



Policy Guidance for US GHG Tax Legislation and Regulation

*Border Tax Adjustments for Products of Energy-Intensive,
Trade-Exposed and Other Industries*

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1. Introduction

An increasing number of US senators and representatives are proposing legislation to address climate change based on a greenhouse gas (GHG) tax or “pollution fee.” Such proposals would create significant economic impacts on fossil fuel producers and energy-intensive industries that rely on them, especially those proposals that call for large tax increases over time to achieve the long-term goals of the Paris Agreement. Resulting cost increases for US industries with significant GHG emissions—typically referred to as energy-intensive, trade-exposed (EITE) industries—could cause some production to shift to countries without comparable carbon pricing policies, resulting in “leakage” of GHG emissions that the domestic tax aims to reduce and competitive disadvantages for domestic manufacturers competing with foreign firms not facing the tax (both in the United States and abroad in export markets). The impacts would include loss of jobs, business, and investment. In regions where such businesses play a central economic role, the impacts would spread to the entire community and supply chains that rely on them. Such concerns have led to proposals for US GHG policy to include border adjustments (BAs) in past and current proposed legislation. Specifically, in the case of a GHG tax—by imposing a charge on GHG-intensive imported products (based on the US tax) and providing rebates for the tax on the cost of similar products exported by US firms—border tax adjustments (BTAs) are intended to alleviate losses to domestic companies from changes in international trade.

Recognizing the need to address these concerns, a decade ago, H.R. 2454 (the Waxman-Markey cap-and-trade legislation) included provisions for relief to domestic firms in EITE sectors. Eligible firms would have been entitled to free allowances or rebates based on a complex procedure that covered emissions from operations and purchased electricity. At the time, an interagency task force led by the US Environmental Protection Agency (EPA) identified 46 sectors¹ within the North American Industry Classification System (NAICS) that were presumptively eligible for relief. However, challenges exist in designing BAs that are compatible with US obligations under the World Trade Organization (WTO).² If other nations believe that US BAs constitute illegal domestic subsidies or discrimination against imported products, they can challenge them through WTO dispute settlement procedures or by more direct retaliation against US exports. Such possibilities would place a cloud over the legitimacy of US BAs that could damage relations with other nations in a way that further complicates both climate and trade negotiations, and such claims can take years to resolve. At the time, many trade lawyers believed that BAs as proposed in the

1 The interagency report: The Effects of H.R. 2454 on International Competitiveness and Emission Leakage in Energy-Intensive Trade-Exposed Industries (December 2, 2009). https://www.epa.gov/sites/production/files/2016-07/documents/interagencyreport_competitiveness-emissionleakage.pdf.

2 See Addressing Competitiveness Concerns in a Carbon Tax: What Are the Options? (October 27, 2015) and references mentioned. <http://www.rff.org/events/event/2015-10/addressing-competitiveness-concerns-carbon-tax-what-are-options>.

Waxman-Markey bill would not survive a WTO challenge. From a WTO perspective, the award of free allowances to offset the economic impact of the cap-and-trade regulations could be an illegal domestic subsidy aimed at alleviating competitiveness concerns. The relevant WTO rules, however, would permit the border adjustment of an indirect carbon (GHG) tax on products.^{3,4}

This paper builds from the recent update⁵ to our original Framework report by providing policy guidance on how proposed BTAs could be incorporated as an element of US GHG tax legislation and implemented by regulators. (Below, in discussing provisions and tasks, we will refer to the GHG tax legislation as the “Legislation,” and regulatory authorities as the “Regulator”). In what follows, Section 2 summarizes the technical background regarding the upstream GHG tax, covered products and sectors, and determining export rebates and import charges for covered products. Section 3 discusses principal administrative tasks that would need to be specified in the Legislation and accomplished by the Regulator. Section 4 discusses additional administrative procedures to simplify and promote implementation, such as obligations of covered manufacturers, aggregating production across firms’ domestic facilities, procedures for appeals, and developing authorized guidelines to allocate GHG emissions of facilities to the products they create. Section 5 presents a summary and conclusions.

3 Climate Change and the WTO: Cap and Trade versus Carbon Tax?, Warren H. Maruyama, *Journal of World Trade* 45, no. 4: 679–726 (2011).

4 Changing Climate for Carbon Taxes: Who’s Afraid of the WTO? Jennifer Hillman, Climate & Energy Policy, German Marshall Fund Paper Series, July 2013.

5 Framework Proposal for a US Upstream Greenhouse Gas Tax with WTO-Compliant Border Adjustments: 2020 Update, Brian P. Flannery, Jennifer Hillman, Jan W. Mares, Matthew Porterfield, October 2020. (originally published March 2018) <http://www.rff.org/research/publications/framework-proposal-us-upstream-greenhouse-gas-tax-wto-compliant-border>.

2. Technical Background on WTO-Compliant Border Tax Adjustments

Our original Framework provided details for WTO-compliant BTAs in the context of an upstream US GHG tax. In the updated Framework (see footnote 5), we propose criteria to determine covered GHG-intensive products and sectors (see Section 3.5 of the Framework report). Criteria are based on a proposed greenhouse gas index (GGI)—with units in tonnes of carbon dioxide equivalent (CO₂e) emissions per tonne of product—that specifies the rate of GHG emissions required to produce a tonne of product. The GGI includes contributions from the carbon content of produced fossil resources, GHG process emissions from the operations of the manufacturer, and emissions associated with covered products purchased from suppliers (e.g., electricity and fuels). In the Framework proposal, BTAs apply to products with a GGI of at least 0.5 tonnes CO₂e per tonne of product and 0.25 tonnes CO₂e per MWh in the case of electricity. We refer to these as GHG-intensive products. Covered sectors are those containing GHG-intensive products. Also, note that in covered sectors, only GHG-intensive products are eligible for or subject to BTAs. With these thresholds, covered sectors include the 46 (typically referred to as EITE sectors) listed in the interagency report a decade ago, plus several others. Additional sectors include oil and gas production, petroleum refining, coal production, and electricity. Most covered products occur in NAICS code sectors with an energy intensity⁶ of at least 5 percent (the threshold used in the interagency report) but, as a result of various technical quirks, some covered products occur in NAICS code sectors that may not meet the 5 percent threshold (see Section 3.2 below). The Framework’s criteria for covered products do not include an examination of the energy-intensity or trade exposure of a given product or sector. If a product is GHG-intensive, it would be eligible for export rebates and subject to import charges.

