

**Treatment of Petroleum Refining and Other Energy-Intensive and Trade-Sensitive
Industries in Pending National Climate Legislation**

Matthew Berman

Institute of Social and Economic Research
University of Alaska Anchorage
3211 Providence Drive
Anchorage, AK 99508
(907) 786-5426
matthew.berman@uaa.alaska.edu



February 3, 2010

Treatment of Petroleum Refining and Other Energy-Intensive and Trade-Sensitive Industries in Pending National Climate Legislation

One of the major issues confronting Congress as it deliberates about legislation to limit carbon dioxide and other greenhouse-gas (GHG) emissions is the effect on international trade. If the U.S. implements a cap and trade program, the cost of emissions rights becomes a new business cost for domestic establishments that foreign establishments do not face. This puts domestic industry at a competitive disadvantage in export markets as well as against imported goods. Over time, investments in U.S. industries decline, taking jobs overseas and undermining progress in reducing greenhouse gas emissions. The concern, often called “carbon leakage,” is most acutely felt in trade-sensitive, energy-intensive manufacturing industries.

The main climate bills that Congress is currently considering include H.R. 2454 and S. 1733, commonly termed the Waxman-Markey and Kerry-Boxer bills, respectively, in reference to their original sponsors. H.R. 2454 passed the House on June 26, 2009 with a recorded vote of 219-212. The companion Senate bill was filed on September 30, 2009, and is at this writing (11/06/09) under markup in the Senate Committee on Environment and Public Works. S.1733 incorporates many sections of HR 2454 verbatim, but differs in some respects in the way it treats energy-intensive and trade-sensitive industries.

This policy brief analyzes the way that both bills approach the issue of carbon leakage, with particular attention to the petroleum processing industry. The next section outlines the general treatment of energy-intensive and trade-sensitive industries that is common to both bills. Then, the brief discusses the specific treatment of refined petroleum products. Following that comes an analysis of the limitations and deficiencies in the approach that Congress is taking. The brief concludes with a discussion of potential modifications -- an outline of proposed amendments -- that could address the deficiencies consistent with the overall approach of H.R. 2454 and S. 1733.

Approach to energy-intensive and trade-sensitive manufacturing industries

Both bills add a new Part F, entitled, “Ensuring Real Reductions in Industrial Emissions,” to Title VII of the Clean Air Act. The overall intent of the Part F is to reduce job loss and erosion of profits from foreign trade, and to prevent or at least reduce leakage of greenhouse gasses overseas. Table 1 summarizes the approach used by of H.R. 2454 and its Senate counterpart to accomplish that objective. The primary tool the bills use is a distribution of free allowances to industries deemed at risk of carbon leakage if brought into a U.S. cap and trade program. The bills designate a pool of emission allowance rebates for vulnerable, energy-intensive, trade-sensitive industries, if the U.S. has not signed a treaty limiting global GHG emissions by 2018. Eligible industries would receive free allowances for essentially their entire carbon emissions, including those associated with electricity consumption, through 2025, with the percentage then declining by 10 percent per year until it reaches zero in 2035 (section 764(a)(1)(B)).

The special allowance program covers manufacturing industries defined by a six-digit North American Industrial Classification System of 2002 (NAICS) code starting with 31, 32, or 33, that are either highly energy or greenhouse-gas-intensive, or trade-intensive and somewhat energy or greenhouse-gas-intensive. Table 1 illustrates the provisions for

an example of such a manufacturing establishment: a petrochemical plant such as the mothballed Agrium fertilizer plant in Nikiski. The bills define trade intensity by the ratio of the sum of imports and exports to the sum of value of shipments and imports. They define energy intensity by the ratio of the value of energy inputs to the value of shipments, and greenhouse-gas intensity by 20 times the ratio of tons of carbon-dioxide-equivalent (CO₂e) emissions in manufacturing and electricity consumption to the value of shipments. Greenhouse-gas intensity is therefore the ratio of the cost of allowances to value of shipments at an allowance price of \$20 per ton of CO₂e. To be eligible to receive free allowances, the industry must have an energy intensity or greenhouse-gas intensity of at least 20 percent, or a trade intensity of at least five percent along with an energy intensity or greenhouse-gas intensity of at least five percent (section 763).

