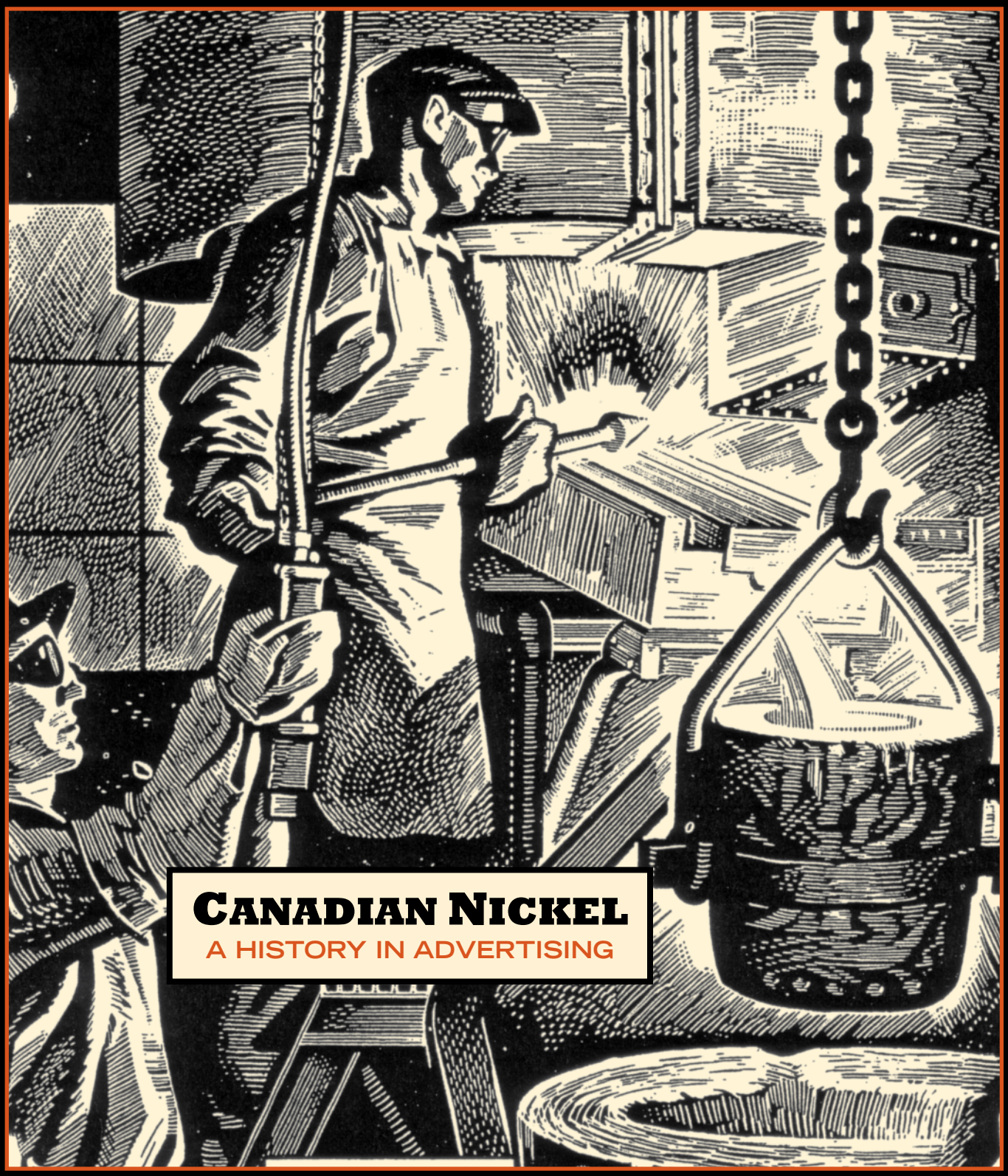
NICKEL

Stainless steels' carbon footprint

Fighting fires in Japan

SEPTEMBER 2007 VOLUME 22, NUMBER 4 THE MAGAZINE DEVOTED TO NICKEL AND ITS APPLICATIONS



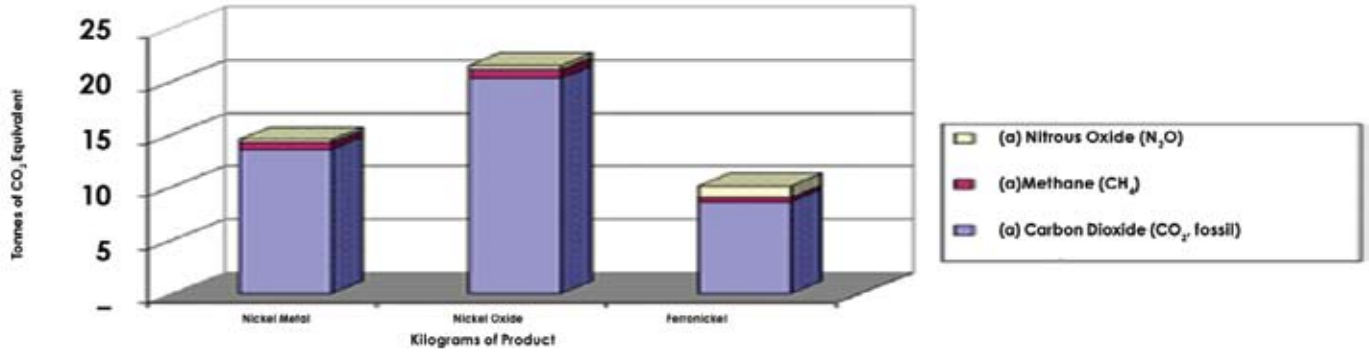
OUR CARBON FOOTPRINT

Global warming is one of the top issues of the day. Industries are feeling the heat to publish information on the greenhouse gases they emit.

We published this information back in 2001, long before it assumed the prominence it has today. See our Life Cycle Assessment web pages at:

www.nickelinstitute.org/carbonfootprint

And, we are planning to update this information in 2008 to increase the percentage of global production it covers, better reflect the evolution and growth of nickel production, and improve the quality of the data.



This is just one example of the leadership we practice every day. Other examples include:

- Nickel REACH Consortia
- The Safe Use of Nickel In The Workplace
- Nickel Environmental Health and Hygiene Training Reference Manual
- Basic Science Papers
- 'Good Practices' Online Training Modules
- Nickel Institute Technical Support

Please visit our 'Good Practice Forum' web page:

www.nickelinstitute.org/goodpractice

Nickel INSTITUTE
knowledge for a brighter future

A STEP FURTHER
RESPONSIBILITY IN THE NICKEL INDUSTRY

NICKEL

Volume 22, Number 4, September 2007

The Magazine Devoted to Nickel
and its Applications

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Cover photo:
Detail of an advertisement created by The International Nickel Company of Canada in 1944.

The next issue of Nickel Magazine will be published in December 2007.

STEPPING LIGHTLY

WE'RE GETTING BETTER AT MAKING STAINLESS STEEL – THE WORLD'S STAINLESS STEEL MANUFACTURERS ARE USING LESS ENERGY AND EMITTING LESS CARBON DIOXIDE

