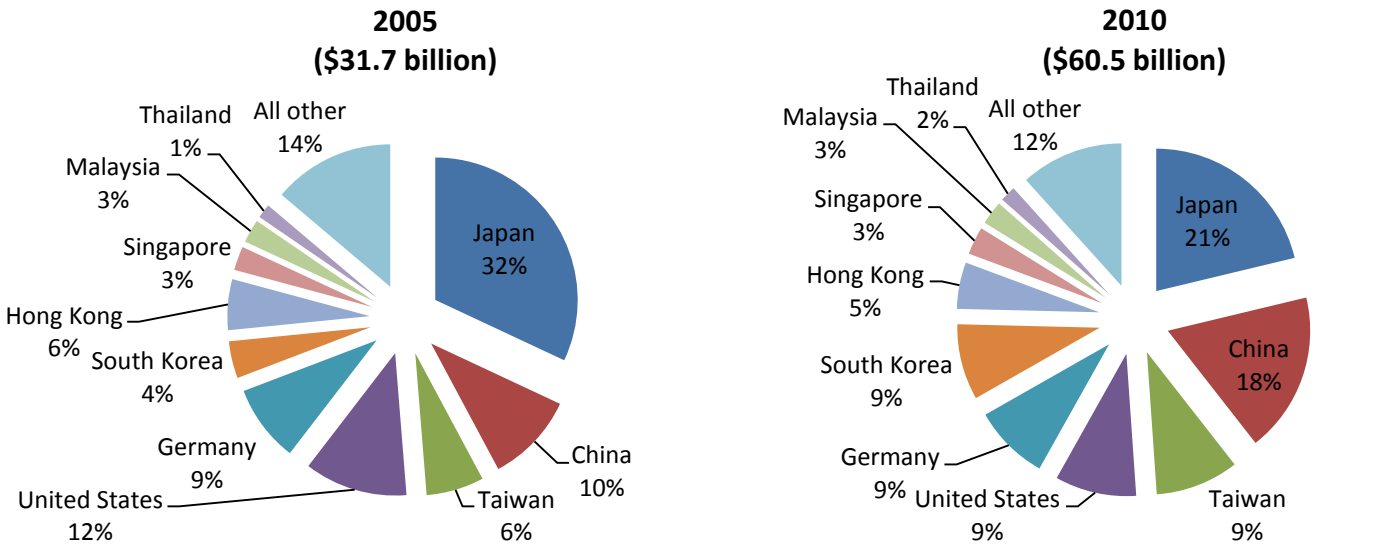


Figure 16. Export Market Shares in Africa

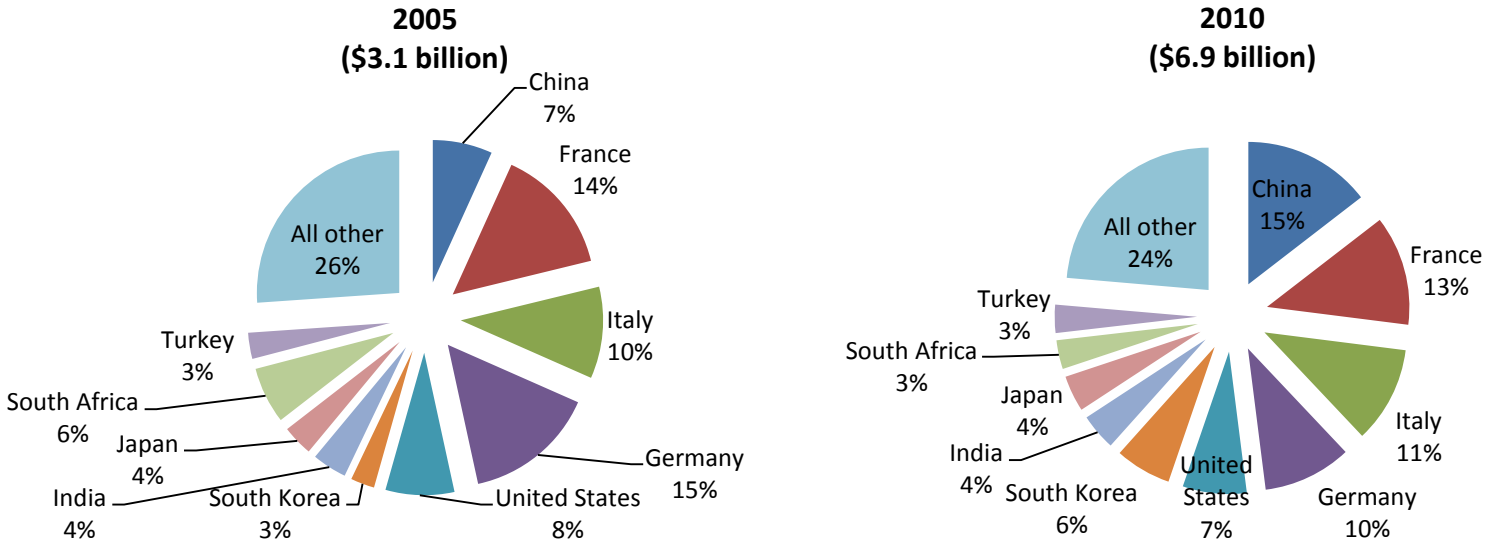


Figure 17. Export Market Shares in the Middle East

