

Reusable, recyclable, remarkable – steel’s three Rs

By David J. Penny B.E.S.

In the world of sustainable development the greatest challenge is often to be seen as green. Steel is the most recycled material in the world. In North America we have been collecting and recycling steel scrap for over 150 years. Some 1,800 scrap processors, 12,000 auto dismantlers, as well as demolition and railway contractors manage to blend into a society that is searching for things that are green.

Every year thousands of tonnes of steel beams, steel cladding, culvert pipe, railway rails and tie plates are salvaged from projects that have reached the end of their design service life. Many of these components remain in excellent condition and, after quality checks and reconditioning, are reused in new construction or added to for expansion and upgrade of the original facilities.

The steel industry is Canada’s largest steel recycler, recovering and re-using over 8 million tonnes of steel scrap every year. This is done for economic

reasons, as scrap is a valuable commodity and economics drive sustainability in the long run. Even though two out of every three kilograms of new steel are produced from “old” steel, the fact that buildings, appliances, bridges, storm-water detention systems and other infrastructure products have such long service lives makes it necessary to continue to mine ore to supplement the production of new steel. 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” (recycled scrap) steel to make “new” steel. Canadian steel producers use basic oxygen furnace (BOF) and electric arc furnace (EAF) technologies interchangeably to supply construction market end uses. The traditional BOF technology uses raw materials such as iron ore, coal and a component of recycled scrap to make new steel while the EAF technology uses nearly 100% recycled steel scrap as its feedstock. Both of these steel-making processes are used to supply construction products, where strength is the valued material characteristic.

Steel possesses a unique material property unrivalled by other materials in that it is recycled both up and down the product value chain without degrading its strength and other chemical properties. Open loop recycling allows

(1) Post Consumer Content – is defined as scrap steel resulting from end of life consumer products (e.g. steel cans, steel auto bodies, steel building materials).

(2) Post Industrial Content – is defined as scrap steel resulting from product manufacturing operations (e.g. turnings, stampings from auto part manufacturers). It does not include internally generated scrap from steel making operations such as the BOF and EAF.

an old car to be melted down to produce a soup can, and then, as the new soup can is recycled, it is re-melted to produce new appliances, structural beams used in bridges or buildings, building products like culverts and roofing, and even new cars. Recycling in the steel industry is second nature and almost invisible to the average citizen. Perhaps this is why the green is hard to see.

The total recycled content found in Canadian manufactured steel used for steel construction and building products is a minimum of 25% in the case of BOF and greater than 95% in the case of EAF. An audit conducted for the Canadian corrugated steel pipe industry measured the post consumer (1) content of culvert steel at 13.8%, the post industrial content (2) at 36.9%, for a total recycled content of 50.7%. All of these values represent industry-leading levels of recycled content.

The fact that steel making is a “visible smoke stack industry” has affected its environmental perception. The Canadian steel industry has been active for many years in reducing the environmental impacts of its activities. Some

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Recycling in action. Photos courtesy Stelco.



of its achievements include a reduction of carbon dioxide (CO₂) emissions by more than 20% since 1990, surpassing the target set out in the Kyoto Protocol. It has reduced sulphur dioxide (SO₂) emissions by 77% since 1990. Nitrogen oxide (NO_x) emissions have been reduced by 24% since 1990. Polycyclic aromatic hydrocarbons (PAH) emissions have been reduced by 74% since 1993. Other achievements include energy efficiency improvements of 25.4% between 1990 and 2001 and a reduction in waste going to landfill of 52% between 1994 and 2002.

The Canadian Green Building Council / LEED™ Canada (Leadership in Energy and Environmental Design) – a green building rating system to provide a framework for sustainable construction, may become the visual aid that allows us to see just how green steel is. It was developed to promote the architectural design and performance features of commercial buildings for “green and sustainable” attributes. The rating system places very high emphasis on site selection (brownfield vs. greenfield), site design (materials, density, drainage), site access (transport issues) and heat island effects. Products made from steel can be credited with a significant number of points for this category as well as in the categories of water efficiency, energy and the atmosphere, materials and resources, and innovation aspects of the rating system.

Steel is a remarkable material that, when used wisely by qualified designers, can significantly reduce consumption of the world’s limited resources.

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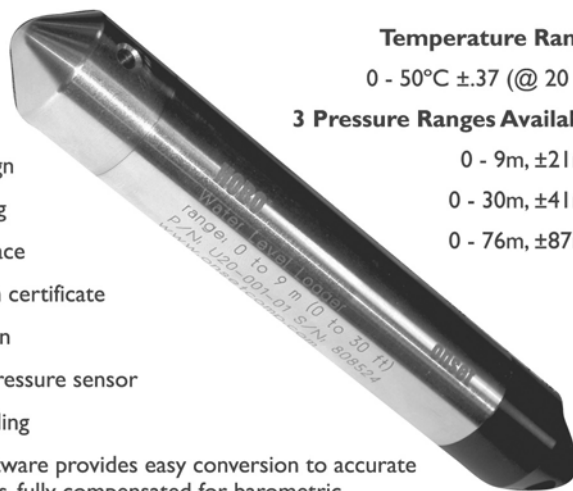
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