Improving our Environmental Footprint

Construction has a profound impact on our natural environment and impacts our energy, water and raw material consumption, and greenhouse gas (GHG) emissions. Corrugated steel pipe and structural plate manufacturers are focused on improving their environment footprint. For the past 25 years, Canada's steel manufacturing industry has continuously lowered its carbon footprint through enhanced practices in the manufacturing and recycling of steel products, thereby effecting reductions in: greenhouse gas emissions; ozone depletion and smog air, while increasing the use of renewable energy sources, enhanced waste disposal procedures and more efficient end-of-life recycling. Corrugated Steel Pipe is a remarkable product that, when used wisely by qualified designers, can significantly reduce consumption of the world's limited resources.

Once iron ore is extracted and refined into steel, its life never ends. This makes steel an ideal material to deploy in sustainable strategies for the construction industry. Today's steel is produced using two technologies, both of which require "old" steel to make "new" steel. The combination of these technologies gives Canadian steel mills the flexibility to produce a variety of steel grades for a wide range of product applications.

This fact sheet provides an overview of the methods used to produce steel and presents the results of the CSPI Environmental Product Declaration.

Reducing our Environmental Footprint

Steel – The World's Most Recycled Material

Steel is the world's most recycled material, and in North America, over 80 million tonnes of steel are recycled for consumption and 20 million tons are exported annually. North America is the world's largest scrap exporter. The exported scrap reduces the amount of much more energy intensive primary steelmaking production in other parts of the world. This is done for both economic and environmental reasons. It is always economical to recycle steel.

A Car to a Bridge to a Culvert and Back to a Car...

What's unique about steel is its ability to be closed loop recycled. Closed loop recycling is a material's ability to be recycled into the same product without loss of inherent properties or quality. A culvert can be recycled into a culvert. A concrete culvert cannot be recycled into a concrete culvert as concrete can only go through open loop recycling or "downcycling" into aggregate. The North American steel industry has been recovering and recycling steel scrap for over 150 years through over 1,800 scrap processors and a network of 12,000 auto dismantlers across the Continent. As a result of the large quantities of "old" steel supplied to the steel manufacturers, the steel industry is Canada's largest recycler consuming over 8 million tonnes of steel scrap every year.

Reducing our Environmental Footprint

Recycled Content of Corrugated Steel Products

Canadian steel producers use both basic oxygen furnace (BOF) and electric arc furnace (EAF) technologies inter- changeably to supply construction market end uses. Corrugated steel structural plate and culvert structures may be fabricated from steel manufactured using the BOF or EAF process. The traditional BOF technology uses typically 25% steel scrap (“old” steel) to make new steels. Steels manufactured by the BOF method are used to produce products where form- ability is a key material requirement. These products include automotive outer body panels, automotive axle shafts, exterior panels for appliances, residential door skins, and construction products.

The scrap based electric arc furnace (EAF) technology uses close to 100% steel scrap as its feedstock. EAF steels are used in construction products such as culverts and other drainage products, underground water detention systems, commercial roofing and cladding, steel studs, decking, and floor joists.

The average recycled content, determined using LEED 4 methods, found in CSP product made from Canadian manufactured steel is over 60%. These values represent industry leading levels of recycled content especially when compared to alternative culvert and buried structure materials such as plastic or concrete, which have little or no recycled content. A detailed breakdown of specific recycled contents is shown below:

Post-Consumer Content (1) 38 %
Post Industrial Content (2) 24 %
Total Recycled Content 62 %*

These are the numbers used for the LEED recycled content credit and do not include home scrap or internally generated scrap.

(1) Post Consumer Content – is defined as scrap steel resulting from end of life consumer products (e.g. steel cans, steel auto bodies, building materials)
(2) Post Industrial Content – is defined as scrap steel resulting from product manufacturing operations (e.g. turnings, stampings from auto part manufacturers) and does not include internally generated scrap from steel making operations such as the BOF and EAF

Reducing our Environmental Footprint

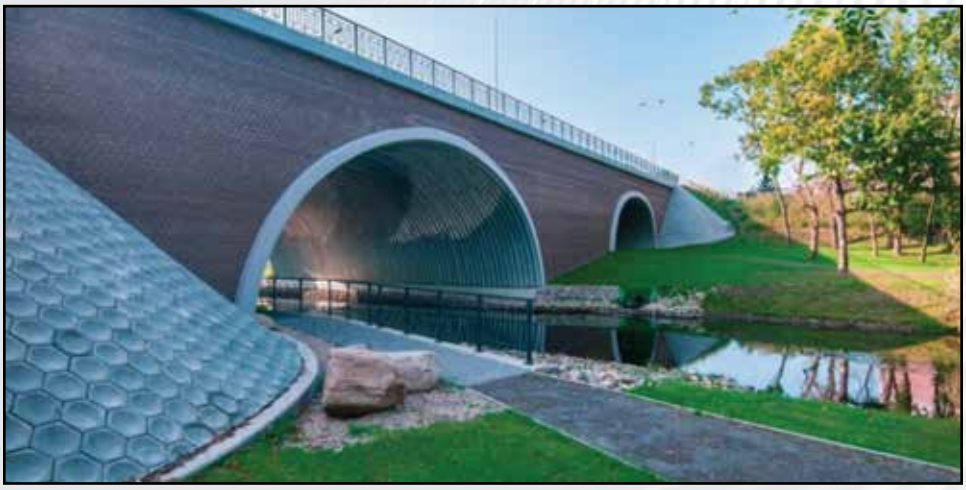
Environmental Product Declaration

Today, many engineering associations and design standards require designers to consider climate change and environmental footprints. Owners, when purchasing product, are considering environmental factors such as greenhouse gas emissions and pollution of water, soil and air, minimizing consumption of finite raw materials and energy, and ensuring the product's ability to adapt to the changing climate over its service life.