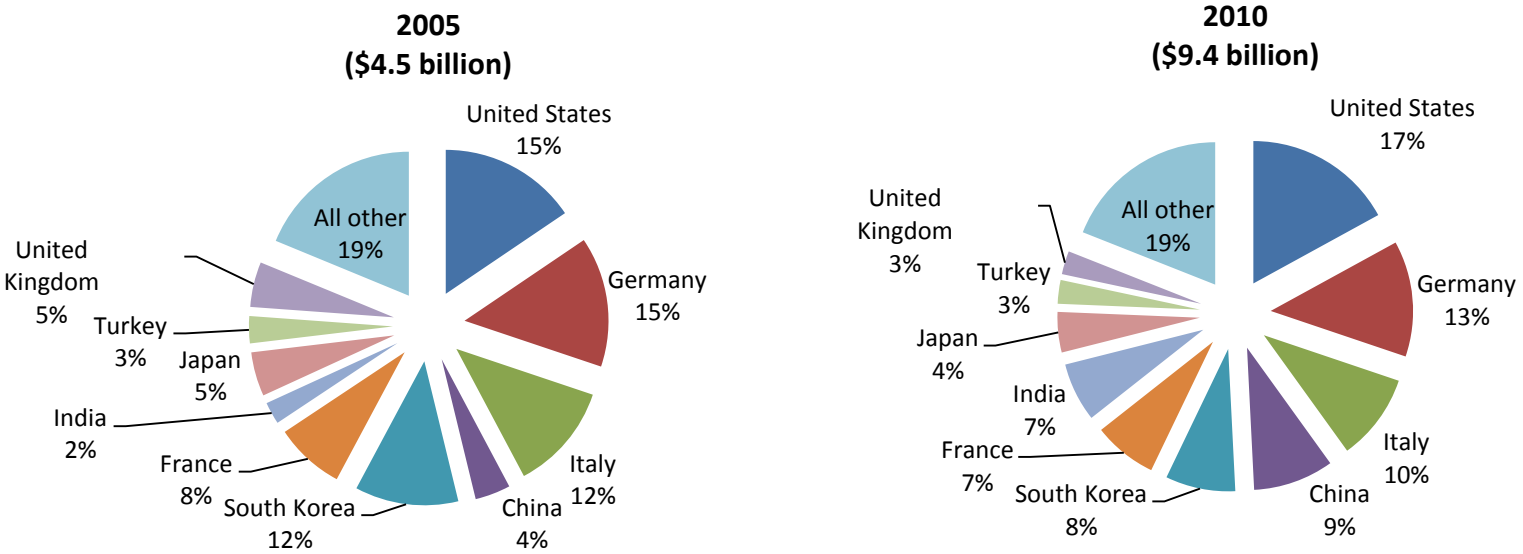


Figure 18. Export Market Shares in NAFTA partners

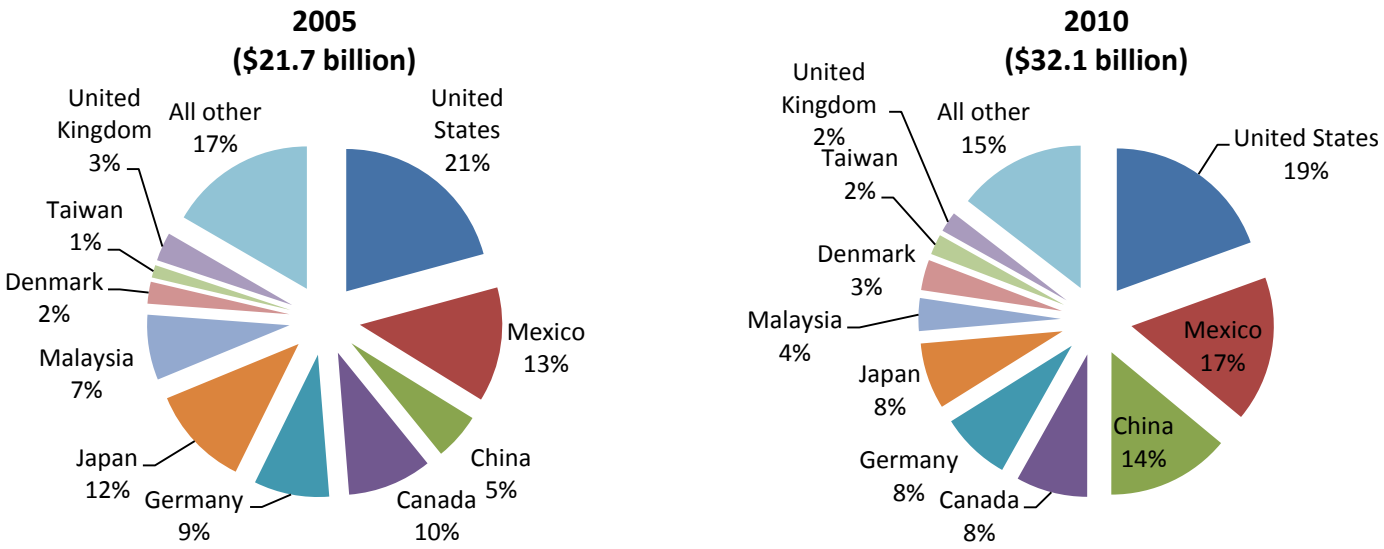
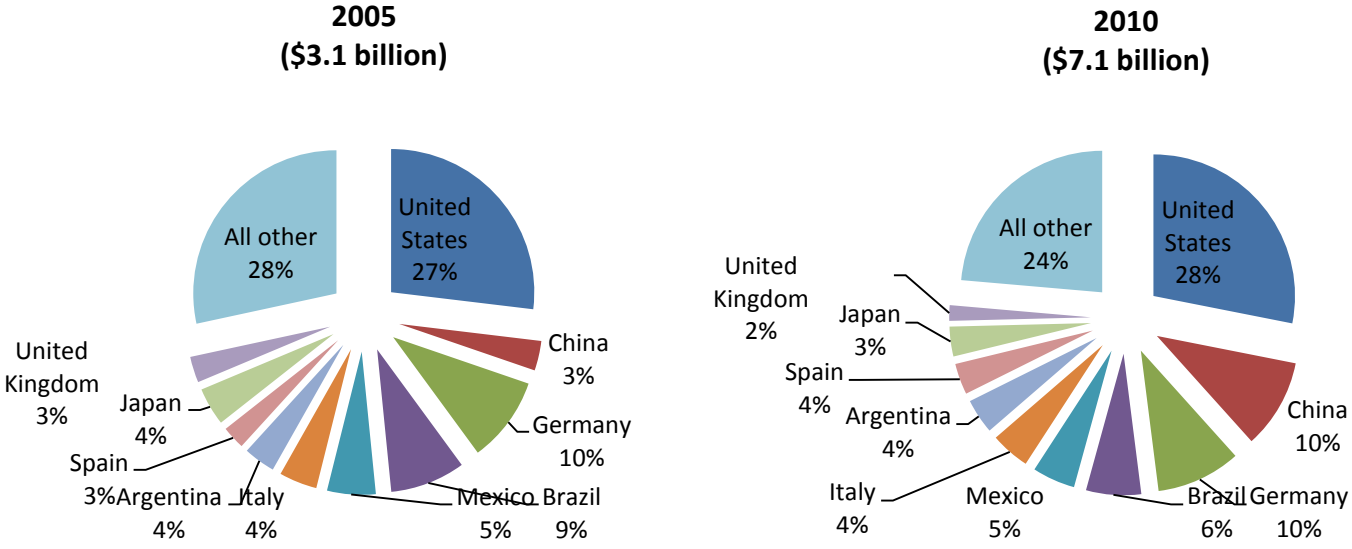