A recent study by Yale University (see page 12 of this issue) shows that the energy required to make a tonne of S30400 stainless, the most commonly used nickel-containing stainless steel in the world, is significantly less than what was needed before stainless steel became one of the world's most recycled materials. That's because melting technology is more efficient than ever before.

SOME 53 GIGA-JOULES of energy goes into making a tonne of S30400 stainless steel.

NISSHIN STEEL

In addition, the same study shows that the industry emits less carbon dioxide when stainless steel is re-melted after use. On a worldwide basis, up to 60% of the materials used to make S30400 is recycled scrap. Consequently, less virgin material is needed to make S30400 than was the case in the early 20th century (when stainless steel was first manufactured).

These findings have implications for the thousands of end-users of nickel-containing stainless steels.

In today's environmentally conscientious marketplace, customers want assurance that the products they buy will not contribute to climate change. They prefer to contribute to a sustainable world.

My parents belonged to the war generation: they saved everything, from paper to glass to aluminum; they saved condiment jars and re-used them for storing jams and jellies; they threw their kitchen waste into the compost; they saved aluminum pie plates.

Today products are advertised as being made of materials that have been validated, by one association or another, as safe for the environment. For example, Northbrook, Illinois, U.S.A.-based Crate & Barrel reports that its sofas have wood frames "certified by the Sustainable Forestry Initiative" and that they're "guaranteed for life". What's more, its cushions are "created with revolutionary, bio-based materials that are environmentally renewable." The advertisement concludes: "Sustainability is a beautiful thing."

