Written Testimony of John J. McMackin
on behalf of
The Energy-Intensive Manufacturers' Working Group
on Greenhouse Gas Regulation

Before the House Committee on Energy and Commerce
Subcommittee on Energy and Environment

Hearing on the American Clean Energy and Security Act

April 23, 2009

Summary: Continued Progress—and Remaining Critical Issues

Mr. Chairman and members of the Subcommittee, the Energy-Intensive Manufacturers' Working Group on Greenhouse Gas Regulation greatly appreciates this opportunity to testify concerning the March 31 discussion draft of the American Clean Energy and Security Act. Much has changed—and much progress has been made—since I testified before the Subcommittee on behalf of the Working Group last month. We commend you and the Subcommittee for the quality of your work, your responsiveness to the unique threat posed to energy-intensive, trade-exposed industries by unilateral climate-change legislation, and for the openness of your process to stakeholders.

The Working Group is more convinced than ever that the problem upon which it is exclusively focused, the leakage of carbon and jobs to unregulated countries that could result from the costs imposed on U.S. energy-intensive and trade-exposed industries, can be adequately addressed. The draft has adopted a structure—largely paralleling the work of Congressmen Inslee and Doyle—that can work.

However, the draft leaves several critical decisions unmade—and the success of the anti-leakage output-based-rebate provision hangs in the balance. Chief among those issues are two: first, funding of the provision with an adequate number of allowances, and, second, making sure that the provision stays in effect until the underlying problem is solved through comparable actions by countries whose energy-intensive manufacturers compete in the global market.

Before addressing those two issues, I will briefly review the Working Group's membership as well as developments since we last testified. I will also discuss a key element of the progress to date, i.e., adoption by the discussion draft and by the newly-reintroduced and modified Inslee-Doyle bill of an eligibility mechanism that—with a few modifications—can go a long way towards infusing objectivity, fairness and relative certainty into the process of determining which industries should qualify for relief.

The Energy-Intensive Manufacturers' Working Group

Our group is composed primarily of companies from the U.S. industries that are widely and correctly seen as most vulnerable to leakage: ferrous metals (iron and steel), non-ferrous metals (aluminum and copper), cement, glass (including fiberglass), ceramics, chemicals and paper. It also has members from some of the other industrial sectors or subsectors that our work has identified as subject to leakage, such as nitrogen fertilizer producers. The companies include AK Steel, Alcoa, ArcelorMittal, Corning, Cliffs Natural Resources, Dow, Holcim(US), NewPage Corporation, Nucor, Owens Corning, Owens-Illinois, PPG, Rio Tinto, Terra Industries, U.S. Steel and Weyerhaeuser.[1]

The Working Group was formed early last year for a single purpose: to engage constructively with Congress and other stakeholders in working out the many design questions involved in constructing a workable allowance-grant (or allowance-value rebate) provision.

I am a principal in the law firm of Williams & Jensen, PLLC and have been a director of Owens-Illinois, Inc. for nearly fifteen years. O-I is headquartered in Perrysburg, Ohio and has U.S. manufacturing facilities in eleven states. It is the world's largest manufacturer of glass containers. O-I is an active and committed member of the Working Group.

Developments Since our March 18 Hearing Testimony

At the time of our March 18, 2009 testimony in the Subcommittee's *Hearing on Competitiveness and Climate Policy: Avoiding Leakage of Jobs and Emissions* the Committee had not yet finished or released its discussion draft, nor had Congressmen Inslee and Doyle yet introduced a new version of their anti-leakage bill. Our testimony recommended that the Committee adopt the output-based rebate concept and general structure of Inslee-Doyle as it then existed, but we were also advocating a refined eligibility mechanism (building on work of the World Resources Institute, the Peterson Institute and others) that made use of objective standards for determining presumptive eligibility based upon energy-intensity and trade-intensity quotients, and that provided an opportunity for individual showings by sectors or subsectors not meeting the presumptive criteria. The proposed methodology, moreover, in contrast to most prior work, made use of relatively disaggregated data, using North American Industrial Classification System codes at the narrow six-digit level.

In conjunction with its testimony, the Working Group released a study by FTI Consulting (also included in our March 24 testimony before the Ways & Means Subcommittee on Trade) that showed the results of applying the presumptive criteria: 45

---

[1] While this written testimony generally represents the position of the Working Group, not all statements are necessarily endorsed by every member. I do not represent individual members of the group other than Owens-Illinois, and while my responses to any questions during the hearing will attempt not to stray from the group's views, those responses will be my own and not necessarily the group's.

qualifying sectors or subsectors. As the study showed, the criteria serve both to expand the number of industries or sub-industries subject to potential relief by identifying smaller or otherwise previously ignored sectors, and, at the same time, to disaggregate some of the traditionally identified but very general categories, such as "glass" or "steel."

The study has received wide distribution within the private sector and government agencies, has been well received, and has informed discussions on eligibility. Attached to this testimony as Exhibit A is an updated version of the study, reflecting some minor corrections that emerged from our work and discussions subsequent to the hearing.[2]

On March 26, Congressman Inslee and Doyle introduced a revised version of their legislation, H.R. 1759, now called the "EMPLOY Act" or the "Emission Migration Prevention with Long-term Output Yields Act." The new Inslee-Doyle bill adopted an eligibility mechanism very similar to that advocated by the Working Group, and the Committee's Working Draft of its ACES bill, similarly, adopted, with some significant changes, much of the Inslee-Doyle bill, including similar eligibility provisions.