In addition to the free allowances, H.R. 2454 contains several provisions (sections 765-769) addressing international trade in energy-intensive and trade-intensive goods. Starting in 2020, importers of energy-intensive and trade-intensive products from countries not limiting their emissions would have to purchase allowances for the presumed greenhouse-gas emissions emitted in their manufacture (section 768). Exempted are imports from countries that adopt their own strict GHG limits, from “least developed or developing countries,” and from countries exporting only a small amount of these goods to the U.S. This trade provision has received criticism as potentially erecting a discretionary trade barrier, given the distribution of free allowances to domestic manufacturers, and therefore raising the specter of a trade war. The Senate bill has no specific mechanism, but contains a placeholder section (765) acknowledging that the issue remains to be addressed as the legislation moves forward.

Specific measures for refined petroleum products

According to Energy Information Agency (EIA), petroleum refining is the most energy-intensive manufacturing industry in the United States, accounting for about 7.5% of total national energy consumption and 6.3 percent of total carbon dioxide emissions.¹ The amount of energy used to manufacture petroleum products is approximately equal to the energy content of the crude oil used as feedstock. In 2006, petroleum refining consumed 3,283 trillion Btu of fuel and 3,399 trillion Btu of petroleum feedstock.² Nearly all of this energy consumption is derived from burning fossil fuels. In addition to self-generated energy from burning the low-valued portions of the feedstock, petroleum refineries buy large quantities of electric power and cogenerated steam from power plants, mostly derived from combustion of coal and natural gas.

Petroleum refining is also trade-intensive. In fall 2009, about 10 percent of U.S. production was exported, and imports of refined products amounted to 13 percent of U.S. consumption.³ Despite potentially meeting the standards in section 763 as energy-intensive and trade-intensive, both the House and the Senate bills specifically exclude the petroleum refining sector from the special allowance program. It is the only industry singled out for this exclusion. The rationale is not clear. One potential reason is that

¹ The estimate is based on data from the 1998 Manufacturing Energy Consumption Survey. See http://www.eia.doe.gov/emeu/mecs/iab98/petroleum/energy_use.html.

² Based on the 2006 Manufacturing Energy Consumption Survey: <http://www.eia.doe.gov/emeu/mecs/mecs2006/2006tables.html>

³ Estimate based on EIA data:

http://tonto.eia.doe.gov/dnav/pet/pet_move_wkly_dc_NUS-Z00_mbbldpd_w.htm.

refined petroleum products are given their own industry-specific allocation of free allowances in the section of the bills (section 782) that describes allocation of allowances to industries. As shown in Table 1, refineries get two percent of the annual emission allowances, with small independent refiners able to obtain an additional 0.25 percent. In addition, the bills require importers as well as domestic producers of petroleum-based (and coal-based liquid) fuels to hold allowances for the CO₂e that will presumably be emitted when these fuels are burned (Section 722(b(2))). Electricity production plants and other industrial facilities purchasing petroleum fuels may deduct the emissions from burning these fuels from their own allowance requirements, since the importer of the fuels would have already purchased the allowance and passed on the cost to the buyer.⁴

Deficiencies in the treatment of petroleum products

The complex set of requirements for petroleum fuels appears designed to ensure that these products face the full impact of GHG emissions from their manufacture as well as combustion, while awarding them limited free allowances to ease the financial impact of transition to the cap and trade regime. While the goal makes sense, the approach to achieving it has a number of deficiencies. First, one should note that the free allowances in section 782 cover only about one third of the amount of GHG emissions that petroleum refiners emit in the manufacturing process, not counting emissions generated from combustion of their marketed products. Refiners will need to purchase the remaining two-thirds of their very high manufacturing allowance requirements.