The same can be said of products made of nickel-containing stainless steel. It is one of the world's most recycled materials. Austenitic stainless steel products are all around us. Our kitchen appliances and sinks are made of it; we cook our meals in it; we eat our meals with it; the material has been available for less than 100 years and is increasingly recycled.

More than 80% of all products made of austenitic stainless steel are recycled at the end of their useful life. That has significance for the environment and sustainability. It means less energy is needed and less carbon dioxide emitted in the manufacture of austenitic stainless steel than in the past, when virgin material was all that was available. As more scrap becomes available, the need for virgin material declines and the carbon footprint left by a tonne of austenitic stainless steel becomes smaller. The production of austenitic stainless steel is more sustainable than ever.

Manufacturers of stainless steel and stainless steel products can take pride in telling their customers that stainless leaves a smaller carbon footprint because it's routinely recycled.

Patrick Whiteway

Patrick Whiteway
Editor

NICKEL IN USE

ISTOCK PHOTO

Structural Stainless

Conservatory gets a new lease on life thanks to a corrosion-resistant structure

The East Conservatory at Pennsylvania's Longwood Gardens has a classy, long-term lease on life, thanks to a novel roof support structure of stainless steel.

Circular hollow columns of S30403 stainless steel support transverse and longitudinal roof trusses of S30400, all in an attractive, blasted satin finish. An arched roof of glass panels in an aluminum framework completes the renovation, giving the conservatory a spacious, modern look.

Situated 50 kilometres west of Philadelphia, U.S.A., Longwood sits on more than 10 hectares of gardens, woodlands and meadows, much of which was owned by industrialist Pierre S. du Pont, until his death in 1954. In the early 1970s, the East Conservatory, largest of the conservatories at Longwood (65 metres long by 30 metres wide) had a self-supporting, barrel-shaped roof of acrylic panels. However, by the 1980s, ultraviolet radiation had embrittled many of the panels, making it necessary to replace the roof.

English architect Sir Peter Shepheard (1914-2002), then at the University of Pennsylvania, was retained to design the replacement, and in 1989 Philadelphia-based Keast & Hood Co. was engaged as the engineering firm. The acrylic panels were replaced by glass, which meant the heavier new roof was not self-supporting. An interior support structure was therefore required. Engineers had to decide what material to use to support the glass. Aluminum was too flexible, and the durability of galvanized steel was too short, given the corrosive atmosphere resulting from fertilizers and humidity needed for the plants. Life-cycle analysis proved that stainless steel, in spite of its higher initial cost, was the preferred choice. S30403 was selected for the columns because they are in direct contact with corrosive, fertilizer-bearing soils.

Crescent Iron Works Inc. of Philadelphia supplied and installed the steel for the project. The 35-cm-diameter columns are each about 12 metres long consisting of seam-welded pipe in two parallel rows. Transverse trusses of S30400 stainless rest on each pair of columns across the width, while longitudinal trusses rest on top of the two rows of columns. There are two expansion joints at the one-third points along the longitudinal trusses to accommodate changes of as much as 4 cm at each joint between summer heat and winter cold. The hollow columns double as downspouts for rainwater from gutters along the length of the roof structure, while vines, now climbing up the columns, add to the aesthetic effect.

THIS RENNOVATED CONVSERVATORY features S30403 stainless steel support columns which also serve as downspouts for rainwater.

ROBERT UNDERWOOD, LONGWOOD GARDENS, INC.

The project was not without its problems, most of which stemmed from local inexperience with welding and inspection of stainless steel components. Fred Baumert, structural engineer and a principal of Keast & Hood, acknowledges that "the Nickel Institute was a big help in supplying much-needed assistance with design guidelines, welding criteria, and material availability."

The steel used in the Longwood project weighs a total of 130 tonnes. Numerous ageing conservatories of similar size around the world are a potential market for similar applications of stainless steel.

MORE INFORMATION:
www.nickelmagazine.org/longwood

FREDERICK BAUMERT, PE, KEAST & HOOD CO.

RENNOVATIONS INCLUDED these transverse and longitudinal roof trusses of S30400 stainless steel.