Figure 19. Export Market Shares in Latin America



Conclusion

As the United States and its international trade partners work to develop clean energy, reduce emissions of greenhouse gases, mitigate climate change, and protect the environment, those countries that develop and foster competitive environmental goods industries should be positioned to take advantage of growing international demand for these products. This report shows that over the last several years, the U.S. and other seemingly well-positioned countries have not adequately benefited from this growing demand as they continue to be outpaced by China's efforts to supply global markets with environmental goods.

By specifically examining U.S. trade flows in solar and wind technology, this report also shows that U.S. imports from China continue to rapidly surge, strengthening the preliminary determinations by the ITC that such imports are a cause of domestic industry harm that, left unmitigated, could wipe out U.S. manufacturers in this sector.

China's rapid and punctuated growth appears to be the outcome of aggressive industrial policies employed by Chinese authorities to become one of the world's leading producers and exporters of environmental goods, a stated goal in China's two most recent Five Year Plans. Programs that distort trade by providing unfair advantage to Chinese exporters of environmental goods not only harm American producers but also those in other major environmental goods producing countries like E.U. member states and Japan. These Chinese programs need to be further identified and investigated to determine their consistency with WTO rules. WTO violations in this sector, and any other, must be aggressively challenged by the U.S. and its trading partners bilaterally and in multilateral forums.

The complaints filed by U.S. producers of solar and wind energy products represent a test as to whether international trade rules can be respected and whether U.S. trade laws provide a sufficient remedy to illegal dumping and subsidization by China.

The recent efforts by the Obama Administration to challenge some of China's unfair trade practices are welcome and encouraging. A strategy to eliminate foreign barriers to American environmental goods and a strong effort to enforce global trade rules to combat unfair trade are necessary steps toward ensuring a level playing field for U.S. producers in global markets. However, these steps alone are insufficient given that the myriad practices employed by China are not likely to be sufficiently remedied in the near term.

Insufficient political appetite in Washington, D.C. to more fully challenge China's tactics, and weak enforcement of international trade rules, undermine America's environmental goods industry, and many others. As a result, the U.S. domestic policy environment will also remain critical to the success or failure of an American environmental goods industry. Policy makers in Congress would be wise to develop and implement policies that reflect a lasting, bipartisan consensus that establishes a pro-growth environment that enables the development of the American environmental goods industry.

Appendix

Data table for Figure 1

Source: U.S. International Trade Commission, Dataweb.