Second, given the high energy intensity of petroleum fuels manufacturing, the requirement for domestic refiners to purchase the additional allowances for the energy used in manufacturing significantly disadvantages them compared to offshore refiners located in nations without greenhouse-gas controls.⁵ Refiners do not have to hold emission allowances for the combustion of refined products exported from the U.S., but they are still held responsible for the emissions generated to produce the exported fuels. The lack of effective border adjustments for petroleum refining could especially disadvantage refineries located in Alaska, Hawaii, and some other coastal states where a significant share of refined products are already being imported or exported. To the extent that the market share of these refineries is replaced by offshore refineries, the carbon leakage goals of the legislation will not be met.

Potential modifications to S. 1733 to improve trade effects

⁴ For example, if a utility generates electricity from fuel oil, the utility does not have to hold allowances for the emissions from burning the fuel, regardless of whether the fuel oil came from a domestic or foreign refinery. If the utility purchased the fuel oil from a domestic refinery, the domestic refiner would have to acquire the allowances for the GHG content of the fuel. If it came from a foreign refiner, the importer would have to obtain the allowances. However, as is noted below, the importer's allowance requirements only have to cover the emissions for the fuel itself, while the domestic refiner also has to obtain allowances for the emissions generated in the refining process.

⁵ For example, if a company purchases imported fuel that would generate 100 tons of CO₂e when burned from a Caribbean refinery, it has to obtain 100 tons of allowances. If it manufactures the same amount of fuel in a domestic refinery, it has to obtain allowances for the emissions from fuel used up in the refining process as well as the potential emissions from burning the refined products.

While it is easy to point out the problems that the proposed cap and trade legislation causes for the petroleum refining industry, fixing the problems within the overall framework that Congress is pursuing is much more challenging. Many of the problems with petroleum refining arise from the approach Congress is taking to address trade effects for energy-intensive and trade-intensive industries, and indeed, to the cap and trade program in general. At the highest level, the problems illustrate the consequences of constructing national legislation to tackle a global problem, and of giving away GHG emissions rights selectively rather than auctioning them uniformly to all emitters. The following set of options might be considered for modifying energy-intensive and trade-intensive industries in S. 1733 within the overall legislative approach of H.R. 2454. Table 1 summarizes these options in the final column.

1. Adopt trade language from H.R. 2454;
2. Include petroleum refining as a trade-sensitive industry in sections 761-764;
3. Change to value added as base for energy intensity;
4. Keep border adjustments for energy-intensive imports, including refined petroleum products, or the rebates for domestic manufacturers of energy-intensive goods, but not both. former is better, with credit for allowances already purchased in source country
5. Provide allowance rebates for exports for energy inputs in all trade-sensitive industries, including petroleum refining, if exported to a non-treaty country;
6. Extend import allowance requirements and export rebates to all trade-sensitive industries (not just manufacturing).

1. Adopt trade language from H.R. 2454. This option would retain the proposed new Clean Air Act sections 761-764 in S. 1733 as originally introduced (similar to language in H.R. 2454), and also replace the proposed section 765 in S. 1733 with the sections 765 through 769 of the house bill. As mentioned before, awarding free allowances to U.S. firms while requiring importers from some countries but not others to purchase allocations may create the perception of discretionary trade barriers. Such a perception potentially invites retaliation from trading partners. Congress also might consider dropping the exemption for imports from (and to) the least developed nations (767(a)(1)(E)(ii)) and minor importers (767(a)(1)(E)(iii)) if eliminating these provisions would make the border adjustments appear less arbitrary and therefore more palatable to affected trading partners. But for a variety of reasons outlined below, this is the least beneficial option.

2. Include petroleum refining as a trade-sensitive industry in sections 761-764. Eliminating the exclusion for petroleum refining in paragraph 763(b)(2)(C) and bringing the industry into the program for energy-intensive and trade-intensive industries would seem to be a simple fix for this industry. Unfortunately, there are a number of problems with this approach that would require additional fixes to the legislation. First, leaving aside the potential problems with trading partners, Congress would have to reconcile the free allowances that petroleum refiners receive in section 782 with the allowance rebates available in section 764. Second, the way that section 763 defines energy-intensity -- based on energy use as a percentage of value of shipments -- will cause problems for petroleum refining. The appropriate measure of output in a manufacturing industry is "value added," the value of shipments less the value of inputs purchased from other industries. Unlike most other energy intensive manufacturing industries, which start with relatively low-value raw-material inputs, the value of the crude oil feedstock is quite high