Reducing Sulphur Dioxide Emissions

Air pollution conference shows a new generation of engineers a fresh direction

More than 100 people traveled to Louisville, Kentucky, U.S.A., in June 2007 to attend NACE International's AIRPOL conference and hear what's new in air pollution control for fossil-fuel burning power plants. The timing was appropriate because government regulations, especially in the U.S., have led to a marked increase in the construction of flue gas desulphurization (FGD) systems since the last AIRPOL meeting in 2004.

In the first two days of the conference there were 24 presentations on materials of construction for the corrosive conditions of FGD systems, as well as system design considerations. There are typically 12 component sections in a wet FGD system, starting with the flue gas inlet duct into the absorber and exiting through the chimney stacks. Corrosive conditions can vary considerably as the flue gas progresses through the system, which in turn allows various materials to be used. These range from high nickel alloys in the most corrosive areas to nickel-containing stainless steels in the less corrosive areas.

An informative status report on FGD system materials was authored by William Mathay and Richard Avery, consultants to the Nickel Institute, and David Gandy, technical leader of the Electric Power Research Institute. The report was based on an EPRI report on material performance at 42 installations. The oldest two units were started 40 years ago and the six most recent were started in the current decade. Two-thirds of the units surveyed were started in the period 1975-1990, and most of those have been rebuilt or had a major retrofit.

The most corrosive areas in the FGD systems are at the inlet and outlet ducts and associated areas in the absorber. The flue gases are normally carried directly into the absorber by the inlet duct after leaving the electrostatic precipitators. Gas temperatures are above the dew point and range from 120 to 200° C , making unlined carbon steel a suitable material. However, in the duct work immediately ahead of the absorber, blowback of the gas and the scrubbing medium can lead to serious corrosion. Where corrosion is a concern, nickel alloys such as N10276 and N06022 (either solid or as linings on carbon steel) are preferred. The EPRI survey found that more than half the units used one of these nickel alloys at that location.

A field trip was offered to the Ghent Station of Kentucky Utilities on the last day of the conference. The station is involved in a major expansion of its FGD facilities, including absorbers and chimney stacks. The absorbers are of a newer design, which uses a Stebbins tile inner lining backed by concrete on the outside for structural support. The tile structure extends up past the demister (a device that removes entrained liquid droplets from a gas stream) to a N10276 dome section. N10276 is also used in the lower section where a metallic material is needed.

MORE INFORMATION:
www.nickelmagazine.org/airpol2007

A TYPICAL FGD system for a coal-fired electric generator.

SPRAY PIPING of N08367 at Northern Indiana Public Service Co.'s Bailly Generating Station Units 7 & 8. These have been in service for more than 12 years.

THYSSENKRUPP VDM

ATI ALLEGHENY LUDLUM AND ROLLED ALLOYS

Olde Time PROMOTION

A Brief History of Nickel's Benefits As Told in Advertising 1932-1947

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When the First World War ended, in 1918, the global market for nickel collapsed. Until then, the main use of nickel had been for military applications. In November 1921, the International Nickel Company of Canada, a predecessor to today's CVRD Inco, completely shut down its nickel operations in Sudbury, Ontario, Canada – the source of about 90 per cent of world nickel supply. Not until the following September did operations resume. The nickel miner was in serious financial trouble.

In 1922 Robert Stanley was elected president of the company and immediately established a Development and Research Department to promote peacetime industrial uses for nickel products. For this reason he is widely credited for saving International Nickel from bankruptcy.

As new markets were found for nickel in agriculture, chemical processing, oil and gas, and pulp and paper, the devastating bust of the early 1920s subsided and the community of Sudbury continued to grow. By 1929, world use of nickel had reached an all-time high of 125 million pounds.

While the early stages of the Depression hampered nickel production and increased unemployment in Sudbury, by 1933, new civilian uses for the metal, combined with re-arming for war, had brought renewed demand. In a country ravaged by depression, Sudbury was one of Canada's few economic bright spots.

The public, however, remained largely ignorant

Olde Time
PROMOTION

The main theme throughout the seventeen years of advertising showcased in the following pages has always been the enormous economic benefits of nickel and nickel containing materials. Many of these benefits remain the same today.