U.S. imports for consumption of environmental goods, by group and HS code, 2006-2011						
In 1,000 dollars						
	2006	2007	2008	2009	2010	2011
REP						
841182	106,989	171,125	231,452	195,576	258,158	430,070
853710	4,337,287	4,829,246	5,082,868	4,030,860	5,260,229	5,961,295
854140	1,823,448	2,111,857	2,727,402	2,584,649	4,368,614	7,105,569
841869	388,970	812,189	918,369	831,227	874,789	943,899
848340	1,609,799	1,859,704	2,219,280	1,619,423	1,743,293	2,287,305
900190	311,683	332,082	365,597	275,580	341,824	380,052
841181	152,374	148,473	213,884	330,706	212,568	249,240
841990	579,568	720,159	829,154	652,301	667,675	773,013
850720	425,393	550,336	642,164	481,844	657,369	703,568
850164	224,997	561,206	825,357	551,322	436,883	527,207
848360	226,741	295,383	305,473	198,887	295,659	333,498
841581	47,158	24,441	32,420	52,925	75,290	108,392
850162	63,061	52,217	70,640	51,900	75,005	80,760
841919	304,776	360,228	383,367	328,084	365,382	387,739
850161	158,955	138,885	169,747	114,650	132,773	176,747
730820	247,659	578,729	944,405	612,183	467,814	557,047
900290	147,083	114,093	137,448	129,224	159,881	177,252
841861	364,252	15,869	51,135	56,630	86,540	98,519
841090	40,418	36,274	45,244	49,095	59,150	53,414
761100	3,173	4,134	2,350	2,337	2,390	3,506
850231	1,208,667	2,379,940	2,503,349	2,279,968	1,221,804	1,233,940
840681	68,103	57,559	39,524	31,880	31,910	51,432
850163	37,259	69,623	81,397	36,716	39,560	40,458
841011	472	455	1,939	5,474	4,197	1,367
Subtotal	12,878,285	16,224,207	18,823,965	15,503,441	17,838,757	22,665,289
SHW						
392010	472	455	1,939	5,474	4,197	1,367
761290	175,824	194,439	203,378	175,740	184,265	183,935
840290	114,922	274,105	298,271	374,375	136,889	85,151
841940	104,240	142,798	233,470	414,250	258,486	135,843
840219	9,577	10,312	18,322	74,567	15,030	20,961
840410	22,401	48,064	110,356	108,963	57,604	92,604
Subtotal	427,436	670,173	865,736	1,153,369	656,471	519,861
APC						
841989	313,167	346,104	373,477	269,602	297,072	347,173
840510	19,583	24,427	15,927	36,953	7,120	11,126
840490	66,941	116,658	128,602	152,871	83,320	79,658
Subtotal	399,691	487,189	518,006	459,426	387,512	437,957
HEM						

841950	371,189	477,373	722,684	808,975	515,980	542,830
701931	69,281	73,623	56,868	43,918	82,406	84,021
Subtotal	440,470	550,996	779,552	852,893	598,386	626,851
WWM						
730900	166,576	227,080	308,930	587,328	289,458	299,443
560314	59,596	58,011	57,249	82,529	103,165	110,260
732490	226,172	285,091	366,179	669,857	392,623	409,703
Subtotal	**452,344**	**570,182**	**732,358**	**1,339,714**	**785,246**	**819,406**
CRET						
732111	1,336,355	1,587,267	1,330,962	1,100,523	1,245,651	1,323,715
850680	94,347	91,466	86,295	66,413	64,617	56,497
732190	328,842	308,700	296,864	218,149	239,733	221,972
Subtotal	**1,759,544**	**1,987,433**	**1,714,121**	**1,385,085**	**1,550,001**	**1,602,184**
EMAA						
903210	538,283	500,197	526,922	475,674	614,605	614,804
903220	32,812	39,749	45,553	31,507	31,072	34,085
Subtotal	**571,095**	**539,946**	**572,475**	**507,181**	**645,677**	**648,889**

Data table for figures 1 as well as 2

Source: U.S. International Trade Commission, Dataweb.

U.S. domestic exports of environmental goods, by group and HS code, 2006-2011						
In 1,000 dollars						
	2006	**2007**	**2008**	**2009**	**2010**	**2011**
REP						
841182	2,271,448	3,381,026	3,140,607	2,833,996	2,685,455	2,760,585
853710	2,117,908	2,303,292	2,341,176	1,911,080	2,176,700	2,542,000
854140	1,298,083	1,582,206	1,976,071	2,017,633	2,706,096	2,427,000
841869	206,819	849,532	928,021	705,070	864,852	1,152,254
848340	667,244	743,038	885,890	732,804	929,642	1,189,944
900190	1,474,915	1,344,295	874,813	847,957	1,208,440	1,001,546
841181	496,631	592,548	738,480	390,437	209,630	234,056
841990	503,782	588,307	655,848	564,203	655,352	831,239
850720	301,595	388,302	520,860	374,786	539,586	639,300
850164	268,144	302,080	419,095	370,467	579,837	615,004
848360	198,433	215,737	235,405	203,886	251,645	292,436
841581	109,107	109,305	142,954	140,762	160,909	145,178
850162	94,821	110,505	118,284	121,336	129,179	144,080
841919	79,982	92,312	114,685	119,257	186,639	120,063
850161	66,175	69,991	94,410	79,057	78,450	95,412
730820	83,721	85,080	91,117	65,544	70,935	102,287
900290	95,678	99,062	86,912	62,823	91,326	106,540
841861	628,778	77,914	76,489	80,265	40,030	39,916
841090	34,347	28,636	35,072	50,452	40,632	35,038
761100	16,276	18,842	22,670	13,767	16,555	26,914
850231	83,310	14,158	22,073	116,998	142,116	125,977
840681	2,765	3,150	13,149	78,156	94,573	167,221

