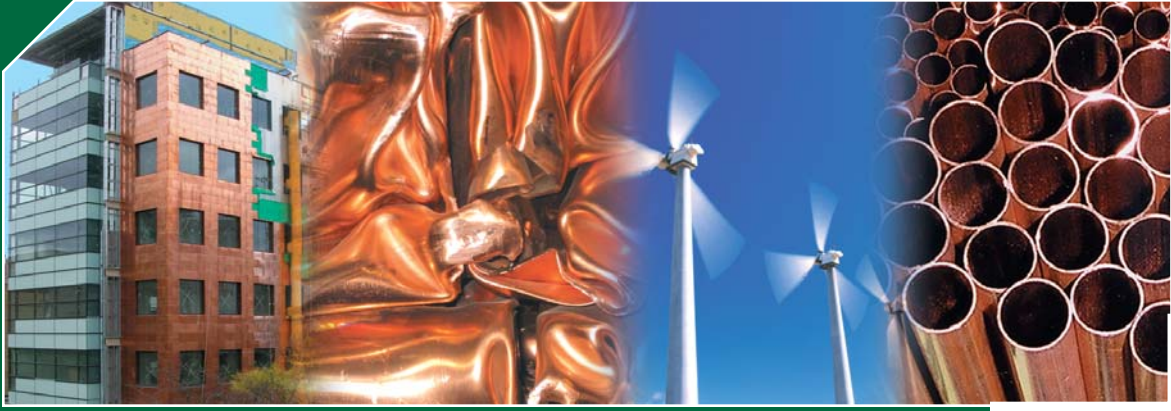
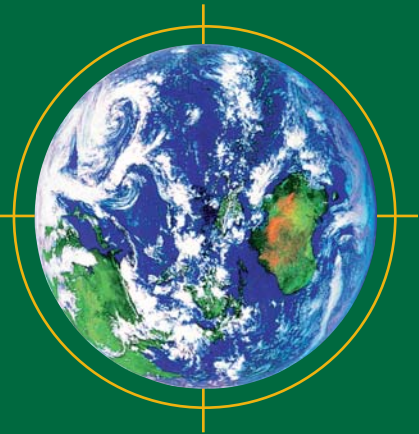


**CANADIAN COPPER & BRASS  
DEVELOPMENT ASSOCIATION**



**COPPER**

*The  
Green  
Choice*



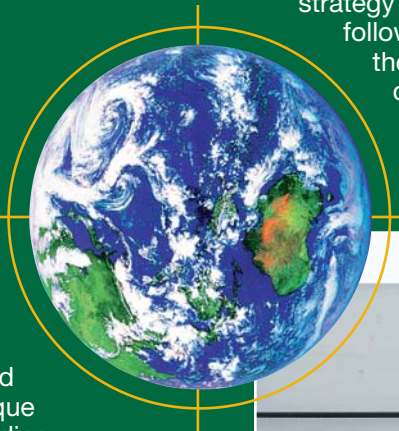
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# C O P P E R

## *It's Old. It's New. It's Copper*

increasingly important in construction as increased efforts focus on ways to minimize diversion of demolition materials to landfills. Essentially all of the copper and copper-alloy materials that can be recovered in the demolition of a building have value, and will be converted into new products. Add this to the tangible benefits realized during the service life of copper building systems, and copper becomes the premier choice for many building applications.

The CCBDA's Green building strategy is expanded upon in the following sections covering the significant uses for copper and copper alloys in construction.



Building professionals are becoming more and more aware of the unique benefits of copper building systems. Architects choose copper roofing or cladding systems for their exceptionally long service life. Engineers specify premium efficiency electrical motors to reduce operating costs and conserve electric power. And building owners avoid the problems of poor power quality by insisting on upsized, all copper wire & cable systems.

Now, considering the need for sustainable materials and the trend towards cradle-to-cradle assessments of a material's useful life, copper is an increasingly key element in the future of building construction.

Copper has been used for more than 10,000 years for a wide variety of applications, and it is 100% recyclable. In other words, virtually all products made from copper can be recycled. This end-of-life profile has become



### **Plumbing Systems**

One of the most recognized uses of recycled copper is copper plumbing tube and fittings. Copper plumbing tube produced in Canada today is regularly made from more than 70% recycled copper. It means that high-priority copper scrap is used as the main feed material in the mills producing copper tube. The end-product is third-party certified as meeting ASTM and NSF specifications.

Feed materials for making fittings, valves and other components include copper tube, copper-alloy ingots, and brass rod - depending

on the manufacturing process. They all contain recycled metal, approaching 100% in the case of ingots for example.