relative to the value of the refined petroleum products produced. For example, in 2007, when crude oil prices were close to the levels prevailing in early 2010, the value of purchased inputs including petroleum feedstock in the petroleum and coal products industry accounted for 88 percent of the value of shipments, according to BEA gross product figures. According to the California Energy Commission, crude oil costs have averaged between two-thirds and five-sixths of the wholesale cost of gasoline during the past several years (<http://energyalmanac.ca.gov/gasoline/margins/index.html>). If crude oil prices rise substantially, value added in petroleum refining as a percentage of value of shipments will decline further, making it unlikely that the industry would be eligible under section 763 in any case.

3. Change to value added as base for energy intensity. For the reasons discussed in the previous paragraph, bringing the petroleum refining industry into the carbon leakage program would work only if Congress changes the definition of energy-intensity in section 763 to base it on manufacturing value added rather than the value of shipments. In other words, a revised section 763(b)(2) would define energy intensity by the ratio of the value of energy inputs to value added, and greenhouse-gas intensity by 20 times the ratio of tons of carbon-dioxide-equivalent (CO₂e) emissions in manufacturing and electricity consumption to the value added plus electricity purchases. The drawback of this change is that it might require aggregating industries from the six-digit NAICS level to the four-digit level NAICS for many of the energy-intensity calculations. That is because value added, unlike value of shipments, is not published at a more detailed level than the four-digit NAICS code, and therefore may not be available for the calculations. On the other hand, since many plants produce products in more than one six-digit NAICS industry, aggregation to the four-digit NAICS level might actually be preferred, to reduce administrative costs.

4. Keep border adjustments for energy-intensive imports, or the rebates for domestic manufacturers of energy-intensive goods, but not both. H.R. 2454 potentially creates problems for international trading partners primarily because it provides free allowances for domestic firms (section 764), while requiring foreign firms to purchase allowances to sell in the United States (section 768). To protect energy-intensive industries and their workers while maintaining the nation's standing with the World Trade Organization, Congress may have to choose between the free allowance program and the border adjustment program. S. 1733 as introduced contains the free allowance program but not the border adjustment. For several reasons, however, the border adjustment -- that is, requiring importers of energy-intensive and trade-sensitive products to purchase allowances covering the GHG emissions presumed to occur in their manufacture, with a credit for allowances purchased in the source country -- is a better option than the free allowances for domestic producers.

First, the main reason these industries are singled out for assistance in the first place is that they are especially vulnerable to foreign competition if they have to pay for GHG emissions while their competitors do not. In the end, there is no escaping the need for border adjustments if the U.S. aims to adopt a binding GHG control regime on its own, while preventing carbon leakage from energy-intensive and trade-intensive industries. Second, these industries are big GHG emitters. The ten most energy-intensive manufacturing industries (including petroleum refining) accounted for 14 percent of all

U.S. carbon dioxide emissions in 2006.⁶ Awarding free allowances weakens the economic incentive for these industries to reduce emissions, and increases the burden on other sectors of the economy to meet the national emissions targets. That burden will be expressed as a higher cost of allowances for those sectors that have to purchase allowances at auction.

Congress should treat petroleum refiners the same as other energy-intensive manufacturing industries in international trade. As currently written, S. 1733 requires importers to obtain allowances for the GHG emissions from combustion of the products but not the emissions created in their manufacture. The best way to level the playing field for refiners would be require that importers purchase allowances for the GHG emissions for the energy inputs to refining as well as those required for fuel consumption, and eliminating the free allowances for refineries in section 782.

5. Provide allowance rebates for exports for energy inputs in all trade-sensitive industries, including petroleum refining, if exported to a non-treaty country. If the free allowances awarded in section 764 are dropped from the bill, then energy-intensive and trade-intensive producers, including petroleum refiners, should receive allowance rebates for the share of their output exported to countries that do not have binding restrictions on their GHG emissions. This would level the playing field for U.S. firms with respect to foreign competitors in international as well as domestic markets.