The New Eligibility Mechanism

Much of our optimism that a workable anti-leakage provision can be achieved is based upon the inclusion of the basic structure of the presumptive eligibility mechanism in the draft bill. We continue to work with Congressmen Inslee and Doyle, the Committee and other stakeholders to improve the provision. We strongly believe that in many instances where the discussion draft differs from Inslee-Doyle, the Inslee-Doyle language should be used. Moreover, some drafting issues exist in the discussion draft which, if not remedied, would greatly undermine the determinacy of the presumptive criteria and the certainty it was meant to foster. Further, among the major omissions in the discussion draft is a provision of Inslee-Doyle that specifies that industrial processes that can be conducted on either an integrated or separate basis shall be aggregated for calculating whether they meet the presumptive thresholds. Another provision that needs significant further clarification is Subsection (b)(3) providing for individual showings of presumptive eligibility.

Allowance Adequacy—The Question of a Cap and Its Amount

The discussion draft leaves unanswered the question of a cap on the number of allowances available to fund the anti-leakage rebate for energy-intensive, trade-exposed industries. By contrast, Inslee-Doyle, like the Brown-Stabenow provision in the Senate, capped the amount available under the provision at 15% of the first year's number of total allowances. (Both those bills assumed that the total number of allowances under a cap and trade bill would be highest in the first year.) If the number actually needed exceeded the cap in any given year, recipients would receive a pro-rata reduction.

---

[2] On page 9 (Methodology for Estimating Emissions), the emissions figure in the first bullet has changed from 612 million to 614 million, and in the second bullet from 806 million to 802, to remain consistent with the table on page 8.

The analysis done by our Working Group and submitted to the Committee last month as Exhibit A to my March testimony indicated that allowances capped at 15% should be sufficient to fund the anti-leakage, Inslee-Doyle-type rebate. (That analysis is repeated in the updated version of the study attached hereto, at page 8.) However, that analysis, like most of the thinking to date on the question, assumes that the "first year of regulation" number of allowances would be approximately that of the Lieberman-Warner bill, i.e., 5.775 billion (or, as it is often expressed, in millions, 5,775 MM.) Fifteen percent of 5,775 MM represents 866 million allowances. It is something in the range of that number that we believe represents an adequate cap.

Our reasoning stems from our analysis of the industries that would qualify under the presumptive standards and the emissions of those 45 industries. It also reflects the need to allow for additional industries qualifying through mechanisms other than application of the NAICS-code-level presumptions, the possibility of *growth* of qualifying domestic industrial sectors, the uncertainty inherent in the estimates, and the nature of a cap itself.

As can be seen on page 8 of the Appendix, our analysis indicates that the 45 presumptively qualifying sectors and subsectors represent approximately 771 MM tons of emissions (combustion, indirect and process). That is 13.4% of the 5,775 allowances provided for in the first year of Lieberman-Warner.

Those figures do not reflect the 15% across-the-board reduction in allowances granted qualifying facilities that Inslee-Doyle and the discussion draft would impose. The Working Group does not believe that reduction is appropriate policy, especially in light of the potentially huge uncompensated costs that energy- and trade-intensive industries are likely to suffer under unilateral legislation. These include, for instance, the increase in the cost of carbon-favored substitutable fuels such as natural gas caused by both demand increases and upward shifts in their demand curves. They also include the increase in the cost of many production inputs, such as raw materials.

Nonetheless, even if it is assumed that the 15% reduction will be included in final legislation, any cap still needs to be no lower than, roughly, the 850-900 MM range. The 15% haircut would reduce the estimate of allowances to be provided to the 45 qualifying sectors to about 655 MM (85% of 771), or 11.3 percent of the Lieberman-Warner first-year level of 5,775 MM.

That still leaves only 211MM allowances (866-655), or 3.7% of the Lieberman-Warner level, to cover the following:

- the uncertainty of the estimation process;
- sectors or subsectors that qualify under either of the two methods of individual showings under the bill; and
- growth in American industrial, energy-intensive manufacturing, including: (i) growth in export markets; (ii) growth involved in "green manufacturing" (e.g., wind turbines including their towers and bases, energy-efficient automobiles, and a reconstructed power grid); and (iii)

growth involved in making our residential and commercial structures more energy efficient (requiring insulated plate glass, fiberglass, steel, cement, etc.).

The structure of the ACES draft's annual allowance distributions complicates a discussion conducted in percentage terms of the number of allowances needed to fund the anti-leakage provisions. For instance, the ACES bill's distributions are lower in the first two years than they are in the third, and lower in the fourth year than in the fifth, which is the highest year overall. [See Subsection 721(e)(1), pp. 360-361]. Moreover, the bill allows the Administrator to adjust these numbers. [Subsection 721(e)(2), pp. 362-365.] Additionally, even the bill's highest level, 5,391 MM in 2016, is significantly less than the Lieberman-Warner level of 5,775 MM. If the presumptively eligible sectors received the 771 MM we believe is appropriate that would represent 14.3% of available allowances even in that highest year, leaving only .7 % for the uses identified above. If the presumptively eligible received the 15%-reduced amount, 655 MM, that would represent 12.1% and leave only 2.9%, or 152 MM allowances, for the additional needs.

In the Working Group's view, the best way to express any cap is in absolute terms, and it should be in the range of 850-900 MM allowances. We urge the Committee to note that this is a cap, not a grant of allowances, and that the consequences of a cap that is too low are far more deleterious in policy terms than is a cap that is too high. A cap set lower than the needs of the energy-intensive industries under the Inslee-Doyle structure will result in underfunding of the Inslee-Doyle formulaic relief, raising, by the same measure, the risk of leakage. A cap that is set higher than what turns out to be actual need simply means that more allowances will be available for auctioning or other uses.