The CSPI Environmental Product Declaration {link to website} details corrugated steel pipe and structural plate life cycle environmental footprint on a per 1 metric ton unit basis for the following environmental factors. This cradle to gate assessment covers from raw material extraction to end of life recycling.

LCIA RESULTS FOR 1 METRIC TON OF CORRUGATED STEEL CONDUITS

Impact Category	Units	Product Stage			Credits & Burdens Beyond the System Boundry
		Steel Production	Transport to the Manufacturer	Manufacturing	Reuse, Recovery, Recycling Potential
		A1	A2	A3	D
Global Warming Potential	Metric ton CO_2 eq	2.21	0.0202	0.0311	-0.760
Ozone Depletion Potential	Metric ton CFC-11 eq	$5.06x10^{-8}$	$1.79x10^{-13}$	$6.16x10^{-11}$	$5.39x10^{-9}$
Acidification Potential	Metric ton SO_2 eq	0.0119	$8.91x10^{-5}$	$1.61x10^{-4}$	$-1.49x10^{-3}$
Eutrophication Potential	Metric ton N eq	$5.11x10^{-4}$	$7.42x10^{-6}$	$1.51x10^{-5}$	$-6.52x10^{-5}$
Photochemical Ozone Creation Potential	Metric ton O_3 eq	0.175	$2.94x10^{-3}$	$1.57x10^{-3}$	-0.0212
Depletion of Abiotic Resources (Elements)*	Metric ton Sb eq	$4.57x10^{-8}$	$3.45x10^{-9}$	$1.85x10^{-8}$	$-2.18x10^{-6}$
Depletion of Abiotic Resources (Fossil)	MJ, net calorific value	25,600	285	649	-7,280



Reducing our Environmental Footprint

The following table reports resource use, waste categories and output flows, and other environmental information.

RESOURCE USE AND WASTES RESULTS FOR 1 METRIC TON OF CORRUGATED STEEL CONDUIT

Parameter	Units	Product Stage			Credits & Burdens Beyond the System Boundry
		Steel Production	Transport to the Manufacturer	Manufacturing	Reuse, Recovery, Recycling Potential
		A1	A2	A3	D
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ net calorific value	1,080	7.11	332	-2.67×10^{-9}
Use of renewable primary energy resources used as raw materials	MJ net calorific value	0.392	9.35×10^{-12}	62.3	0.00
Total use of renewable primary energy resource	MJ net calorific value	1,080	7.11	332	-2.67×10^{-9}
Use of nonrenewable primary energy excluding nonrenewable primary energy resources used as raw material	MJ net calorific value	27,300	286	828	-9,150
Use of nonrenewable primary energy resources used as raw material	MJ net calorific value	0.00	0.00	0.00	0.00
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials.)	MJ net calorific value	27,3	286	828	-9,150
Use of secondary materials	Metric ton	0.446	0.00	0.00	0.00
Use of renewable secondary fuels	MJ net calorific value	0.00	0.00	0.00	0.00
Use of nonrenewable secondary fuels	MJ net calorific value	0.00	0.00	0.00	0.00
Net use of fresh water	m^3	14.9	0.00	0.0488	-5.21
Nonhazardous waste disposed	Metric ton	0.0136	0.00	1.77×10^{-5}	0.00
Hazardous waste disposed	Metric ton	4.26×10^{-4}	0.00	3.95×10^{-7}	-4.12×10^{-13}
Radioactive waste disposed	Metric ton	5.88×10^{-4}	6.28×10^{-7}	7.33×10^{-5}	2.45×10^{-7}
Components for re-use	Metric ton	0.00	0.00	0.00	0.00
Material for recycling	Metric ton	0.446	0.00	2.54×10^{-4}	0.00
Material for energy recovery	Metric ton	0.00	0.00	0.00	0.00
Exported energy	MJ per energy carrier	0.00	0.00	0.00	0.00

Reducing our Environmental Footprint

Corrugated Steel Products Contribute to LEED v4 Points

The use of corrugated steel products (CSP) can help obtain up to 7 LEED v4 points. CSP users maximize CSP's strength, versatility, and sustainability advantages through flexible and versatile solutions. Intelligently designed CSP infrastructure solutions help preserve the environment by improving our infrastructure's environmental footprint. Owners wishing to receive LEED credits for their project should confirm source of material information with the manufacturer.

Environmental Product Declarations	2 Points
Source of Raw Materials (CORPORATE SUSTAINABILITY REPORT, RECYCLED CONTENT)	2 Points
Construction Waste Management	2 Points
Material Ingredients Reporting (GET A POINT FOR DISCLOSURE AND POSSIBLE EXTRA POINT FOR MEETING THE THRESHOLD 100PPM)	1 Point
Total	7 Points