Chinese and North American Produced Hot-dip Galvanized Steel Research Summary

Background

The Steel Recycling Institute recently commissioned a detailed study of hot-dip galvanized steel coils produced in China. This study has now been independently critically reviewed in accordance with the requirements of ISO/TS 14067:2013 for the carbon footprinting of products. The review panel consisted of two experts from Quantis International and one steel industry expert (retired). The same panel also independently reviewed an additional report documenting the cradle-to-gate greenhouse gas (GHG) emissions associated with North American production of the same hot-dip galvanized steel product. (See the section titled "Referenced Reports" for a complete listing of these reports.)

The products produced in China and in North America are market substitutes, in other words, they are functionally equivalent and can both be used in the manufacture of finished steel products in North America. The reports cover the same cradle-to-gate scope, representing raw material extraction, transportation, and steel production. For steel produced in China, transport to reach the North American market was also included. The results were calculated using the same life cycle inventory (LCI) data collection and impact assessment methodologies.

Results

The study results are presented in the following table of 100-year Global Warming Potential (GWP-100) impacts, which represent aggregated cradle-to-gate GHG emissions expressed in carbon dioxide equivalents (CO_2eq):

Product	Impact Category	Units	Produced in China	Produced in North America
Hot-Dip Galvanized	GWP-100*	Tons CO_2eq./ton	3.23	2.20

*Calculated per IPCC 5th Assessment Report, 2013

On the North American market, the cradle-to-gate GHG emissions per ton of hot-dip galvanized coil produced in China are nearly 50% higher than the same product produced in North America.

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Limitations

Note the following study limitations: 1) the Chinese sites for which data were collected are likely newer, more efficient mills, which are compared to average North American production; and 2) the Chinese data represents 2013-2015 production with background data ranging from 2010-2015, while the North American data is representative of 2006-2010, with some background data from as early as 2000. Both of these limitations can be considered conservative in that they would likely result in more favorable results for the steel product produced in China in a comparison to the same product produced in North America.

This study presents results for a single environmental impact or indicator (aggregated GHG emissions or GWP-100); however, GHG emissions that cause climate change impacts are of high public and institutional interest, and is among the currently most pressing environmental issues. Furthermore, because the study focuses on a single environmental issue, it is not intended to support "comparative assertions" as defined by the ISO standards for life cycle assessment (specifically ISO 14040, Section 3.6[1]), which pertains to claims of overall environmental superiority based on a comprehensive set of environmental indicators.

Referenced Reports

Title: ***Structural Section and Hot-Dip Galvanized Steel Production in China: Life Cycle Assessment Report***

Authors: Trisha Montalbo, thinkstep

Date: August 2017, version 1.0

Title: ***LCI Data for Steel Products: North American Hot-Dip Galvanized***

Authors: Brandie M. Sebastian, Steel Recycling Institute

Date: November 2015, revised July 2017

[1] ISO 14040: Environmental management – Life cycle assessment – Principles and framework. Geneva: International Organization for Standardization. 2006.