Chapter 2 Definitions
Section 202 Definitions

Add new definitions as follows:

CARBON DIOXIDE EQUIVALENT (CO2e). A measure used to compare the impact of various greenhouse gases based on their global warming potential (GWP). CO2e approximates the time-integrated warming effect of a unit mass of a given greenhouse gas relative to that of carbon dioxide (CO2).

GLOBAL WARMING POTENTIAL (GWP). A measurement that combined the impact of the various greenhouse gases relative to an equivalent unit of carbon dioxide over a given period of time.

PRODUCT-SPECIFIC TYPE III ENVIRONMENTAL PRODUCT DECLARATION (EPD). Type III environmental product declaration (EPD) complying with the goal and scope for the production stage and modules A1 through A3 (also referred to as cradle-to-gate) requirements in accordance with ISO Standards 14025 and 21930 and be available in a publicly accessible database. The data must represent the impacts for a specific mix design and manufacturers across multiple facilities.

Chapter 22 Steel
Section 2205 Structural Steel

Add new section as follows:

2205.3 Embodied CO2e in structural steel products. 100% of the weight structural steel, hollow steel section, steel plate, and concrete reinforcing bar used in the building project's *primary structural frame, secondary members*, lateral force-resisting system, and foundations shall not exceed the values specified in Table 2205.3 and meet the documentation requirements of 2205.3.1.

Exceptions:

1. Projects less than 50,000 square feet.

Table 2205.3 CO2e Limits per Steel Product

	Steel Product	Milled Steel kg CO2e/kg[a]
Structural Steel	Hot Rolled Structural Sections	1.20
Structural Steel	Hollow Structural Sections	2.05
Structural Steel	Plate	1.76
Steel Deck		2.32
Reinforcing Bars		1.03

a: Applies when an EPD declares mill-only material (cradle to mill gate).

2205.3.1 Documentation of Product CO2e. 100% of the structural steel, based on weight, must have a product-specific cradle-to-mill gate Type III EPD. Confirmation of the product's EPDs shall be provided to the code official prior to the certificate of occupancy.

Reason Statement:
Building operations and construction are responsible for 39% of today's global carbon emissions. About 11% of these emissions are embodied carbon emissions, the emissions associated with the creation of building materials and construction activities. Unlike operational emissions, which can be improved over the lifespan of a building through deep-energy retrofits and the decarbonization of the electric grid, embodied carbon emissions occur before a building is occupied and cannot be reduced over time. Therefore, addressing embodied carbon in the construction of buildings presents an urgent and valuable opportunity to reduce carbon emissions in Seattle.

As the Seattle energy code continues to improve building energy efficiency and the grid energy becomes cleaner, operational carbon emissions will be reduced, and embodied carbon will become a larger part of a building's total carbon emissions. The building code is where the materials and products installed in buildings are regulated. Therefore, the proposal is recommended for the steel chapter of the building code.

Steel is one of the most widely used materials in building construction and a primary contributor to embodied carbon in buildings, second only to traditional concrete. The U.S. steel industry is responsible for 104.6 MMT of CO2 emissions annually, a contribution that makes up 2% of total U.S. emissions. Steel destined for the built environment is responsible for 46 MMT of CO2 emissions annually, nearly half of the total annual emissions from the steel industry.

Many types of steel products made with different manufacturing techniques are found in buildings. Structural steel sections are the predominant structural framing material used in construction, holding 46% of the market share for structural framing materials for nonresidential and multistory residential construction in 2017. Steel reinforcing or "rebar," typically embedded in structural concrete, can also be a major use of steel and a source of embodied carbon in buildings.

A recent case study analysis by RMI shows that simply by specifying rebar products with lower CO2e content, a typical commercial construction project's embodied carbon can be reduced up to 10%. The report also states that products with higher recycled content have lower embodied carbon values. The Nucor Bar Mill near Seattle produces reinforcing bars with some of the highest recycled content values at 97.4%.

Aligned Initiatives:
The U.S. steel industry has taken great strides to disclose the carbon intensity of its products, and they have made reductions over time and will continue to do so. 95% of all structural steel in the U.S. have EPDs, including local manufacturers like Nucor Steel. In conversations with steel industry professionals, they encouraged the requirement for 100% of structural steel products to comply. Doing so supports US-made products and ensures that project teams can state that 100% of the steel complies and the low carbon steel is not offset with higher carbon steel. They were not concerned about meeting the demand for U.S.-made steel, stating that most steel mills operate at 70-80% capacity.

The Washington State legislature has been very interested in embodied carbon policies like Buy Clean as they have funded additional research into the topic. The legislation and research have signaled to the market that these policies are of interest. The market has responded with innovative solutions, leading local architects and contractors to specify and procure lower-carbon steel on larger projects.

Compliance:

Projects will be required to meet the global warming potential (GWP) value for each product listed in the table. The table lists the GWP cap for each product as indicated by 120% of the industry-wide environmental product declarations (EPD.) In stakeholder meetings with contractors, engineers, architects, and concrete providers, they support a proposal to incorporate lower carbon steel into Seattle's skyline.

Anticipated reporting requirements might include a summary table of each steel shape's GWP limit and actual GWP. Seattle may request that a plan for reporting steel GHG emissions to be provided at the time of permit.

Design, construction, and product manufacturers must work together to achieve and report the embodied carbon results. Architects will include the global warming potential (GWP) requirements in project specifications and review the cutsheets as contractors select and provide submittals for the designers to review. Contractors will work with suppliers to identify products that meet the GWP values. With over 80% of U.S. mills able to provide EPDs, documentation will be easy.

Steel Cost Data

The impact of the embodied carbon considerations in code to project teams has been shown to be cost-neutral when the requirements are specified and administered efficiently. The GWP limits were established for steel products using 120% of the Type III industry-wide EPDs for each product.

The energy related to steel product manufacturing dominates the calculated embodied carbon of the final product. Therefore, products manufactured with electricity, over natural gas, and in regions, like Seattle, with lower carbon energy grids, will have lower embodied carbon. Contractors will be interested in procuring concrete locally when they can. International steel production's energy is sourced from more extensive coal and natural gas percentages than in the U.S., making American-made steel lower in carbon than most steel derived from China.

To comply with the code, small product manufacturers and/or suppliers will see a small financial impact from the development of EPDs for their products. A study by Energy Transitions Commission showed that the company pass-through cost to the individual projects to create the initial $5-30K EPD is negligible.

Delayed Implementation:

The proponents and stakeholders engaged in the proposal development process recommend that project teams are given an additional year to comply with the code if adopted. Design teams need to ensure that the specifications include the requirements before they go out to bid. In addition, contractors need to understand the requirements and secure subcontracts with their steel

suppliers. Since 30% of the steel used in the U.S. comes from China, which often does not comply with the GWP limits listed within, some contractors may need additional time to procure and transport complying steel.

Since this code would apply to projects over 50,000 SF, these projects often include multi-year design development before the permit stage. Providing time for the team to set the requirements and work together will lead to a more successful outcome. Because the code only applies to larger projects, the requirement will not impact all steel used in Seattle, or even all buildings, leaving an opportunity for imported steel.