850163	9,812	10,751	10,446	10,008	13,173	30,486
841011	1,680	3,789	6,749	3,813	5,833	4,828
Subtotal	**11111453**	**13013858**	**13551275**	**11894557**	**13877585**	**14829304**
SHW						
392010	892,876	955,339	1,189,459	990,029	1,127,190	1,187,622
761290	296,446	347,518	333,848	371,271	462,376	365,933
840290	155,578	170,438	220,772	237,092	116,309	151,266
841940	29,953	52,332	89,721	92,374	111,404	169,050
840219	41,425	29,729	36,289	27,167	32,209	47,380
840410	22,759	27,638	29,391	28,155	48,533	82,980
Subtotal	**1439037**	**1582994**	**1899480**	**1746088**	**1898021**	**2004231**
APC						
841989	556,005	518,246	836,420	525,932	675,840	576,070
840510	47,029	58,228	65,378	78,772	63,702	86,657
840490	75,699	54,607	46,486	59,066	85,945	95,158
Subtotal	**678733**	**631081**	**948284**	**663770**	**825487**	**757885**
HEM						
841950	582,203	668,159	764,933	651,456	652,835	814,540
701931	62,567	84,232	117,455	99,974	55,072	53,918
Subtotal	**644770**	**752391**	**882388**	**751430**	**707907**	**868458**
WWM						
730900	200,384	253,859	379,312	268,434	270,201	317,741
560314	147,886	165,159	206,538	156,686	217,956	250,124
732490	48,140	66,766	73,622	64,995	70,907	65,656
Subtotal	**396410**	**485785**	**659472**	**490115**	**559064**	**633521**
CRET						
732111	153,366	207,111	208,879	205,483	251,212	276,773
850680	146,235	112,858	86,570	68,453	90,347	90,058
732190	68,343	64,084	65,061	48,894	47,825	50,046
Subtotal	**367944**	**384053**	**360509**	**322830**	**389384**	**416877**
EMAA						
903210	123,707	109,291	112,027	90,332	92,398	96,257
903220	24,386	19,929	14,424	10,288	17,600	20,356
Subtotal	**148092**	**129220**	**126450**	**100620**	**109998**	**116613**

Summary: Imports in thousand U.S. dollars

	2006	2007	2008	2009	2010	2011
REP	12,878,285	16,224,207	18,823,965	15,503,441	17,838,757	22,665,289
SHW	427,436	670,173	865,736	1,153,369	656,471	519,861
APC	399,691	487,189	518,006	459,426	387,512	437,957
HEM	440,470	550,996	779,552	852,893	598,386	626,851
WWM	452,344	570,182	732,358	1,339,714	785,246	819,406
CRET	1,759,544	1,987,433	1,714,121	1,385,085	1,550,001	1,602,184
EMAA	571,095	539,946	572,475	507,181	645,677	648,889
Total	16,928,865	21,030,126	24,006,213	21,201,109	22,462,050	27,320,437

Summary: Exports in thousand U.S. dollars						
	2006	2007	2008	2009	2010	2011
REP	11,111,453	13,013,858	13,551,275	11,894,557	13,878,585	14,829,304
SHW	1,439,037	1,582,994	1,899,480	1,746,088	1,898,021	2,004,231
APC	678,733	631,081	948,284	663,770	825,487	757,885
HEM	644,770	752,391	882,388	751,430	707,907	868,458
WWM	396,410	485,785	659,472	485,785	559,064	633,521
CRET	367,944	384,053	360,509	322,830	389,384	416,877
EMAA	148,092	129,220	126,450	100,620	109,998	116,613
Total	14,786,439	16,979,382	18,427,858	15,965,080	18,368,446	19,626,889
U.S. trade balance with the world	-2,142,426	-4,050,744	-5,578,355	-5,236,029	-4,093,604	-7,693,548

U.S. Trade Balance World and China (in million dollars)						
	2006	2007	2008	2009	2010	2011
With China	Not in graph	-3,004	-3,277	-2,733	-3,967	-6,389
World without China	Not in graph	-1,047	-2,301	-2,503	-127	-1,305
With the World	Not in graph	-4,051	-5,578	-5,236	-4,094	-7,694

Data table for figure 3

Source: ITC Dataweb, Congressional Research Service.

Exports of environmental goods						
in million U.S. dollars	2006	2007	2008	2009	2010	2011
U.S. exports	14,818	17,119	18,630	17,645	21,064	22,190
China	10,070	16,173	27,371	24,397	42,572	49,113
Global exports	137,526	173,129	215,570	185,198	236,690	298,466

Data table for figure 4

Source: ITC Dataweb, Congressional Research Service.

U.S. General Imports of Photosensitive Semiconductor Device inc. Photovoltaic cells (HS code 854140) from 7 exemplary countries							
in thousand U.S. dollars							
	2005	2006	2007	2008	2009	2010	2011
China	165,570	260,483	386,313	462,400	636,925	1,567,452	3,365,164
Germany	38,543	66,744	150,606	227,681	126,878	175,698	316,763
Japan	483,339	597,169	662,545	756,335	500,675	734,937	876,648
Mexico	112,732	160,512	133,035	284,188	393,650	543,507	579,228
South Korea	11,631	14,241	16,983	26,562	23,112	46,906	119,056
Canada	28,049	25,611	35,745	33,023	23,901	28,107	44,471
India	8,205	18,452	25,899	15,237	12,658	42,469	52,800
all other	522,981	681,430	711,952	916,671	834,256	1,199,276	1,728,499
Worldwide	1,371,050	1,824,642	2,123,078	2,722,097	2,552,055	4,338,352	7,082,629

Data table for figure 5

Source: U.S. International Trade Commission, Dataweb.