Reduction and Termination

As a country we need a solution to the leakage problem that is as serious as the problem itself. That means, among other things, that the solution cannot be phased out or terminated before the underlying problem of regulation-caused production-cost disparity is solved, and the underlying problem will be solved only when the other countries producing energy-intensive materials adopt climate legislation that imposes on their industries costs comparable to what the ACES bill will impose on ours.

A scheduled phase down unrelated to the actions of other countries is a phased unilateral disarmament that will only encourage other countries to drag their feet. It would, moreover, simply schedule the re-emergence of leakage. The realities of international competition and international sourcing, further, means that the actual leakage would take place greatly in advance of its scheduled return. Businesses in energy-intensive, trade-exposed, international industries make decisions on capital expenditures and footprint re-alignment every year. Many of those decisions, such as whether to build or close a plant or replace a furnace, must have 20-year, 30-year or longer time horizons. The threat that leakage relief would expire before the leakage problem will very quickly be factored into those decisions.

Inslee-Doyle, like the Brown-Stabenow amendment, ties reduction of leakage relief strictly to the reduction of the underlying problem. Accordingly these proposals do not tie the amount of available anti-leakage allowances to the reduction in the economy-wide number of allowances. The discussion draft is silent on this point, but the effectiveness of the relief it provides depends on following the Inslee-Doyle approach of a free-standing pool of allowances.

Instead of scheduled, automatic reduction, the Inslee Doyle bill contains two provisions for reduction or elimination of the relief tied to reducing or eliminating the underlying international competiveness/regulation-cost problem. One of these involves a scheduled reduction that is itself to be eliminated or reduced if competing countries do not achieve objective benchmarks for greenhouse-gas regulation—benchmarks that signal comparable burdens on their energy-intensive industries. The second involves some level of broader discretion for the President and the EPA.

The working draft re-mixes the two provisions—moving the objective standards out of the scheduled-decline provision and into the discretionary one—in a fashion that significantly weakens the protections afforded U.S. manufacturing. The draft also weakens the protections in other significant ways. The Working Group very much believes that we need to return in this respect to the Inslee-Doyle structure and work to strengthen that in several respects as well.

Conclusion

The progress to date, much of it reflected in the discussion draft, has strengthened the Working Group's belief that climate change legislation can adequately address the problem of the leakage of carbon and jobs affecting our energy-intensive and trade-exposed industries. It has likewise strengthened our resolve to continue to work with Congressmen Inslee and Doyle, the Committee and all its members, and the other stakeholders to that end.

EXHIBIT 1

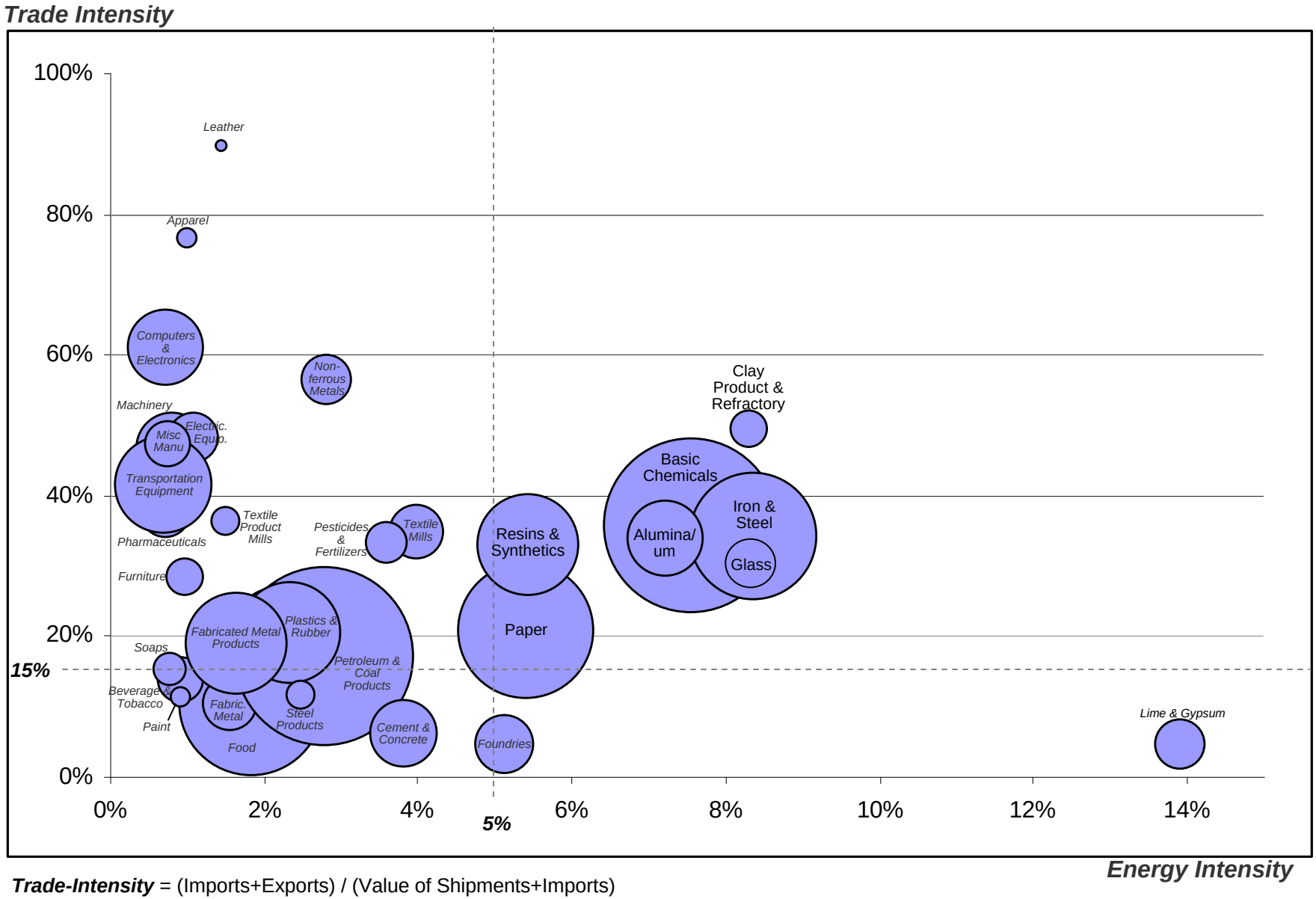
Greenhouse Gas Emissions Legislation
Leakage-Exposed Manufacturers