The GHG tax is assumed to be levied on the carbon content of produced fossil resources and on process emissions of GHGs from operations in EITE and other covered sectors. The Framework covers not only CO₂ but also emissions of other significant GHGs covered by US regulations. These include methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF₆), weighted according to their CO₂e radiative forcing. The Waxman-Markey proposal provided relief (in the form of free allowances that could be used by facilities to reduce compliance costs) to firms facing competition from foreign products. Unlike Waxman-Markey, in the Framework BTAs apply to exported and imported GHG-intensive products of EITE and other covered sectors. In a follow-on

6 From the interagency report (page 8 see footnote 1): *An industry’s energy intensity is defined as its energy expenditures as a share of the value of its domestic production.*

Compendium⁷ we applied the Framework to demonstrate how to determine export rebates and import charges for products in three dozen EITE sectors. In a forthcoming report we intend to post new estimates and methods to estimate export rebates and import charges for covered products in many sectors.

2.1. The GHG Tax

For convenience, we discuss application of the upstream GHG tax to products of covered manufacturers in two sets (described in greater detail in the Framework report, Section 3.3):

1. the situation with respect to producers of fossil resources (coal, oil, and natural gas), where the tax applies both to GHG process emissions and to the carbon content of produced resources; and
2. manufacturers in other covered sectors where the tax applies only to GHG process emissions, if any.

Fossil Resource Producers

Producers of in-ground natural fossil resources pay the GHG tax on two sources: first, on the emissions latent in the carbon content of products sold to others; second, on GHG process emissions from operations to extract and treat produced resources. Taxed products include not only crude oil, processed coal, and natural gas, but also products derived from associated gas and condensate. Producers of fossil resources pay the upstream tax under the assumption that 100 percent of embedded carbon will ultimately be emitted as CO₂ by end users. GHG process emissions occur from, for example, venting, flaring, and leakage of CO₂ and associated gases, and from using portions of the produced resource, if any, to generate heat, steam, or electricity. Under the proposed Framework, such process emissions are allocated proportionally to products sold to customers, based on their relative carbon content. Process emissions vary considerably depending on geological and chemical conditions of the natural resources and technologies used to produce them. Typically, process emissions from fossil resource production vary from a few to several percent or more of the CO₂ emissions associated with combustion of carbon content of produced products. Note that, to avoid double taxation of GHG emissions, the Framework does not tax GHG emissions from use of purchased fuels, electricity, or other GHG-intensive products as process emissions. That is because the GHG tax was already paid on those products by manufacturers along the supply chain that produced them.

7 WTO-Compatible Methodologies to Determine Export Rebates and Import Charges for Products of Energy-Intensive, Trade-Exposed Industries, If There Is an Upstream Tax on Greenhouse Gases, Jan W. Mares and Brian P. Flannery, Oct 30, 2018. <http://www.rff.org/research/publications/wto-compatible-methodologies-determine-export-rebates-and-import-charges>.

Producers in Other Covered Sectors

For manufacturers in other covered industries producing GHG-intensive products, the tax applies to their GHG process emissions, if any (e.g., CO₂ from calcination of limestone and perfluorocarbons from reduction of primary aluminum). For many of these industries, the economic consequences of the upstream GHG tax arise far more from its impact through higher costs for products sold to customers and purchases from suppliers (e.g., of electricity and commercial fuels) than from GHG taxes that they may pay. That is why proponents of BTAs include consideration of added costs faced by manufacturers from the impact of the tax on purchased GHG-intensive products.

2.2. Export Rebates and Import Charges

To determine export rebates and import charges, the Framework utilizes the GGI. The GGI keeps track of cumulative GHG emissions (and therefore GHG taxes paid) to produce specific products manufactured in a specific, covered manufacturing facility or operation (e.g., to produce natural gas, cement, or petrochemicals). The rate (in US\$ per tonne of product) for the export rebate is given by its GGI multiplied by the US GHG tax rate (in US\$ per tonne of CO₂e). Similarly, the rate for the import charge is given by the imported product's GGI multiplied by the US GHG tax rate. While the Framework proposal applies to the entire set of GHGs, a slimmed-down version could be designed if the GHG tax applied to a smaller set of GHGs (e.g., to only CO₂ or to only CO₂ and CH₄).

The GGI was designed to satisfy criteria to be WTO compliant (see Sections 3.2 and 3.4 of the Framework report). The GGI is formulated in a manner analogous to the familiar value-added taxes (VATs). WTO rules permit VATs and other such indirect taxes⁸ to be “border adjusted” (rebated on exported products and applied to imported products).⁹ Significantly, BTAs need not be imposed or rebated directly on the product that is subject to the domestic tax, but may also be imposed or rebated on manufactured goods that incorporate the product—including energy inputs—that is subject to the domestic tax. BTAs on imports and exports, must not exceed the tax paid on like products that are sold for domestic use. The rates for Import charges and export rebates for covered products are given by their GGI multiplied by the US GHG tax rate.

8 “Indirect taxes” are defined broadly to cover essentially all taxes on products, including “sales, excise . . . value added, transfer . . . and all taxes other than direct taxes and import charges.” See page 34: Agreement on Subsidies and Countervailing Measures, Apr. 15, 1994, Marrakesh Agreement Establishing the World Trade Organization, Annex 1A, 1869 U.N.T.S. 14. https://www.wto.org/english/docs_e/legal_e/24-scm.pdf.