U.S. Total Exports of Photosensitive Semiconductor Device inc. Photovoltaic cells (HS code 854140) to 7 exemplary countries in thousand U.S. dollars							
	2005	2006	2007	2008	2009	2010	2011
China	33,802	50,280	87,560	83,113	93,008	157,859	98,836
Germany	260,056	301,146	404,754	503,203	656,460	742,970	381,892
Japan	270,292	177,230	130,728	171,706	126,917	219,795	240,140
Mexico	171,174	213,292	226,722	263,408	223,703	259,835	314,163
South Korea	47,572	82,510	92,810	138,683	95,128	73,897	34,186
Canada	104,198	114,507	112,507	122,763	189,449	382,273	423,843
India	18,092	20,600	39,062	33,189	60,676	56,520	132,793
all other	719,780	664,918	819,834	1,048,144	971,782	1,357,126	1,335,934
Worldwide	**1,626,971**	**1,624,483**	**1,913,977**	**2,364,209**	**2,417,123**	**3,250,275**	**2,961,787**

Data table for figure 6

Source: U.S. International Trade Commission, Dataweb, GTM.

U.S. trade balance of solar goods (PV Capital Equipment, PV Polysilicon, Thin Film PV Feedstock, PV Wafers, PV Cells, PV Modules, PV Inverters, CSP, SHC)		
in million U.S. dollars	2010	2011
Balance with China	395	-1,635
Balance with the World	1,882	-1,598

Data table for figure 7

Source: U.S. International Trade Commission, Dataweb.

Trade balance for PV Cells and modules (added together)		
in million U.S. dollars	2010	2011
China	-1,110	-2778.4
World without China	3,755	-1155.7
World	2645	-3934.1

Data table for figure 8

Source: U.S. International Trade Commission, Dataweb.

Trade balance for PV Polysilicon		
in million U.S. dollars	2010	2011
China	869	672.3
World without China	1502	1607.9
World	2371	2280.2

Data table for figure 9

Source: U.S. International Trade Commission, Dataweb.

U.S. Domestic Imports of Towers and Lattice Masts of Iron or Steel (HTS 7308200000) and Generating Sets, Electric, Wind-powered (HTS 8502310000) (added together)		
	2010	**2011**
in 1,000 U.S. dollars by FAS value		
China	103,573	222,085
rest of the world	1,586,045	1,452,189
total	1,689,618	1,674,274

Data tables for figure 10, 11, 12 and 13

Source: Global Trade Atlas, Congressional Research Service.

Top importers of environmental goods in 2010				
Rank	**Country**	**Amount (mil) 2010**	**2005**	**CAGR 05 10**
1	Germany	26,267	10,201	0.17074224
2	United States	23,573	14,879	0.079709325
3	China	21,569	11,370	0.112615035
4	Italy	14,847	3,309	0.28427193
5	Netherlands	9,749	2,916	0.222818757
6	France	8,065	4,350	0.108372782
7	South Korea	7,363	3,540	0.129818261
8	United Kingdom	6,313	4,543	0.056368661
9	Canada	6,222	3,720	0.089509892
10	Japan	6,147	4,625	0.048556683
11	Hong Kong	5,094	2,623	0.116974971
12	Spain	4,866	3,484	0.057261278
13	Belgium	4,591	2,366	0.116817195
14	Czech Republic	4,470	1,107	0.261904969
15	Mexico	4,418	2,754	0.081957735
16	Taiwan	3,792	3,605	0.008464257
17	Russia	3,613	1,970	0.106369741
18	Australia	3,363	1,626	0.128758554
19	Thailand	3,081	1,666	0.107905666
20	Brazil	2,845	980	0.194380486
21	Singapore	2,827	1,399	0.124392696
22	Turkey	2,587	996	0.172436999
23	Switzerland	2,518	1,661	0.071801471
24	India	2,470	791	0.208982678
25	Austria	2,470	1,720	0.062171761
26	Sweden	2,449	1,445	0.091909949
27	Indonesia	2,301	619	0.24462254

28	Malaysia	2,233	1,457	0.073754166
29	Poland	2,082	1,143	0.105110612
30	Denmark	1,882	1,254	0.070007973
31	United Arab Emirates	1,765		
32	Algeria	1,662	428	0.253712266
33	South Africa	1,482	666	0.142603796
34	Venezuela	1,404	410	0.227714001
35	Hungary	1,391	845	0.086621775
36	Slovakia	1,319	460	0.191921976
37	Iran	1,035		
38	Norway	1,026	1,222	-0.028716467
39	Romania	1,009	484	0.130249441
40	Chile	997	407	0.161047867
41	Greece	970	450	0.136562188
42	Nigeria	864	nr	
43	Finland	852	641	0.048568791
44	Portugal	841	595	0.059367158
45	Kazakhstan	703	478	0.066402705
46	Egypt	623	124	0.308712931
47	Argentina	572	325	0.098800322
48	Slovenia	520	246	0.132864687
49	Ukraine	490	396	0.036136125
50	Bulgaria	476	173	0.183750408
51	Ireland	460	527	-0.022407481
52	Colombia	382	212	0.103116169
53	Morocco	361	198	0.105283454
54	Peru	358	155	0.149719475
55	Jordan	345	78	0.281211266
56	New Zealand	345	285	0.032354937
57	Croatia	344	200	0.094598229
58	Ecuador	326	81	0.261213944
59	Philippines	314	217	0.063518345
60	Luxemburg	272	151	0.103058789
61	Azerbaijan	211	112	0.111332646
62	Cyprus	201	65	0.207018102
63	Lithuania	175	182	-0.006515467
64	Guatemala	154	131	0.027325901
65	Panama	143	31	0.290215903
	Kenya	142	nr	
	Serbia	141	127	0.017581568
	Estonia	129	165	-0.040192157