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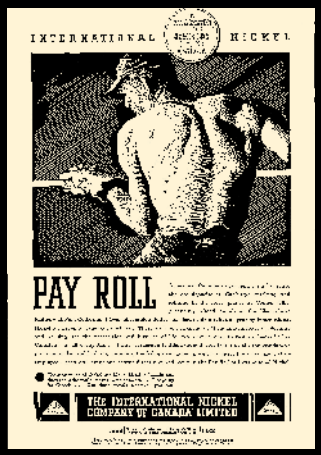

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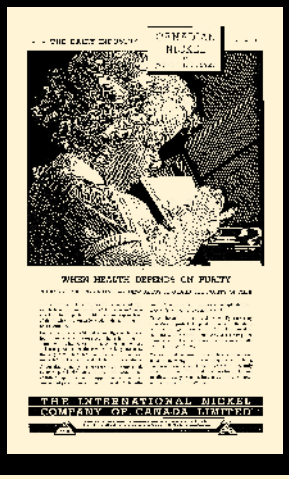

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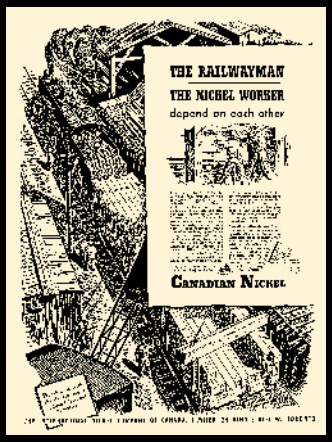

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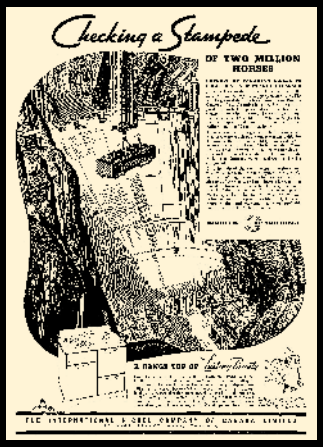

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about non-military uses of nickel and of the significant ways International Nickel was contributing to Canadian society during the Depression. For this reason, the company decided to run a series of print advertisements in 1932.

Reaction to the first advertisements was overwhelmingly positive and the company continued the campaign, adapting the messages to the prevailing economic and political conditions. At the start of the Second World War, for example, nickel production in Sudbury accelerated dramatically, so the advertising reflected heroic contributions and uses of the metal from the home front and the war effort.

In total, about 95 per cent of all Allied country demands for nickel came from the Sudbury Basin. From 1939 to 1945, International Nickel delivered to the Allied countries 1.5 billion pounds of nickel, 1.75 billion pounds of copper, and 1.8 million ounces of platinum metals. The tonnage of ore mined during the war years was equivalent to the amount produced by the company and its predecessors during the previous 54 years of their existence.

Throughout the 17 years of advertising showcased on the following pages and on the Nickel Institute's web site – www.nickelinstitute.org – the main theme has always been the enormous economic benefits Canadians have received from the development of their country's nickel resources. Today, many of those benefits remain the same, while many additional nations enjoy economic benefits from the use and reuse of nickel-containing materials.

MORE INFORMATION:
www.nickelmagazine.org/promotion


SPEEDING EMPIRE PRODUCTION!
20,000 WORKERS
SPEED THE SUPPLY OF
CANADIAN NICKEL
TODAY more Canadian Nickel is being produced than ever before. This ever-increasing output shows what can be accomplished when stout limbs, skilled hands and willing hearts combine in an inspiring cause.
THE INTERNATIONAL NICKEL COMPANY OF CANADA, LIMITED
25 KING ST. W., TORONTO
NICKEL
MONEL

Fighting Fires

Demand for stainless steel in fire extinguishing systems in Japan gets a boost

Changes to Japan's Fire Service Law Enforcement have resulted in the increased use of stainless steel pipes in fire fighting systems. A wave of regulation, which also affects air-conditioning and sanitation piping systems, is boosting demand for stainless steel in indoor piping systems.

Demand for light, durable, pressure-resistant materials for piping has risen in recent years, reflecting an increase in the construction of high-rise buildings. Nickel-containing stainless steel may not be as inexpensive as ordinary carbon steel; however, its advantages in fire fighting are considerable. They include corrosion and heat resistance, ease of installation (owing to its relatively light weight), low friction loss (especially valuable in piping), and overall strength.