9 Border Adjustments for Carbon Taxes, PPMs, and the WTO, 41 U. PA. J. INT’L L. 1. Matthew C. Porterfield, (2019), available at <https://scholarship.law.upenn.edu/jil/vol41/iss1/2>.

The GGI accounts for GHG taxes paid both by manufacturers and their suppliers to create GHG-intensive products. So, besides its use in BTAs for covered products (to claim rebates for exports and to collect a charge on imports), the GGI serves a second purpose: namely, suppliers must communicate the GGI of the GHG-intensive products that they sell to their domestic customers in covered sectors. This is required so that customers can account for taxed GHG emissions in their supply chain. Purchased products that contribute to the GGI include, for example, primary aluminum, electricity (where the emissions occur from operations of the power producer), and products that contain embedded carbon that will ultimately be emitted (e.g., purchased commercial fuels, chemicals, and produced natural resources). As described in the Framework report (see Section 3.6 there), treatment of the accumulated contributions of GHG emissions (and taxes paid on them) from suppliers and manufacturers is analogous to the situation used to determine VATs in other settings.

For products of a specific covered manufacturing facility, or operation to produce fossil resources, three sources contribute to GGI:

1. process GHG emissions from operations of the manufacturer (e.g., CO₂ from conversion of limestone to cement; PFC emissions from primary aluminum reduction; and CO₂ and CH₄ emitted as a result of venting, flaring, or leaks during production and processing of in-ground fossil resources);
2. the carbon content of products created by extraction and processing of fossil resources (coal, oil, and gas), under the assumption that 100 percent of the carbon embedded in these products will ultimately be emitted as CO₂ by later end users; and
3. contributions (at a rate given by their GGI) from GHG-intensive products purchased from suppliers and used by the manufacturer.

All covered facilities and operations pay the tax (item 1, above) based on their GHG process emissions. In addition, producers of fossil resources also pay the GHG tax (item 2) based on the embedded carbon in products they sell to others. Besides crude oil, processed natural gas, and coal, such products may also include associated gas and liquid condensate that typically accompany resource extraction. Contributors to the GGI for a covered product differ from those on which the GHG tax is paid by the manufacturer (in items 1 and 2), because they also include (in item 3) contributions from GHG-intensive products, including electricity purchased from suppliers.

To avoid double counting of GHG taxes already paid on the latent emissions in these products, the GGI does not account for emissions from combustion of purchased fossil fuels, chemicals, or off-gases that might be generated (e.g., in refineries or chemical plants, as “process emissions”). The GHG tax affecting the price of GHG-intensive products purchased by a manufacturer will already have been paid by producers in their supply chain. Consequently, to avoid double counting of GHG taxes paid, the GGI accounts for emissions associated with using purchased electricity, commercial fuels, and other products with embedded carbon (in item 3) based on the GGI of the purchased product.

In this way, the GGI tracks the flow of taxed sources of GHG emissions (both actual and latent emissions from embedded carbon) from the point of statutory incidence where the tax is paid (e.g., on produced natural gas and associated products) through the supply chain to the point where the manufacturer uses them to produce new products. Table 1, discussed in more detail below, contains a list of approximate, indicative values for the GGI of commodity products in several covered sectors and US electricity.

While the information necessary to determine the GGI for US domestic firms and their covered products appears to be available, the Regulator will need to develop authorized protocols to determine the GGI for covered products. (Below we describe approaches for such procedures based on existing voluntary industry guidelines and other sources.) For imported products, the challenge will be still greater because of: (a) the large number of EITE and other covered sectors and products; (b) data being less likely to be available and reliable in many nations; and (c) the potential for incomplete, negligent, or fraudulent information. Finally, there are a number of questions and issues concerning timing of information that will need to be resolved.¹⁰

BTAs in the Framework satisfy several criteria, including those below, to be compatible with WTO requirements (as discussed fully in Section 3.2 of the Framework report):

- Rebates and import charges are determined in the context of the impact of an indirect domestic tax on GHG emissions associated with the product.
- Objective international standards are used to determine the GGI on which the domestic rebates for exports and border charges on imports are based.
- The export rebate cannot exceed the tax paid on the product.
- The import charge cannot exceed the tax paid on like products sold domestically (i.e., based on the GHG tax rate and the GGI of the imported product).
- Import charges are applied without discrimination based on national origin.

Our proposal determines the GGI using objective standards as the basis for both export rebates and import charges on products (see Section 3.1 in the Framework). The rate (in US\$ per tonne of product) for the export rebate is given by product's GGI (tonnes CO₂e per tonne of product) multiplied by the US GHG tax rate (US\$ per tonne CO₂), where the tax rate is the one in effect in the year the domestic product was manufactured. The rate for the import charge is given by the GGI multiplied by the US tax rate in the year the foreign product is imported and would be competing with like goods in the United States.

It is important to note that the final bullet requires that no credit should be given to reduce the import charge based on the GHG policies in the nation where the imported product was manufactured. This runs counter to many legislative proposals in the

¹⁰ WTO-Compliant Border Tax Adjustments: Perspectives and Implications, Brian P. Flannery, Jennifer A. Hillman, Jan W. Mares and Matthew C. Porterfield, October 2020.

United States and elsewhere that would provide a credit to offset the “equivalent price” of GHG policies in the nation that exports to the United States. Providing such a credit, however, runs the risk of violating the Most Favored Nation principles of non-discrimination on the basis of the national origin of imports (as discussed in references cited in footnotes 3 and 4). Moreover, designing an objective methodology to evaluate the “equivalent price” of GHG policies poses significant challenges, if they are not based on a GHG tax (see Framework Section 3.2). For these reasons the Framework proposal provides no such credit.

To avoid gaming to receive larger export rebates or pay smaller import charges by sourcing products from facilities that are more or less GHG-intensive, we propose that BTAs for products should be based on the average GGI for a firm’s entire domestic production of a given product—or on a national sectoral average if firm-specific data is unavailable. The rate (in US\$ per tonne of product) for the export rebate for a covered product of a firm is given by its average GGI multiplied by the US tax rate (US\$ per tonne CO₂e) in the year the product was manufactured. Similarly, the rate for the import charge is given by the entire domestic average GGI of the producer in the country where the product was manufactured multiplied by the US tax rate in the year the product is imported.