On top of these startling statistics, during their actual use, copper tube and fittings have provided dependable service for decades. It is estimated that over 30 billion feet have been installed in plumbing systems in houses and other buildings in North America. At the end of their service life, copper plumbing tube and fittings can be easily recovered during demolition of a building and recycled once again, without any loss in terms of material performance and reusability.

Other applications of copper tube and fittings should also be



mentioned. Solar water heating, refrigeration, air-conditioning, natural gas systems, hydronic heating, and snow melting systems all use tube and fittings with the same Green qualities.

### Architectural Systems

Copper architectural sheet is made largely from recycled copper. In some cases manufacturers report that 95% or more of their new product is produced from recycled material. Copper also has the enviable reputation of having an exceptionally long service life - upwards of 100 years, for roofing, cladding, and other architectural applications. In many cases, its life span is measured in centuries!

As is the case with plumbing systems, at the end of an

installation's service life, the copper roofing or cladding is easily recouped to be recycled once again. The long life span, aesthetic appeal and recyclability of copper make it a prime choice for architectural projects around the world.

Another feature of copper that makes it a natural for green projects is the fact that it does not need any after-treatment, coating, or artificial treatment with chemicals to achieve its appearance. Untreated, bare copper, when allowed to patinate normally and adapt to its local environment is one of the most durable, natural and beautiful metals, which is why it has been widely used for architectural applications for centuries.



It is of interest to note that occasionally contractors have been known to carefully remove a copper roof and store the naturally aged material when they have to make changes or upgrade the roof deck. The previously used copper sheet is then available later for other projects, which is strong testimony to copper's Green attributes.

### Wire & Cable Systems

Unlike plumbing, mechanical, and architectural systems, most copper wire and cable is not manufactured from recycled material. The superior performance of copper however, combined with its higher efficiency (only silver is a better conductor), make it the top choice for electrical systems. Examples of this green performance include the increased use of electronic monitoring and

sensor equipment, smart and structured wiring, individual controls on (and more efficient) heating, ventilation and air-conditioning systems, and the operation of premium electric motors and transformers.

Copper is also playing a leading role in one of Canada's most ambitious programs for renewable energy - wind turbine power generation. Projections are that by 2010 wind power will generate a significant portion of the nation's power requirements for homes and industry - with the sky (or wind!) the limit beyond that. Copper is the electrical conductor of choice to ensure the reliability and quality of the power generated from the giant turbines. One turbine manufacturer, for example, uses



about 3.5 tonnes (7,700 pounds) of copper in each of their units.

At the end of any copper product's service life, it is fully 100% recyclable. There is, today (and most certainly in the future), a strong market for scrap copper-based material. Wire and cable is the best source of high-quality copper in place today, and as applications reach their end-of-life cycle, copper conductors will provide a steady and substantial source of recyclable feed material.

### Copper & Green Building

Although there may be no single solution to all the challenges of the "green building" philosophy, the Canadian Copper & Brass Development Association (CCBDA) is demonstrating leadership in this



area with a two-pronged Green building strategy that addresses the various issues and segments in this market.

The first approach, referred to as “hard green” (or capital “G”) identifies copper’s place in official Green scoring systems, such as LEED (Leadership in Energy and Environmental Design). In many cases, such rating systems are the only analysis method available to assess a project’s “greenness”.

The second approach, titled “soft green” (or small “g”) involves creating awareness of copper as an environmentally-friendly and responsible material. This has proven to be a relatively successful and inexpensive approach, which covers building types that fall



Photo: RenewABILITY Energy Inc.

outside of LEED, or other evaluation systems.

Building “green” has not always been considered the most economical option in the short term. But with the CCBDA’s long-term efforts to identify and promote copper-intensive solutions that meet both regulatory and market needs (in addition to delivering energy savings), the future of Copper and Green building looks to be very well aligned.

### Copper’s Contribution to Green Buildings

Used for centuries as a ‘noble’ and aesthetically pleasing building material, today copper’s role is more important than ever because of its substantial contribution to any building’s environmental performance. Across its life cycle, from extraction to recycling, copper can enhance energy efficiency, resource use and indoor air quality, as well as minimizing transportation costs and impacts. Copper can be used in any number of applications in a building improving its environmental performance from its envelope and elements including - cladding, roofs, sun shades, eaves, flashings and downspouts to finishing products

such as bathroom fixtures, to plumbing, through to innovative new technologies such as high efficiency electrical systems, on-demand lighting systems and photovoltaic cells. Many building products benefit from copper’s recycled content, often over 80%, and its durability, which tends to be measured in generations rather than years. Copper’s attributes are clearly demonstrated by its role in achieving up to 13 LEED credits across three performance categories - a number of which are demonstrated by the CCBDA case studies in this series. Finally, its aesthetic qualities ensure that designers can achieve their visual aspirations without sacrificing their environmental and cost performance objectives.