Briefing Book

Rob Fisher
(202) 589-3408

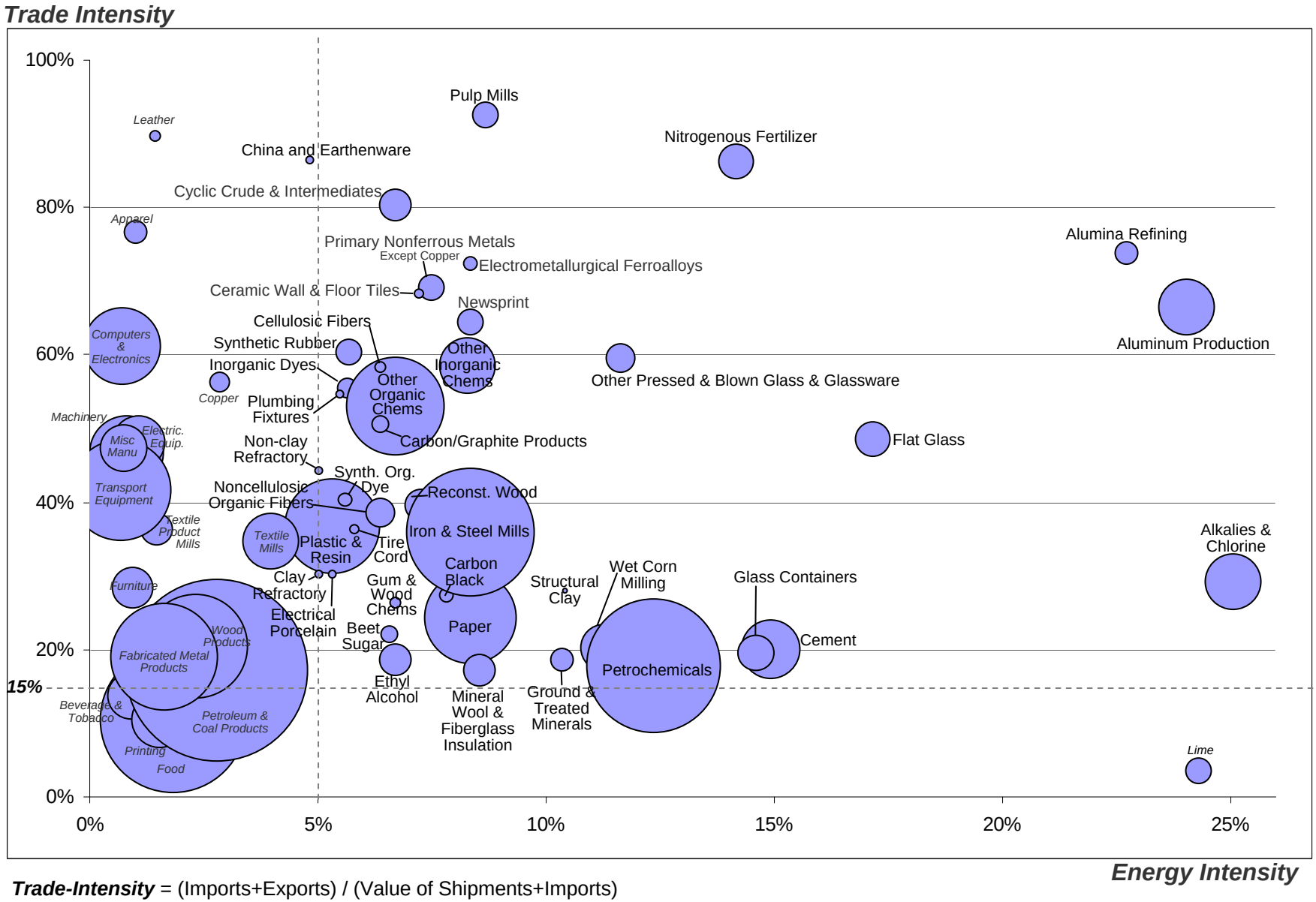
April 23, 2009

US Manufacturing Leakage Exposure: Aggregate Level



Trade-Intensity = (Imports+Exports) / (Value of Shipments+Imports)
Energy-Intensity = (Energy & Fuel Costs + Generation) / Value of Shipments
Size of Bubble = Amount of energy and fuel consumed as proxy for emissions
Sources: US Census 2006 Annual Survey of Manufacturers, EIA 2002 MECS, US International Trade Commission Tariff & Trade DataWeb

US Manufacturing Leakage Exposure: Detailed Industry Level



Trade-Intensity = (Imports+Exports) / (Value of Shipments+Imports)
Energy-Intensity = (Energy & Fuel Costs + Generation) / Value of Shipments
Size of Bubble = Amount of energy and fuel consumed as proxy for emissions
Sources: US Census 2006 Annual Survey of Manufacturers, EIA 2002 MECS, US International Trade Commission Tariff & Trade DataWeb

Leakage Exposure

To identify the manufacturing industries that are the most highly exposed to this leakage issue, we calculated the energy intensity and trade intensity of each manufacturing sub-industry (at the 6-digit NAICS code).