3. Legislative and Regulatory Responsibilities and Tasks to implement BTAs

As described in the Framework and Perspectives reports (see footnotes 5 and 10), numerous challenging issues must be resolved to design and approve legislation to implement GHG tax legislation. They include the following, for example:

- which gases, sectors, and activities are covered by the GHG tax and BTAs;
- where the statutory incidence of the tax falls;
- the size of the initial tax and procedures to adjust it (upward) over time;
- whether to continue, modify, or terminate other GHG policies and regulations; and, importantly,
- the use of very significant revenues—over \$100 billion per year from fossil fuels alone, even with a relatively modest initial tax of \$20 per tonne CO₂.

Support for a GHG tax would be contingent on finding solutions for these and other critical design factors. This report does not address that galaxy of fundamental challenges and opportunities. Rather, assuming that an upstream GHG tax could be implemented, we address the challenge of designing BTAs for exports and imports in the context of a domestic, economy-wide, upstream GHG tax. Some BTA issues (e.g., establishing lead and support agencies) and authorization for the Regulator to undertake many of required tasks would need to be set in the legislation itself—others (e.g., establishing methodological guidelines and administrative procedures), would be undertaken by the Regulator.

3.1. Administrative Responsibilities

Because of the large number of nations involved and the large number of GHG-intensive products exchanged in international trade with the United States, implementing BAs of any sort, including the BTAs proposed here, will require a significant administrative effort—which we believe to be feasible. To implement the proposed BTAs, multiple tasks must be managed by one or more administrative agencies that need to be specified in the Legislation and regulations. No single agency currently performs all the tasks required to implement this Framework (see the Appendix). We propose that the US Department of the Treasury, or its Internal Revenue Service, should establish a new office as the lead agency to manage the Framework with substantial assistance from EPA and the Department of Commerce. EPA and Commerce would continue to lead in relevant areas where they already have expertise and jurisdiction and take on new responsibilities as required by the Legislation and assigned by the lead agency. As noted in the Introduction, we refer

to this set of agencies responsible for implementing the GHG tax and BTAs as the “Regulator.” Collection of the upstream GHG tax and disbursement of rebates should be assigned to the Treasury Department and Internal Revenue Service. Import charges should be collected by the commissioner responsible for Customs and Border Protection. Determination of covered GHG-intensive products eligible for domestic rebates and subject to import charges as well as development of procedures to determine the GGI for them should be the responsibility of the new office. As it has for many years, EPA would have an ongoing role overseeing procedures to determine and report GHG emissions from facilities in the United States and to account for inevitable changes as resources, technologies, processes, and products evolve.

Because of its extensive involvement with trade issues, tariffs, domestic and foreign companies, and foreign governments (including via investigations carried out in foreign countries), the Office of Enforcement and Compliance (under the US Department of Commerce’s International Trade Administration) would be particularly useful in evaluating data submissions by foreign producers about their energy usage, GHG emissions, and products’ GGIs.

Implementation will take time and effort to build relevant technical and administrative capacity, both in firms and in regulatory agencies. Consequently, we propose that implementation should be phased in through an initial start-up phase using available domestic and foreign data for as many significant products as possible—then ramped up to full implementation over time by augmenting and adjusting regulations based on experience and growing availability of data.

3.2. Covered NAICS Code Sectors and Their GHG-Intensive Products

A critical initial decision for Congress is to establish principles for determining which GHG-intensive products and their sectors should be eligible for export rebates and subject to import charges. In general, commodity goods (e.g., steel, cement, and gasoline, as well as liquefied natural gas [LNG] produced in EITE industries and a few others) are those most affected by competitive changes in international trade. Suppliers of these products compete primarily based on price, not customer service, proximity, delivery time, unique features, advertising, or marketing. Even a small difference in the price of commodities can have significant impacts on competitiveness (see Section 3.5 in the Framework report).

Unlike criteria for energy-intensity, trade-exposure, and GHG-intensity used in the interagency report, our Framework utilizes the GGI as the sole basis to identify both GHG-intensive products and sectors.¹¹ Covered products are only those with a GGI of at least 0.5 tonnes CO₂e per tonne of product and at least 0.25 tonnes CO₂e per MWh

¹¹ Section 3.5 of the Framework report.

in the case of electricity. We refer to covered products as GHG-intensive products. Covered sectors are those that include GHG-intensive products. Only those products in covered sectors that satisfy the GGI threshold would be entitled to an export rebate or assessed an import charge. With these thresholds, the major commodity products of EITE sectors appear to be covered, as would electricity produced from burning fossil fuels. To connect with the large existing literature and generic use of the term in public dialogue, we continue to make use of the phrase and acronym EITE even though we do not include energy-intensity or trade-exposure as criteria. As discussed above in Section 2, some covered products also occur in energy-intensive sectors not among the 46 listed in the interagency report, and, as a result of various technical quirks, some covered products occur in NAICS code sectors that may not meet the 5 percent threshold (e.g., LNG is an obvious example).¹² Other examples of covered products that may not require energy-intensive processing by the final manufacturer occur in sectors that transform GHG-intensive primary resources such as steel and aluminum purchased from suppliers into finished products (see Section 4.5 below). In these cases, the major contribution to the GGI of finished products derives from the contribution of the purchased GHG-intensive feedstock material rather than from energy use by the manufacturer.

Table 1 contains a list of approximate, indicative values for the GGI of commodity products in several energy-intensive sectors and others as well as US electricity. The adjectives “approximate” and “indicative” apply because actual values for the GGI for products from a particular facility will depend on the specific natural resources, purchased products, and processes used to produce them, and on sources of electricity. Indicative GGI values were taken from a variety of sources, some based on life-cycle analyses (LCAs) of the product’s GHG footprint, and on input from trade associations and other public sources. Going forward, it will be essential to determine both representative values and ranges of values for GGIs based on more thorough analyses of GGIs that differ in some ways from product GHG footprint values based on LCAs. In particular, the GGI considers contributions only from factors subject to the GHG tax for manufacturing facilities in covered sectors that produce GHG-intensive products.