	Costa Rica	126	61	0.128513568
	Uruguay	125	42	0.199343135
	Bolivia	111	nr	
	Iceland	98	79	0.036572853
	El Salvador	93	69	0.051007083
	Sri Lanka	85	50	0.092466563
	Latvia	81	89	-0.0155753
	Paraguay	70	27	0.172075837
	Yemen	65	nr	
	Honduras	62	50	0.036502326
	Cote d'Ivoire	60	25	0.15709373
	Nicaragua	57	29	0.119213164
	Malta	55	67	-0.03235814
	Senegal	42	28	0.069913194
	Mauritius	37	27	0.053916798

Data tables for figure 10, 11, 12 and 13

Source: Global Trade Atlas, Congressional Research Service.

Export market shares in percentage	China 2005	China 2010	U.S. 2005	U.S. 2010	EU 2005	EU 2010	Japan 2005	Japan 2010
in Germany (1)	6.26	27.71	7.79	5.23			9.86	4.04
in United States (2)	15.79	21.94			27.4	21.73	11.62	8.56
in China (3)			6.42	5.19	23.12	22.42	34.19	24.17
in Italy (4)	7.99	33.69	8.79	3.52			4.44	1.58
in Netherlands (5)	6.9	46.93	11.69	3.98			9.82	1.63
in France (6)	2.58	10.44	10.68	5.79			2.93	2.13
in South Korea (7)	9.56	25.04	13.23	8.44	21.95	15.8	42.27	30.21
United Kingdom (8)	5.36	7.96	12.69	10.46			7.62	7.25
in Canada (9)	7.66	10.65	67.23	52.92	13.41	22.67	2.97	2.38
in Japan (10)	27.32	32.46	23.84	14.95	15.22	13.89		
in Hong Kong (11)	41.66	45.76	5.87	3.23	6.56	3.02	25.35	16.73

Export market shares in percentage	China 2005	China 2010	U.S. 2005	U.S. 2010	EU 2005	EU 2010	Japan 2005	Japan 2010
in Egypt (46)	5.56	8.42	10.09	5.22	47.58	59.87	4.87	8.78
in Panama (65)	2.28	5.61	48.01	24.04	9.68	12.59	0.77	0.33
in Italy (4)	7.99	33.69	8.79	3.52			4.44	1.58
in Jordan (55)	9.02	7.72	3.57	2.82	47.44	71.3	0.89	0.53
in Czech Republic (14)	1.36	35.28	1.71	1.34			2.08	5.85
in Ecuador (58)	3.34	5.66	33.24	67.23	13.58	9.2	0.98	0.35
in Algeria (32)	6.41	2.8	11.12	7.55	64.02	57.94	1.05	4.71
in Indonesia (27)	14.8	29.56	9.28	5.72	14.54	8.87	26.5	24.63
in Venezuela (34)	5.66	3.15	46.13	67.22	21.46	11.68	1.89	2.02
in Netherlands (5)	6.9	46.93	11.69	3.98			9.82	1.63

China export market shares (percentage)		
By largest import markets	2005	2010
Germany (1)	6.26	27.71
United States (2)	15.79	21.94
Italy (4)	7.99	33.69
Netherlands (5)	6.9	46.93
France (6)	2.58	10.44
South Korea (7)	9.56	25.04
United Kingdom (8)	5.36	7.96
Canada (9)	7.66	10.65
Japan (10)	27.32	32.46
Hong Kong (11)	41.66	45.76

China export market shares (percentage)		
By fastest growing import markets	2005	2010
Egypt (46)	5.56	8.42
Panama (65)	2.28	5.61
Italy (4)	7.99	33.69
Jordan (55)	9.02	7.72
Czech Republic (14)	1.36	35.28
Ecuador (58)	3.34	5.66
Algeria (32)	6.41	2.8
Indonesia (27)	14.8	29.56
Venezuela (34)	5.66	3.15
Netherlands (5)	6.9	46.93

U.S. export market shares (percentage)		
By largest import markets	2005	2010
Germany (1)	7.79	5.23
China (3)	6.42	5.19
Italy (4)	8.79	3.52
Netherlands (5)	11.69	3.98
France (6)	10.68	5.79
South Korea (7)	13.23	8.44
United Kingdom (8)	12.69	10.46
Canada (9)	67.23	52.92
Japan (10)	23.84	14.95
Hong Kong (11)	5.87	3.23

U.S. export market shares (percentage)		
By fastest growing import markets	2005	2010
Egypt (46)	10.09	5.22
Panama (65)	48.01	24.04
Italy (4)	8.79	3.52
Jordan (55)	3.57	2.82
Czech Republic (14)	1.71	1.34
Ecuador (58)	33.24	67.23
Algeria (32)	11.12	7.55
Indonesia (27)	9.28	5.72
Venezuela (34)	46.13	67.22
Netherlands (5)	11.69	3.98