Methodology for Calculating Energy-Intensity and Trade-Intensity

- We first calculated the energy intensity of each industry. The primary data source we used was the most recent Annual Survey of Manufacturers (ASM) from the US Census, which includes data for 2004-2006. From the ASM we calculated the costs of purchased electricity and of purchased fuel as a percentage of the value of shipments.

- For export and import data, we relied on the US International Trade Commission's Trade Dataweb statistics for 2004-2006, which provides trade data at the 6-level NAICS level.

    - For Imports, we used the US Imports for Consumption category and within that category, we used the CIF Import Value.
    - For Exports, we used the Domestic Exports category. Within that category, we used FAS Value.

- Based on the work in other studies and on the EU's scheme, we have used two thresholds to determine those industries most exposed to leakage[2]:

    1) Energy intensity of **5%**
    2) Trade intensity of **15%**

- The maximum for the last three years of available data (2004-2006) was used to determine eligibility. So, for example, if an industry's energy intensity for the last three years respectively was 4%/5%/4%, it met the eligibility requirement.

[2] Ratios were rounded to nearest whole percentage point. For example, a calculated energy intensity of 4.51% or higher was rounded up to 5.0% and thus met the 5% threshold.

Methodology for Calculating Energy-Intensity and Trade-Intensity (continued)

- 41 industries met these two criteria.

- In addition, we included NAICS code 311210 (Iron and steel tube and pipe from purchased steel) in order to treat it the same for eligibility purposes as tube and pipe manufactured on an integrated basis.

- We added NAICS code 212210 (Iron ore mining and processing) to capture the beneficiation and other processing for similar reasons – to treat products the same for eligibility purposes whether they are produced at an integrated or non-integrated facility.

- To determine eligibility for the copper industry, we combined the energy and trade data for NAICS codes 331411 (Primary smelting and refining) and 212234 (Copper and nickel mining) to properly capture all copper processing whether the beneficiation of ore occurs at an integrated or non-integrated facility.

- A product that meets the energy intensity and trade intensity criteria should be considered eligible even if the facility that produces it is classified in a non-qualifying NAICS code by virtue of the facility's other products or the facility's ultimate product.

Qualifying Manufacturing Industries

Sectors	NAICS	Sub-Industry	Leakage-Intensity: Energy Intensity	Leakage-Intensity: Trade Intensity	Value of Shipments
Pulp, Paper & Newsprint Mills	322110	Pulp mills	**9%**	**92%**	4
	322121	Paper (except newsprint) mills	**8**	**24**	47
	322122	Newsprint mill products	**8**	**64**	4
Basic Chemicals	325110	Petrochemicals	**12**	**18**	66
	325131	Inorganic dyes and pigments	**6**	**55**	4
	325132	Synthetic organic dyes and pigments	**6**	**40**	3
	325181	Alkalies and chlorine	**25**	**29**	6
	325182	Carbon black	**8**	**27**	2
	325188	All other basic inorganic chemicals	**8**	**58**	19
	325191	Gum and wood chemicals	**7**	**26**	1
	325192	Cyclic crude and intermediates	**7**	**80**	9
	325193	Ethyl alcohol	**7**	**18**	8
	325199	All other basic organic chemicals	**7**	**53**	69
	325211	Plastics material and resins	**5**	**37**	79
	325212	Synthetic rubber	**6**	**60**	7
	325221	Cellulosic organic fibers	**6**	**58**	1
	325222	Non-cellulosic organic fibers	**6**	**38**	7
Nitrogenous fertilizer	325311	Nitrogenous fertilizer	**14**	**86**	4
Ceramics/Porcelain	327111	Vitreous china plumbing fixtures	**6**	**55**	1
	327112	Vitreous china and earthenware articles	**5**	**86**	1
	327113	Porcelain electrical supplies	**5**	**30**	1
	327122	Ceramic wall and floor tiles	**7**	**69**	1
	327123	Other structural clay products	**10**	**28**	0.2
	327124	Clay refractory	**5**	**30**	1
	327125	Non-clay refractory	**5**	**44**	1
Glass Production	327211	Flat glass	**17**	**48**	3
	327212	Other pressed and blown glass and glassware; incl. optical fiber	**12**	**59**	4
	327213	Glass containers	**15**	**20**	4
Cement	327310	Cement	**15**	**20**	11
Fiberglass	327993	Mineral wool	**9**	**17**	6
Iron & Steel	331111	Iron and steel	**8**	**36**	92
	331112	Electrometallurgical ferroalloy products	**8**	**72**	1
	331210	Iron and steel pipe and tube from purchased steel			10
	212210	Iron ore mining and beneficiation	**18**	**54**	2
Alumina/um	331311	Alumina refining	**23**	**74**	1
	331312	Primary aluminum production	**24**	**66**	6
Copper	331411	Primary smelting and refining of copper	**6**	**71**	10
	212234	Copper and nickel mining and beneficiation			
Other Industries	311221	Wet corn milling	**11**	**20**	10
	311313	Beet sugar	**7**	**22**	3
	314992	Tire cord and tire fabric mills	**6**	**34**	1
	321219	Reconstituted wood products	**7**	**39**	8
	327992	Ground or treated minerals and earth	**10**	**19**	3
	331419	Primary nonferrous metal (except copper and aluminum)	**8**	**69**	5
	335991	Carbon and graphite products	**6**	**50**	2