For the 46 NAICS code sectors identified for relief in 2009, the interagency report stated that presumptively eligible industries “account for only one-tenth of the value of US manufacturing output, and less than two percent of US gross domestic product in 2007.” However, with the proposed addition of coal, oil and gas production, electricity, and petroleum refining, the share of manufacturing output and gross domestic product in covered sectors will be significantly larger than for sectors that would have been covered by the Waxman-Markey bill.

12 The NAICS Code system lists liquefied natural gas (LNG) within code 488999 (All Other Support Activities for Transportation), rather than within a code associated with an EITE manufacturing sector. Nonetheless, LNG is an important, trade-exposed, GHG-intensive product, and the transformation of natural gas to LNG and its regasification before use are energy-intensive activities—typically amounting to more than 10% of the energy of the final product. Consequently, under the Framework, we classify LNG as a covered product eligible for export rebates and subject to import charges.

As discussed in Section 3.5 of the Framework, we believe that any domestic firm that exports GHG-intensive products or competes with imports will be trade-exposed, regardless of the scale of the sector itself. We cite the example that Canada exports roughly 11 percent of the electricity it produces to the United States, representing only about 2 percent of US electricity. However, in border areas such as New York and New England, Canadian imports can be as high as 12–15 percent of total consumption. In those regions, US electricity producers are certainly trade exposed.

In designating criteria for initial covered products, the GHG Legislation should aim to cover those most important to achieve the goals of BTAs—namely, providing relief to those producers most likely to be at risk from competitive changes that will affect trade and contribute to GHG leakage. Because the number of products and associated sectors that would qualify rises rapidly at lower thresholds for the GGI, initially the statute should err on the side of including too few rather than too many products and sectors. It should also include an appeals process as a means for industries to petition for their products to be included later in the system.

Providing BTAs will be administratively challenging. So, the Regulator should be required to obtain congressional approval to reduce the threshold for GGI or to take other criteria into account.

3.3. Sectors and Products to be Covered Initially

Manufacturers and producers in covered sectors are likely to urge that the implementation of BTAs occur as soon as possible because, on or soon after its initiation, they will experience the economic impacts of the GHG tax through higher costs charged by their suppliers of GHG-intensive products, and producers of fossil resources and industries with GHG process emissions will be directly subject to the GHG tax. Thus, they will desire an export rebate soon and that equivalent import charges be established quickly. The challenge to develop the necessary administrative capacity to determine domestic export rebates is substantial. Similarly, the potential number of covered sectors and products from multiple suppliers and countries that export to the United States would require determination of a substantial number of import charges. Although they do not evaluate a GGI per se, many sources exist that can provide relevant data to help the Regulator determine a GGI to establish initial import charges for GHG-intensive products. Sources include domestic trade associations; international trade associations; multi-national firms and organizations that collect and market relevant data (e.g., IHS Markit¹³ in a variety of sectors); Environmental Product Declarations¹⁴ that are available for a variety of products from a

13 www.ihs.com.

14 www.environdec.com “present transparent, verified and comparable information about the life-cycle environmental impact of products.” In the particular case of results for GHG emissions based on ISO or WRI/WBCSD protocols, these may be somewhat different than the GGI, which tracks only taxed GHG emissions.

number of firms and sectors; national GHG emissions inventory reports¹⁵ to the United Nations Framework Convention on Climate Change (UNFCCC); and many nations that already require GHG emissions reports for facilities. We believe that such data exist for the industries listed below that we recommend for initial coverage.

North American industries are designated by code numbers in the NAICS and, for each such industry, import duty codes for specific products are listed under the Harmonized Tariff System. For a given NAICS code, the number of such import duty codes vary from 2 to almost 2,000. We propose that the Legislation should designate the following sectors, listed by their NAICS code, to be included in the initial set of covered sectors. For these sectors, qualified GHG-intensive products would be identified by the Regulator based on procedures developed and authorized to determine the GGI from which export rebates and import charges could be determined in the first year. The following list identifies these sectors and their NAICS codes. Note: the list does not include all 46 sectors from the interagency report, and that sectors shown in italics were not listed in the interagency report (see footnote 1).

- (a) *Crude petroleum extraction 211120*
- (b) *Natural gas extraction 211130*
- (c) *Coal mining included within 212111, 212112, and 212113*
- (d) *Fossil fuel electric power generation included within 221112*
- (e) Steel products included within 331110
- (f) Alumina and primary and secondary aluminum products included within 331313, 331314, 331315 and 331318
- (g) Lime and cement products included within 327310 and 327410
- (h) Glass products included within 327211, 327212, and 327213
- (i) Nitrogenous fertilizer products included within 325311
- (j) Pulp, paper, newsprint, and paperboard products included within 322110, 322121, 322122, and 322130
- (k) *Refinery products included within 324110*
- (l) Petrochemical products included within 325110
- (m) Some products included within all other basic inorganic chemical manufacturing 325180
- (n) Some products included within cyclic crude and intermediate manufacturing 325194

15 See <http://www.ipcc-nggip.iges.or.jp/index.html>. Development of the new methodology report to refine the current inventory guidelines (2006 IPCC Guidelines for National Greenhouse Gas Inventories), was carried out by the Task Force on National Greenhouse Gas Inventories. The final report “2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories” (2019 Refinement) was approved by the IPCC at its Plenary Session May 2019. Inventories are provided on a sectoral basis, but not the same basis used in NAICS codes.