6. Extend import allowance requirements and export rebates to all energy-intensive and trade-sensitive industries (not just manufacturing). Section 762 of H.R. 2454, carried over in the Senate bill, limits eligibility of all energy-intensive and trade-sensitive provisions to manufacturing industries (NAICS codes 31, 32, and 33, and mineral refining activities). Table 1 illustrates how a non-manufacturing industry -- using the example of commercial fishing -- receives different treatment from a manufacturing industry in the House and Senate bills, regardless of the degree of energy intensity or trade sensitivity. There is really nothing special about manufacturing industries when it comes to trade-sensitivity and energy intensity. Many extractive industries, agriculture, fisheries, and even some services are potentially trade-sensitive as well as energy-intensive. The most effective GHG control regime would treat all industries equally, both domestically and in international trade, avoiding distortion of investment decisions through the economy. Requiring domestic oil and gas producers to purchase allowances for GHG emitted during drilling, pumping, and processing activities in the oil patch, for example, when imports from other countries face no allowance requirements, creates incentives for oil companies to invest overseas and causes carbon leakage. Giving out additional free allowances for non-manufacturing energy-intensive, trade-sensitive industries would not be advisable, for the same reasons as discussed above for manufacturing industries. Instead, Congress might consider requiring importers to purchase allowances equal to the emissions created in their production, and give a rebate for emissions from U.S. exports, using the provisions spelled out for manufacturing industries in sections 765-769 of H.R. 2454.

⁶ Robert E. Scott, "Climate Change Policy-Border Adjustment Key to U.S. Trade and Manufacturing Jobs," October 1, 2009 <http://www.epi.org/publications/entry/bp241/>.

Table 1. Summary of Treatment of Energy Intensive and Trade-Sensitive Industries in Pending Climate Legislation, with Recommended Strategy

	HR 2454	Proposed Senate Bill	Recommended
Petrochemical plant (i.e., Agrium)			
Eligibility	Energy-intensity or GHG-intensity $\geq 20\%$, or $\geq 5\%$ with trade-intensity $\geq 5\%$.	Same as HR 2454	Same as HR 2454, but change measures of energy and GHG intensity. ^a
Free allocations received	Up to 15 percent of all allowances	Same as HR 2454	None.
Trade protection: imports	Employs border tariffs for non-carbon constrained economies	No mechanism to deal with non-carbon constrained economies	Employ border tariffs for non-carbon constrained economies
Trade protection: exports	Free allowance allocations received reduce costs	Free allowance allocations received reduce costs	Rebate percentage of purchased allowances equal to export share of value of shipments
Petroleum refinery			
Eligibility	Domestic fuel producer	Domestic fuel producer	Use amended definitions of energy and trade intensity. ^a
Free allocations received	2 percent of allowances plus an additional 0.25 percent for small business refiners	Same as HR 2454	None.
Trade protection: imports	No mechanism to deal with non-carbon constrained economies	No mechanism	Employ border tariffs for non-carbon constrained economies
Trade protection: exports	Free allowance allocations received reduce costs	Free allowance allocations received reduce costs	Rebate percentage of purchased allowances equal to export share of value of shipments
Commercial fishing operation (example of non-manufacturing industry)			
Eligibility	No specific provision	No specific provision	Use amended definitions of energy and trade intensity. ^a
Free allocations received	None.	None.	None.
Trade protection: imports	No mechanism to deal with non-carbon constrained economies	No mechanism	Employ border tariffs for non-carbon constrained economies
Trade protection: exports	No mechanism to deal with non-carbon constrained economies	No mechanism to deal with non-carbon constrained economies	Rebate percentage of purchased allowances equal to export share of value of shipments

^a Energy intensity measured in HR2454 as the ratio of value of energy inputs to value of shipments. GHG intensity measured as 20 times tons CO₂e emissions per dollar of shipments. A better measure of energy intensity and GHG intensity would use value added rather than value of shipments as the denominator.