Trade-Intensity = (Imports+Exports) / (Value of Shipments+Imports)
Energy-Intensity = (Energy & Fuel Costs + Generation) / Value of Shipments
Sources: US Census 2006 Annual Survey of Manufacturers, EIA 2002 MECS, US International Trade Commission Tariff & Trade DataWeb
EPA -- Inventory of US Greenhouse Gas Emissions and Sinks: 1990-2006
Note: Percentages are rounded to nearest percentage point

Qualifying Industry Descriptions

NAICS	NAICS Name	Description
311221	Wet corn milling	Wet milling corn and other vegetables (except to make ethyl alcohol) to make such products as corn sweeteners (eg, glucose, dextrose, and fructose); corn oil; and starches (except laundry)
311313	Beet sugar	Refined sugar from sugarbeets
314992	Tire cord and tire fabric mills	Cord and fabric of polyester, rayon, cotton, glass, steel, or other materials for use in reinforcing rubber tires, industrial belting, and similar uses
321219	Reconstituted wood products	Reconstituted wood sheets and boards, such as waferboard, oriented strandboard and particleboard
322110	Pulp mills	Pulp manufacturers that do not make paper or paperboard; pulp is made by separating the cellulose fibers from the other impurities in wood or other materials
322121	Paper mills	Paper (except newsprint and uncoated groundwood paper) made from pulp; may also manufacture or purchase pulp
322122	Newsprint mill products	Newsprint and uncoated groundwood paper from pulp
325110	Petrochemicals	Acyclic (aliphatic) hydrocarbons (eg. ethylene, propylene, and butylene) and/or cyclic aromatic hydrocarbons (eg. benzene, toluene, styrene, xylene, ethyl benzene, and cumene) made from refined petroleum or liquid hydrocarbon
325131	Inorganic dye and pigments	Black pigments, except carbon black, white pigments, and color pigments.
325132	Synthetic organic dye and pigments	Includes lakes and toners (except electrostatic and photographic)
325181	Alkalies and chlorine	Chlorine, sodium hydroxide (i.e., caustic soda), and other alkalies often using an electrolysis process
325182	Carbon black	Carbon black, bone black, and lamp black
325188	All other basic inorganic chemicals	Basic inorganic chemicals (except industrial gases, inorganic dyes and pigments, alkalies and chlorine, and carbon black)
325191	Gum and wood chemicals	Wood or gum chemicals (eg, naval stores, natural tanning materials, charcoal briquettes, and charcoal, except activated) or Distillation of wood or gum into products (eg, tall oil and wood distillates)
325192	Cyclic crude and intermediates	Cyclic crudes or, cyclic intermediates (i.e., hydrocarbons, except aromatic petrochemicals) from refined petroleum or natural gas or the distillation of coal tars
325193	Ethyl alcohol	Nonpotable ethyl alcohol
325199	All other basic organic chemicals	Basic organic chemical products (except aromatic petrochemicals, industrial gases, synthetic organic dyes and pigments, gum and wood chemicals, cyclic crudes and intermediates, and ethyl alcohol)
325211	Plastics material and resins	Resins, plastics materials, and nonvulcanizable thermoplastic elastomers and mixing and blending resins on a custom basis and/or noncustomized synthetic resins
325212	Synthetic rubber	Synethetic rubber such as Styrene-Butadiene-Rubber (SBR), butyl, polychloroprene, and stereo polyisoprene elastomers
325221	Cellulosic organic fibers	Cellulosic (i.e., rayon and acetate) fibers and filaments in the form of monofilament, filament yarn, staple, or tow
325222	Non-cellulosic organic fibers	Noncellulosic (i.e., nylon, polyolefin, and polyester) fibers and filaments in the form of monofilament, filament yarn, staple, or tow
325311	Nitrogenous fertilizer	Production of fertilizer through inorganic (Synthetic ammonia, nitric acid, urea, and ammonium compounds) or organic sources
327111	Vitreous china plumbing fixtures	Vitreous china plumbing fixtures and china and earthenware bathroom accessories, such as faucet handles, towel bars, and soap dishes
327112	Vitreous china and earthenware articles	Table and kitchen articles, art and ornamental items, and similar vitreous china, fine earthenware, stoneware, coarse earthenware, and pottery products
327113	Porcelain electrical supplies	Porcelain electrical insulators, molded porcelain parts for electrical devices, ferrite or ceramic magnets, and electronic and electrical supplies from nonmetallic minerals, such as clay and ceramic materials
327122	Ceramic wall and floor tiles	Includes mosaic and quarry tiles
327123	Other structural clay products	Clay sewer pipe, drain tile, flue lining tile, architectural terra-cotta, and other structural clay products
327124	Clay refractory	Clay refractory, mortar, brick, block, tile, and fabricated clay refractories, such as melting pots. A refractory is a material that will retain its shape and chemical identity when subjected to high temperatures and is used in applications that require extreme resistance to heat, such as furnace linings.