- (o) Some products included within all other basic organic chemical manufacturing 325199
- (p) Some products included within plastics material and resin manufacturing 325211
- (q) Some products included within synthetic rubber manufacturing 325212
- (r) *LNG included within all other support activities for transportation 488999*¹⁶

3.4. The Greenhouse Gas Index (GGI) and BTAs for Imports and Exports

As described in Section 2 above, the GGI is used to determine both export rebates and import charges. For products of a specific covered manufacturing facility or operation to produce fossil resources, three sources contribute to the GGI: (1) process GHG emissions, (2) the carbon content of produced fossil resources, and (3) the contribution from GHG-intensive products of suppliers.¹⁷ Additional information is required concerning the products produced by the facility to allocate total GHG emissions (determined by the GGI) from the facility to its product slate. Such information would include the total amount of covered GHG-intensive products (and other products) and aspects of their composition (e.g., the amount of raw steel by weight contained in steel products and the fraction by weight of carbon in covered petroleum products; see below). In the United States, facilities and operations emitting more than 25,000 tonnes CO₂e per year have been required for many years to report their GHG emissions to EPA.^{18,19} Well-established guidelines exist to determine and report GHG emissions of facilities—both official procedures in nations that require GHG reporting and voluntary guidelines endorsed by the international trade associations of many EITE sectors. However, guidelines approved by regulatory agencies do not yet exist to allocate emissions to product slates.

The Framework report and Compendium describe procedures that could be used to allocate GHG emissions included in the GGI from the facility to its product slate. As discussed in the Framework (Section 3.1), these proposed procedures to evaluate the GGI substantially implement relevant parts of related, existing international standards based on life-cycle analyses that have been developed by the International Standards

¹⁶ See footnote 12 for an explanation of classification of liquefied natural gas (LNG).

¹⁷ The GGI intentionally neglects considering contributions of products with small GGIs, because (by definition) they make only a small contribution to overall emissions and their inclusion would add significantly to administrative effort and complexity of determining covered GGIs.

¹⁸ <https://ghgdata.epa.gov/ghgp/main.do>.

¹⁹ <https://www.epa.gov/energy/emissions-generation-resource-integrated-database-egrid>.

Organization (ISO)²⁰ and separately by World Business Council for Sustainable Development (WBCSD) and World Resources Institute (WRI).²¹ These procedures (in the Framework, ISO, and WRI/WBCSD), could be used as a starting point for the Regulator to develop authorized guidelines to allocate GHG emissions from facilities to covered products. The Regulator must also establish guidelines for domestic suppliers of covered products to communicate GGI values for those products and other relevant information to the Regulator and to domestic customers in covered sectors. In the Framework we note that allocation procedures are sector-specific, but many sectors will share similar approaches to simplify determining GGI values.

The Regulator will be responsible for establishing guidelines to determine the GGI for covered products in covered sectors. Developing them should benefit from the experience and previous work on voluntary guidelines by many experts in EITE sectors and other stakeholders. Because of their importance and financial implications, we believe that the reported information on GHG emissions and GGIs for a firm's products should be published by the Regulator and be subject to audit and sanctions for incomplete, negligent, or fraudulent information. This includes information used to administer the GHG tax and BTAs.

Although estimates of the GGI for imported covered products would be used initially, exporters to the United States of such products would be required to provide necessary information on their covered products, GHG emissions, and GGIs. We propose that such information should be submitted within two years after the beginning of the import charges.

We believe that the overall system to implement the Framework must include appeals processes that allow domestic and foreign firms and others to challenge US determinations of covered sectors, products, and their GGIs, since they provide the basis to award export rebates and impose import charges. This would allow firms and other stakeholders to appeal determinations of GGIs not only for their own products, but also to challenge those of domestic and foreign competitors, if they believe them to be inappropriate. For the process to function effectively, it would be desirable for information on GGIs for products of domestic and foreign firms and their facilities to be publicly available as the basis for determining if a challenge is warranted. This could be accomplished by requiring public posting of relevant information on GGIs for GHG-intensive products of domestic firms that produce them and products of foreign firms subject to import charges.

20 ISO Greenhouse gases—Carbon Footprint of products—Requirements and guidelines for quantification, originally ISO/TS 14067:2013, superseded by ISO 14067:2018.

21 WRI WBCSD: GHG Protocol Product Life Cycle Accounting and Reporting Standard (2011).

4. Other Regulatory Issues

4.1. Obligations of Manufacturers and Electricity Providers

US facilities of manufacturers producing covered products and electricity would be required to submit to the Regulator relevant information on: (a) their GHG emissions; (b) amounts of covered products produced, GGI values, and the data and methods they used to determine GGIs for GHG-intensive products they sell; and (c) amounts and GGI values for GHG-intensive products they purchased from suppliers. Manufacturers of GHG-intensive products, including electricity providers, should be required to communicate GGI values of GHG-intensive products that they sell to customers in covered industries. This will help to enable their qualified customers to apply for export rebates.

4.2. Products Produced in Multiple Facilities in a Given Country

As described above, to avoid gaming to receive larger export rebates or pay smaller import charges, based on sourcing products from facilities that are more or less GHG-intensive, we believe BTAs for products should be based on the average GGI for a firm's entire domestic production of a given product, or on a national sectoral average if firm-specific data is unavailable.

4.3. Regulator's Use of Estimates and Aggregations

The Regulator should use estimates of GGIs for imported covered products for a country until the importer or product manufacturer provides verifiable information needed to determine GGIs of their imported GHG-intensive products. The Regulator should initially estimate the GGIs for some covered products, from each covered sector, from a few countries (see Section 3.1 of the Framework report for potential sources to estimate GHG emissions and GGIs in foreign nations). The Regulator should average the GGIs for each of such products and use that average for all such covered products being imported from the countries exporting to the United States. The Regulator should use an average of all such individually determined product GGIs to determine the GGIs for all other covered imported products of such sector. These methods are means to implement the Legislation more quickly in the initial years. Based on experience and improved data, in due course, import charges should be adjusted and where possible determined for specific manufacturers.