EU exports market shares (percentage)		
largest import markets	**2005**	**2010**
United States (2)	27.4	21.73
China (3)	23.12	22.42
South Korea (7)	21.95	15.8
Canada (9)	13.41	22.67
Japan (10)	15.22	13.89
Hong Kong (11)	6.56	3.02

EU export market shares (percentage)		
By fastest growing import markets	**2005**	**2010**
Egypt (46)	47.58	59.87
Panama (65)	9.68	12.59
Jordan (55)	47.44	71.3
Ecuador (58)	13.58	9.2
Algeria (32)	64.02	57.94
Indonesia (27)	14.54	8.87
Venezuela (34)	21.46	11.68

Japan export market shares (percentage)		
By largest import markets	**2005**	**2010**
Germany (1)	9.86	4.04
United States (2)	11.62	8.56
China (3)	34.19	24.17
Italy (4)	4.44	1.58
Netherlands (5)	9.82	1.63
France (6)	2.93	2.13
South Korea (7)	42.27	30.21
United Kingdom (8)	7.62	7.25
Canada (9)	2.97	2.38
Hong Kong (11)	25.35	16.73

Japan export market shares (percentage)		
By fastest growing import markets	**2005**	**2010**
Egypt (46)	4.87	8.78
Panama (65)	0.77	0.33
Italy (4)	4.44	1.58
Jordan (55)	0.89	0.53
Czech Republic (14)	2.08	5.85
Ecuador (58)	0.98	0.35
Algeria (32)	1.05	4.71
Indonesia (27)	26.5	24.63
Venezuela (34)	1.89	2.02
Netherlands (5)	9.82	1.63

Data tables for figure 14

Source: Global Trade Atlas, Congressional Research Service.

Export market shares in EU 2005 In million U.S. dollars	
China	1,493
Germany	9,995
Netherlands	1,770
Italy	4,080
France	3,423
United States	2,520
Spain	1,147
Czech Republic	1,319
Belgium	2,281
Japan	2,738
All other	13,434

Export market shares in EU 2010 In million U.S. dollars	
China	22,168
Germany	20,367
Netherlands	6,884
Italy	5,016
France	4,322
United States	4,148
Spain	3,549
Czech Republic	3,116
Belgium	2,844
Japan	2,809
All other	28,851

Data tables for figure 15

Source: Global Trade Atlas, Congressional Research Service.

Export market shares in Asia 2005 In million U.S. dollars	
Japan	10,139
China	3,238
Taiwan	2,078
United States	3,714
Germany	2,780
South Korea	1,337
Hong Kong	1,830
Singapore	861
Malaysia	843
Thailand	513
All other	4,385

Export market shares in Asia 2010 In million U.S. dollars	
Japan	12,863
China	11,013
Taiwan	5,727
United States	5,591
Germany	5,225
South Korea	5,217
Hong Kong	3,202
Singapore	1,915
Malaysia	1,627
Thailand	1,085
All other	7,072

Data tables for figure 16

Source: Global Trade Atlas, Congressional Research Service.

Export market shares in Africa 2005 In million U.S. dollars	
China	210
France	447
Italy	323
Germany	464
United States	242
South Korea	84
India	122
Japan	108
South Africa	199
Turkey	92
All other	809

Export market shares in Africa 2010 In million U.S. dollars	
China	1,009
France	865
Italy	760
Germany	697
United States	504
South Korea	442
India	288
Japan	285
South Africa	228
Turkey	222
All other	1,640

Data tables for figure 17

Source: Global Trade Atlas, Congressional Research Service.

Export market shares in Middle East 2005 In million U.S. dollars	
United States	699
Germany	658
Italy	543
China	179
South Korea	523
France	353
India	112
Japan	223
Turkey	137
United Kingdom	228
All other	845

Export market shares in Middle East 2010 In million U.S. dollars	
United States	1,607
Germany	1,242
Italy	932
China	863
South Korea	749
France	684
India	631
Japan	433
Turkey	254
United Kingdom	250
All other	1,794

Data tables for figure 18

Source: Global Trade Atlas, Congressional Research Service.

Export market shares in NAFTA countries 2005 In million U.S. dollars	
United States	4,507
Mexico	2,829
China	1,161
Canada	2,078
Germany	1,857
Japan	2,493
Malaysia	1,608
Denmark	538
Taiwan	311
United Kingdom	707
All other	3,611

Export market shares in NAFTA countries 2010 In million U.S. dollars	
United States	6,243
Mexico	5,304
China	4,489
Canada	2,602
Germany	2,555
Japan	2,412
Malaysia	1,193
Denmark	1,111
Taiwan	745
United Kingdom	743
All other	4,663

Data tables for figure 19

Source: Global Trade Atlas, Congressional Research Service.

Export market shares in Latin American Countries 2005 In million U.S. dollars	
United States	834
China	104
Germany	300
Brazil	263
Mexico	170
Italy	133
Argentina	111
Spain	81
Japan	133
United Kingdom	91
All other	880

Export market shares in Latin American Countries 2010 In million U.S. dollars	
United States	1,993
China	726
Germany	684
Brazil	446
Mexico	347
Italy	318
Argentina	283
Spain	252
Japan	241
United Kingdom	126
All other	1,675