Qualifying Industry Descriptions

NAICS	NAICS Name	Description
327125	Non-clay refractory	Nonclay refractory, mortar, brick, block, tile, and fabricated nonclay refractories such as graphite, magnesite, silica, or alumina crucibles.
327211	Flat glass	Flat glass made by melting silica sand or cullet (includes integrated facilities that also produce laminated glass)
327212	Other pressed and blown glass and glassware	Glass made by melting silica sand or cullet and products made by pressing, blowing, or shaping glass or glassware (except glass packaging containers); Also includes fiber optics
327213	Glass containers	Glass containers for commercial packing and bottling, and for home canning, including bottles and jars
327310	Cement	Portland, natural, masonry, pozzalanic, and other hydraulic cements; manufacturers may calcine earths or mine, quarry, manufacture, or purchase lime
327992	Ground or treated minerals and earth	Calcining, dead burning, or otherwise processing beyond beneficiation, clays, ceramic and refractory minerals, barite, and miscellaneous nonmetallic minerals
327993	Mineral wool and fiberglass insulation	Mineral wool and mineral wool (i.e., fiberglass) insulation products made of such siliceous materials as rock, slag, and glass or combinations thereof
331111	Iron and steel mills	Steel production, direct reduction of iron ore, manufacture of pig iron, conversion of pig iron into steel; includes both BOF and EAF; includes integrated facilities that also manufacture shapes (e.g., bar, plate, rod, sheet, strip, wire) or form tube and pipe
331112	Electrometallurgical ferroalloys	Ferroalloys add critical elements, such as silicon and manganese for carbon steel and chromium, vanadium, tungsten, titanium, and molybdenum for low- and high-alloy metals
331210	Iron and steel pipe and tube from purchased steel	Welded, riveted, or seamless pipe and tube from purchased iron or steel
212210	Iron ore mining and processing	Mine site development, mining, and/or beneficiation (i.e., preparation) of iron ores and manganiferous ores valued chiefly for their iron content and/or (2) sinter iron ore production (except iron ore produced in iron and steel mills) and other iron ore agglomerates
331311	Alumina refining	Alumina (i.e., aluminum oxide) refining generally from bauxite
331312	Primary aluminum production	Aluminum production from alumina; includes integrated facilities that also roll, draw, extrude, or cast the aluminum into primary forms (e.g., bar, billet, ingot, plate, rod, sheet, and strip)
331411	Primary smelting and refining of copper	Smelting of copper ore and/or the primary refining of copper by electrolytic methods or other processes to makeprimary copper and copper-based alloys, such as brass and bronze, from ore or concentrates
212234	Copper and nickel ore mining and beneficiation	Mine site development, mining, and/or beneficiation (i.e., preparation) of copper and/or nickel ores, and recovery of copper concentrates by the precipitation, leaching, or electrowinning of copper ore
331419	Primary nonferrous metals (except copper and aluminum)	Primary production of nonferrous metals by smelting ore and/or by electrolytic methods or other processes; includes lead, gold, silver, titanium, zinc and magnesium
335991	Carbon and graphite products	Carbon, graphite, and metal-graphite products including fibers, brushes and brush stock, and electrodes for thermal and electrolytic uses

Methodology for Estimating Emissions

After identifying the manufacturing industries exposed to carbon leakage, we then estimated the emissions for these qualifying industries to determine the scope of required allowances to address the issue. We estimated the 2007 emissions based on available EPA and EIA data. Since sufficient emissions data are not available at a sub-sector level, we needed to make certain assumptions based primarily on electricity and fuel use to estimate emissions for qualifying industries.

Emissions (EPA's Inventory of US Greenhouse Gas Emissions and Sinks: 1990-2007)[3]
(Million metric tons CO_2 Equ.)

	Fuel Combustion	Electricity	Industrial Processes	Other Emissions	Total
Total	3,350	2,397	328	992	**7,068**
Industrial	857	708			1,565
Manufacturing	802	614			1,416
Representative Industries	**391**	**222**	**158**		**771**
% of Total Emissions	5.5%	3.1%	2.2%		10.9%
% of 2012 Allowances *(Est. 5,775)*	6.8%	3.8%	2.7%		13.4%

- We started with the EPA 2007 emissions for the Industrial sector, broken out between combustion and electricity.
- Using the EIA's Annual Energy Outlook 2008, we calculated the percentage of Industrial emissions that Manufacturing represented for electricity (87%) and for consumption (94%).[4]

[3] The Total and Industrial rows are from the EPA, remaining data is derived
[4] The Industrial sector is Manufacturing plus Agriculture, Forestry, Fishing, Hunting, Mining and Construction

Methodology for Estimating Emissions (continued)

- The next step was to allocate the overall Manufacturing emissions to each sub-industry of the Manufacturing sector to determine how many emissions our qualifying industries represent. To allocate electricity emissions, we applied the percentage of purchased and generated kWhs of electricity (from the ASM) for each sub-industry to the overall electricity emissions figure (614 million) for Manufacturing.

- To estimate the consumption emissions, we started with the manufacturing consumption figure derived from the EPA (802 million). We used the EIA's 2006 paper[5] to determine the initial allocation percentages. We first added up the emissions for all the fuel sources and calculated the percentage of the total for each industry. Over 90% of the consumption emissions are allocated to an industry. We allocated to sub-industries where necessary based on the emissions data given and then based on the fuel spend. For the remaining 8.6%, we allocated to the other industries based on fuel spend.

- We assigned/allocated the process emissions from the EPA to the individual industries.