4.4. Petitions for Consideration as GHG-Intensive Product

Domestic manufacturers who believe that some of their products should be considered GHG-intensive and entitled to an export rebate should have the right to petition the Regulator and provide information that justifies their inclusion as eligible for export rebates. Note that this may include manufacturers that might not currently report GHG emissions (if their total emissions are less than 25,000 tonnes CO₂e per year). Nonetheless, they may have products that would qualify (e.g., if they rely heavily on purchased electricity or other GHG-intensive products that would contribute to the GGI of their product).

4.5. All Eligible GHG-Intensive Products

More sectors exist that would satisfy the 5 percent energy-intensity threshold, or that produce at least some obviously GHG-intensive products, than are identified in the NAICS sectors listed above. Recognizing the natural desire of affected industries to benefit as soon as possible from the Legislation, the Regulator should strive to put in place systems and import charges for all defined GHG-intensive products in such sectors within 30 months after enactment of the Legislation. In addition to those listed above these include the following:

1. Wet corn milling (311221)
2. Rendering and meat byproduct processing (311613)
3. Fiber, yarn, and thread mills (313110)
4. Synthetic dye and pigment manufacturing (325130)
5. Artificial and synthetic fiber and filaments (325220)
6. Pottery, ceramics, and plumbing fixture manufacturing (327110)
7. Vitreous china and other pottery manufacturing (327112)
8. Clay building material and refractories manufacturing (327120)
9. Ground or treated mineral and earth manufacturing (327992)
10. Mineral wool manufacturing (327993)
11. Iron and steel pipe and Tube manufacturing from purchased steel (331210)
12. Non-ferrous metal (except for aluminum) smelting and refining (331410)
13. Iron foundries (331511)
14. Carbon and graphite product manufacturing (359991)
15. Iron ore mining (212210)
16. Copper, nickel, lead and zinc ore mining (212230)

4.6. Publication of Affected Products and Import Charges

The Regulator should publish at least annually lists of covered sectors and GHG-intensive products for which export rebates and/or import charges exist. Particularly during the first years after the Legislation enters into force, the Regulator should

publish such information on a more frequent basis so that firms can determine if their products are eligible for export rebates or subject to import charges. Perhaps one way to accomplish this reporting in the United States would be for the Regulator to require that US facilities that currently report their GHG emissions also to report GGI values (and their basis) for GHG-intensive products they sell.

Since the Regulator is required to determine import charges for GHG-intensive products, it must provide that country-specific and ultimately company-specific information to the various Customs and Border Protection officials who are responsible for collecting import duties or related charges. Collection of accurate information required to determine GGIs for covered sectors and products exported to the United States from many nations will be challenging. The Regulator is likely to be helped in that effort by domestic manufacturers, particularly if information about import charges for covered products is publicly available.

4.7. Country and Individual Company Import Charge Adjustments

Initial import charges will be based on estimates of GGIs for the countries from which goods are exported to the United States. These exporters and the Regulator will desire that those charges be adjusted to be more accurate. Thus, there should be a provision that beginning no later than in the third year after enactment, foreign manufacturers or exporters to the United States would be able to provide verifiable information about their manufacturing operations and raw materials for such product as a basis for revising the GGI and adjusting the import charge. They should also be allowed to seek a refund, with interest, based on the information submitted of the portion of the previously assessed charge in excess of the revised, lower approved import charge. Any such refund would be limited to that based on the prior two years of exports to the United States.

4.8. Petitions to Add to List of GHG-Intensive Products

The Regulator should utilize fair, timely, impartial procedures by which any producer of GHG-intensive products in the United States may petition the government to include that product on the list of GHG-intensive products to receive import charges or export rebates.

4.9. Allocation of Manufacturing Facility's GHG Emissions to Products

The Regulator should develop guidelines for authorized procedures to be used by facilities and operations in covered sectors to determine GGIs for covered GHG-intensive products they produce. As described above, this requires allocating total GHG emissions from the facility (as determined by contributions to the GGI) to the product slate that it produces.

5. Summary and Conclusions

Because of the large number of GHG-intensive products exported from the United States and imported from other nations, implementing BAs of any form (including BTAs) in the context of an upstream GHG tax as proposed here will require a significant but feasible administrative effort. Much of the information needed to determine export rebates and import charges for GHG-intensive products is available in many nations from existing programs to report GHG emissions from facilities; from voluntary, industry-endorsed, international guidelines that exist in many EITE sectors; and, typically on a sectoral basis, from national reports of GHG emissions, such as those to UNFCCC. Official procedures must be extended to allocate emissions to the product slates manufactured by facilities (or operations, e.g., to produce fossil resources). Experience with existing GHG product footprint standards and further development of the GGI that we propose can provide a strong basis to develop official guidelines. Though significant (and requiring ongoing updates), the effort required is not unlike tasks currently undertaken in official procedures to tax and trade goods in many settings (e.g., VAT and tariffs in many nations) and to report GHG emissions from facilities. However, no US regulatory authority currently undertakes the range of tasks required to implement the Framework. Legislation, presumably as part of the bill to enable a US GHG tax, will be necessary to establish appropriate regulatory authority to implement BTAs as proposed in the Framework.

Table 1. Approximate, Indicative Values for the Greenhouse Gas Index (GGI) of Representative GHG-Intensive Products and Electricity

Products from Fossil Resources				
Product	C%	CO ₂	GGI	Notes
	Embedded Carbon			
Oil, Gas, and LNG				
Crude Oil	0.85	3.12	3.4	(More for heavy oil and oil sands)
Natural Gas	0.75	2.75	≥ 3	(Taken as CH ₄ only highly dependent on CH ₄ emissions)
LNG	0.75	2.75	≥ 3	(Includes the GGI of natural gas plus emissions for liquefaction and regassification)
Coal				
Anthracite	0.92	3.4	≥ 3.4	(Highly dependent on the natural resource being produced, CH ₄ leaks, and processing)
Bituminous	0.65	2.4	≥ 2.4	
Lignite	0.30	1.1	≥ 1.1	
Oil Refining				
Gasoline	0.90	3.3	4.0	US average + 20%
Jet Fuel	0.82	3.0	3.6	US average + 20%
Diesel	0.86	3.15	3.8	US average + 20%

Notes: Embedded carbon, C%, is the fraction by weight of carbon in the fuel or produced fossil resource. CO₂ emissions (tonnes CO₂ per tonne of product) from combustion of embedded carbon. GGI (tonnes CO₂e per tonne of product) includes contributions not only from embedded carbon, but also from other GHGs, GHG process emissions, and purchased products (see discussion in technical background).