How does Copper Make a Building Green?	Where is Copper Used?	Case Studies
<b>Energy &amp; Atmosphere (LEED)</b> Optimize energy performance	Passive solar walls high efficiency wiring and systems	York University
<b>Material &amp; Resources (LEED)</b> Building reuse, Recycled content, Regional materials	Envelopes, roofs, plumbing, accents and fixtures	York University, Penn State SALA, E’Terra Inn
<b>Innovation &amp; Design Process (LEED)</b> Innovation in design	Recycled content	Penn State SALA
<b>Material &amp; Resources (LEED)</b>	Sunshades, plumbing, internal monitoring systems	Penn State SALA, York University, E’Terra Inn
<b>Competitive Operations, Maintenance &amp; Energy Costs</b>	Passive solar heating, innovative and efficient technologies, low maintenance exteriors	York University, Penn State SALA, E’Terra Inn





## Copper Use Case Studies

The following case studies exemplify how copper contributes to green buildings in the areas of Energy & Atmosphere (LEED), Materials & Resources (LEED), Innovative and Design Process (LEED), Indoor Occupant Comfort and Competitive Operation, Maintenance and Energy Costs. For more information on any of the case studies in this series, to learn how copper can be used in your next project, or to find out how it can help you to achieve LEED certification, please contact the Canadian Copper & Brass Development Association through [www.coppercanada.ca](http://www.coppercanada.ca) or the Copper Development Association through [www.copper.org](http://www.copper.org).

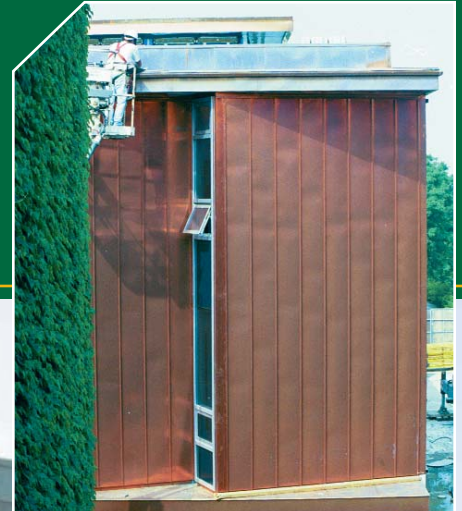
### E'Terra Inn

Situated north of Toronto, E'Terra Inn is a luxury six suite resort that was definitely constructed with green building energy efficiencies in mind. Like York and Penn State, E'Terra Inn made use of recycled copper in envelopes, roofs, plumbing, accents and fixtures and sunshades and internal monitoring systems along with passive solar heating and low maintenance exteriors for reduced energy costs.



### York University, Toronto

Copper is used in passive solar walls, high efficiency wiring and systems to optimize energy performance. In envelopes, roofs, plumbing, accents and fixtures for recycled content. For indoor occupant comfort, copper is used in sunshades, plumbing and internal monitoring systems. To control maintenance and energy costs York incorporated passive solar heating and low maintenance exteriors.



### Penn State SALA

Penn State is a leader in recycled content in the "Innovation in Design" category. It shares with York University the copper materials used in materials & resources, indoor occupant comfort and competitive operation and maintenance and energy costs.



## Green statistics about copper

**100**

Copper is 100% recyclable.

**10,000**

Copper was first used by mankind more than 10,000 years ago.

**2.6 trillion**

Estimated world copper resources in kilograms.

**12**

Percent of known copper resources which have been mined throughout history - or 0.3 trillion kilograms.

**80**

Percent of the copper ever mined during the past 10,000 years is still in use in some form somewhere.

**300**

World demand for recycled copper increased over 300% in the 50 years between 1949 and 1999.

**33**

Estimated percent world annual copper demand today that is supplied by recycled copper.

It must be emphasized that there is no limit to the number of times that copper and copper alloys can be recycled. In addition, the energy required to recycle copper is significantly less than the energy needed to convert copper ores to copper metal.

Copper is significantly greener than other metals and non-metallic materials.

**For more information on copper's green properties, including recycling and the environment, visit:**

[www.coppercanada.ca](http://www.coppercanada.ca)

[www.copper.org/environment](http://www.copper.org/environment)

[www.copperinfo.com/environment](http://www.copperinfo.com/environment)

**Canadian sources of additional information include:**

Natural Resources Canada: [www.nrcan.gc.ca/mms](http://www.nrcan.gc.ca/mms)

Canadian Association of Recycling Industries: [www.cari-acir.org](http://www.cari-acir.org)

Canadian Wind Energy Association: [www.canwea.ca](http://www.canwea.ca)



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