- Definitions of emissions categories:

    - Fuel Combustion: Fossil fuel combustion to generate heat, steam or electricity to power industrial processes

    - Electricity: Indirect emissions from purchased electricity

    - Industrial Processes: Byproduct or fugitive emissions of greenhouse gases from industrial processes not directly related to energy activities such as fossil fuel combustion

[5] Energy-Related Carbon Dioxide Emissions in US Manufacturing (November 2006; Mark Schipper)

Emissions for Qualifying Manufacturing Industries
(million metric tons CO_2 Equ.)

Manufacturing Industry	NAICS	Sub-Industry	Fuel Combustion	Electricity	Industrial Processes	TOTAL
Food	311221	Wet corn milling	14	6		19
	311313	Beet sugar	3	1		4
Textiles	314992	Tire cord and tire fabric mills	0	1		1
Wood Products	321219	Reconstituted wood products	2	4		6
Paper	322110	Pulp mills	2	1		3
	322121	Paper (except newsprint) mills	28	20		48
	322122	Newsprint mill products	2	2		3
Chemicals	325110	Petrochemicals	27	10	4	41
	325131	Inorganic dyes and pigments	1	1		3
	325132	Synthetic organic dyes and pigments	1	1		2
	325181	Alkalies and chlorine	11	14	2	26
	325182	Carbon black	5	1		5
	325188	All other basic inorganic chemicals	7	15		22
	325191	Gum and wood chemicals	1	0		1
	325192	Cyclic crude and intermediates	3	3		6
	325193	Ethyl alcohol	6	3		9
	325199	All other basic organic chemicals	52	24	6	82
	325211	Plastics material and resins	46	21		67
	325212	Synthetic rubber	2	1		3
	325221	Cellulosic organic fibers	1	1		1
	325222	Non-cellulosic organic fibers	3	4		7
	325311	Nitrogenous fertilizer	9	3	36	48
Non-Metallic Mineral Products	327111	Vitreous china plumbing fixtures	0.4	0.1		0
	327112	Vitreous china and earthenware articles	0.3	0.1		0.4
	327113	Porcelain electrical supplies	0.2	0.3		0.5
	327122	Ceramic wall and floor tiles	1	0		1
	327123	Other structural clay products	0.2	0.0		0.2
	327124	Clay refractory	0.3	0.2		0.5
	327125	Non-clay refractory	0.4	0.2		1
	327211	Flat glass	3	1	1	4
	327212	Other pressed and blown glass and glassware	2	2	0.4	4
	327213	Glass containers	3	2	1	6
	327310	Cement	29	8	45	82
	327992	Ground or treated minerals and earth	2	1		3
	327993	Mineral wool	2	3		5
Primary Metals	331111	Iron and steel	111	36	54	201
	331112	Electrometallurgical ferroalloy products	1	1		2
	331210	Iron and steel pipe and tube from purchased steel	1	1		2
	212210	Iron ore mining and beneficiation	3	4		8
	331311	Alumina refining	2	0.3	1	4
	331312	Primary aluminum production	4	17	7	28
	311411	Primary smelting and refining of copper	1	0.4		1
	212234	Copper and nickel mining and beneficiation	1	3		4
	331419	Primary nonferrous metal (except copper and aluminum)	1	3	4	7
Electrical Equipment	335991	Carbon and graphite products	0.5	1		1
			391	222	158	**771**

Fuel Combustion: Fossil fuel combustion to generate heat, steam or electricity to power industrial processes
Electricity: Indirect emissions from purchased electricity
Industrial Processes: Byproduct or fugitive emissions of greenhouse gases from industrial processes not directly related to energy activities such as fossil fuel combustion

Frequently Asked Questions

- Why use energy intensity rather than emissions?
  For purposes of identifying qualifying industries, as opposed to calculating the number of allowances to be awarded, energy spending arguably is a better metric than emissions to determine the financial impact to manufacturing industries of greenhouse gas legislation. For instance, firms may be impacted by the increases in the cost of natural gas that will be inversely related to natural gas's relative carbon intensity advantage. Any emissions metric also will depend on an assumed allowance price, which is difficult to estimate. In addition, emissions data is not readily available at a detailed industry level. There are 473 Manufacturing sub-industries (6-digit NAICS). No known resource provides emissions data, or even detailed fuel usage data from which emissions could be derived, at a level of detail anywhere close to that. In any event, energy spending serves as a reasonable proxy for emissions since combustion emissions are a function of the energy used, varying only by the mix of fuels.

- Why use the Census's ASM rather than EIA's MECS?
  The most recent data for the MECS Survey is from 2002 rather than from 2006 for the ASM. Additionally, the ASM provides data on a much more granular NAICS level than the MECS Survey does. For the 473 NAICS sub-industries (6-digit), MECS provides energy data for only 39 at the 5- or 6-digit level. ASM provides 2005 or 2006 energy data for 472 of the 473 industries (Petrochemicals is the only one with no data) at 5- or 6-digit level. We have validated our results against MECS and in the case of Petrochemicals, we used the MECS data.

- Why is Imports in both the numerator and the denominator of the trade intensity formula?
  The size of any US market in which a manufacturer competes equals Domestic Production + Imports, where Exports are a subset of Domestic Production. Using Imports in the denominator of the trade intensity formula keeps the ratio from exceeding 100%. Note: We have used the same ration that is used by the EU.

- How is the variability from year to year in energy intensity and trade intensity addressed?
  We used the maximum of the three years (2004-2006) for energy intensity and trade intensity, which minimizes situations where an industry may qualify one year and not another. However it should be noted that these metrics have very little variability from year to year. The average annual change in energy intensity is only 0.2%. The average annual change in trade intensity is only 3%.