Table 1. Cont.

Products from Other EITE Sectors			
Product		GGI	
Ammonia		1.6	
Nitric Acid		0.65	
Ammonium Nitrate		0.86	
Alumina		0.84	
Unwrought Primary Aluminum			
Electricity (Coal)		18.1	
Electricity (Gas)		3.7	
Newsprint		1.0	
Propylene		3.4	
Flat Glass		0.82	
Cement			
Electricity (Coal)		1.2	
Electricity (Gas)		0.87	
Basic Oxygen Furnace Steel		3.2	
Electric-Arc Furnace Steel			
Electricity (Coal)		0.53	
LDPE		4.8	
Electricity Production by Fuel (US Average)			
GGI as determined from GGI for purchased fuel (units: tonnes CO ₂ e per MWh)			
Fuel	CO ₂	GGI	Notes
Natural Gas	0.42	≥ 0.42	(Dependent on CH ₄ leakage during production)
Fuel Oil	0.95	≥ 1.1	
Coal	1.00	≥ 1.0	

Appendix. Tasks for Regulatory Authorities to Administer Border Tax Adjustments

Timing of Implementation

Prompt start: Given the administrative complexity and scope of the BTA process, the Legislation should provide flexibility for the Regulator to determine an initial set of sectors and GHG-intensive products that would be covered and to determine those nations subject to import charges during a startup period lasting two years.

Broadening scope: Establish a process to expand the scope of coverage of sectors with GHG-intensive products and nations subject to import charges after the initial startup phase.

Updating and improving the system: The Regulator should establish procedures to update the BTA system annually to account for experience and ongoing changes in, for example, produced natural resources, technology, products, markets, and trade as well as GHG tax and reporting systems, and to covered products and nations subject to import charges.

US Domestic GHG Tax and BTA System

GHG Tax Covered Entities and GHG Reporting Guidelines

Covered entities: Establish rules for entities (e.g., GHG emitting facilities and operations that produce fossil resources) that will be subject to the GHG Tax.

Reporting Guidelines: Provide guidelines on procedures to determine and report GHG emissions from covered entities—presumably these would be based on EPA's existing program that currently collects data from facilities that emit 25,000 tonnes CO₂e per year or more—including the timing of reports.

Companies desiring rebates must provide the Regulator with necessary GHG emissions information, even if not required to provide the same to EPA.

Collect the GHG tax: Establish procedures, including timing, to collect the tax.

Sectors and Entities with Covered GHG-Intensive Products

Covered sectors: Determine sectors (NAICS code industries) with covered products that will be eligible for export rebates.

Covered GHG-intensive products: Determine which GHG-intensive products will be eligible for export rebates and import charges. However, as this will require significant time to complete, provide combinations of export rebates and import charges as soon as possible for as many as possible and then

complete the determinations as time allows. (Note that products eligible for export rebates are likely also to be subject to import charges).

Standards to determine GGIs: Establish authorized guidelines in each covered sector for a manufacturing facility (or operation to produce fossil fuels) to determine the GGI for each of the covered GHG-intensive products that it produces.

Entities required to report: Establish procedures to determine which entities (facilities that manufacture covered products and produce fossil resources) must report GGIs and other relevant product information on their covered products.

Reporting, Communications

Reporting and communications: Require facilities in covered sectors to determine a GGI for each GHG-intensive product they manufacture and to communicate GGIs and other relevant information on these products to the Regulator and to their customers in EITE and other covered sectors.

Rebates

Export rebate claims: Establish the process for US firms to claim export rebates for qualified products at a rate based on the firm's average GGI for their entire US production of that product. (The export rebate rate for a product is determined by multiplying its firm-wide domestic average GGI by the US GHG tax rate using values in the year the product is manufactured).

Certify and issue rebates: Establish procedures to certify claimed export rebates and to pay them.

Audit and Control

Audit and control systems: Establish procedures to assure that information reported by firms for taxed GHG emissions, GGIs and relevant information for covered products, and a firm-wide average GGI for products to be exported is subject to audit and sanctions for incomplete, negligent, or fraudulent information.

Foreign

Covered Nations, Sectors, and Products

Nations: Identify those nations and their EITE and other sectors with GHG-intensive products that will be subject to import charges—these would include all products eligible for US export rebates.

GGI for imports: Determine the default national average GGI for covered GHG-intensive products exported to the United States.

Import charge: Collect import charges on covered EITE products. The rate for

the import charge will be the GGI for the product multiplied by the US GHG tax rate in the year the product is imported.

Firm-specific information: Establish a process for foreign firms to appeal use of the default GGI and instead to use the average GGI for the firm's entire production of the covered product as the basis for the import charge.

Audit and Control

Audit and control systems: Establish procedures to assure that information reported by firms for GGIs and relevant information for covered products as well as firm-wide average GGIs for products to be imported is subject to audit and sanctions for incomplete, negligent, or fraudulent information.

Appeals

Appeals regarding covered nations, entities, and products: Establish procedures so that eligible US and foreign parties can challenge the US Regulator's determination of covered sectors, GHG-intensive products, and values for GGIs, both for US domestic exports and foreign imports.

Parties eligible to appeal: Establish guidelines for parties eligible to make appeals, presumably including US and foreign firms that export from and import to the United States, trade associations and other affected entities, and foreign governments.

Appeals for adjustment of export rebates and import charges: Establish a process for firms to be able to appeal the amount of a claimed rebate or import charge based on submitting required data for their product that should be used in place of the value determined by the Regulator. If successful, firms would receive payment for up to two years of transactions with interest for the difference using new data.