These were among the findings of the Committee for Preparation of the Standards for Pipes and Joints for Indoor Fire Fighting Equipment, which met in the period 2003-2005 to study the benefits of stainless steel in this crucial, life-saving discipline. In 2006, the Fire Service Law Enforcement Regulations were revised in accordance with the committee's findings, so that today the use of stainless steel in fire-fighting equipment is not only encouraged but necessary (in permit applications, for example).

Stainless steel pipes in indoor piping systems have been used in air-conditioning and sanitation for about 30 years in Japan. Non-stainless pipes become corroded by dissolved oxygen and residual chlorine, and generally last no more than 30 years. Long-term deterioration arising from the corrosion of carbon steel pipes, for example, has resulted in accidents. Stainless steel pipes, on the other hand, actually extend the durability of indoor piping systems.

That's welcome news for Japan's construction sector. In recent years, the threat of massive earthquakes, such as occurred in March 2007, has been a matter of great concern. Quake-proof fire extinguishing systems are considered indispensable in high-rise buildings.

To meet social demand for new piping materials the Japan Stainless Steel Association (JSSA) is working to educate the public about the benefits of stainless steel. Besides quake-proof fixtures, the benefits include shorter construction periods and size reduction (owing to prefabrication), as well as durability and light weight.

ISTOCK PHOTO

In 2006, the JSSA and the Nickel Institute jointly held two explanatory meetings to outline revisions to the Fire Service Law Enforcement Regulations. More than 150 people attended the meetings, including Section Chief Ito of the Fire Protection Equipment, Fire Prevention Division, Fire and Disaster Management Agency, Ministry of Internal Affairs and Communications, and Executive Adviser Miyasaka of the Fire Equipment and Safety Center of Japan as guests. The high attendance showed how deeply the industry is interested in the regulations.

The various stainless steel piping systems that the Japan Stainless Steel Association had been advocating are now a reality.

MORE INFORMATION:
www.nickelmagazine.org/fire

A HOSPITAL where stainless steel pipe has been installed for extinguishing fires.

JAPAN STAINLESS STEEL ASSOCIATION.

A CONNECTED water pipe of S30400 stainless steel for fighting fires in an apartment building.

Mitigating Climate Change

Highly recycled nickel-containing stainless steels lower carbon emissions

Fresh research out of Yale University concludes that the energy required to produce nickel-containing, austenitic stainless steel from scrap is less than a third of the energy used to produce stainless steel from virgin sources. As an additional environmental bonus, recycling produces just 30% of the CO_2 emissions.

Already one of the most recycled materials in the world, stainless steel could, theoretically, be made entirely from scrap if there weren't serious limitations on the availability of this material. Ironically, one of the main benefits of the material – its durability – limits its recycling potential: stainless steel structures and products tend to last a long, long time.

Meanwhile, demand for stainless steel has never been stronger as developing economies such as China and India accumulate the materials necessary to build infrastructure. Virgin production is growing to meet this demand, lowering the overall percentage of recycled content.

"Eventually, the demand curve has to flatten and the amount of in-use stainless steel that becomes available for recycling will grow as a percentage of total demand," says Bruce McKean, director of sustainable development for the Nickel Institute, which partly funded the Yale work upon which this study draws. "Therefore the percentage of secondary material in future stainless production will rise."

McKean says there should be much more scrap available in 20 to 30 years than there is today as the current generation of products and structures that contain stainless steel are replaced, usually because of obsolescence. Currently, end users must rely on material that was produced in the 1960s and 1970s, when stainless steel use was significantly lower.

As Yale's The Energy Benefit of Stainless Steel Recycling recently published in Energy Policy shows, a higher recycling rate would provide a significant environmental benefit. Under current operations (based on 2004 figures), the world produces about 17 million tonnes of austenitic stainless steel using 9.0 x 10^{17} Joules of primary energy and emitting about 61 million tonnes of CO_2 throughout the life cycle of production. Current recycling operations reduce primary energy use by about 33% and CO_2 by 32% compared with production from virgin sources alone. But if stainless steel were to be produced solely from scrap (a merely hypothetical scenario), about 67% of the energy could be saved and CO_2 emissions cut by 70%.

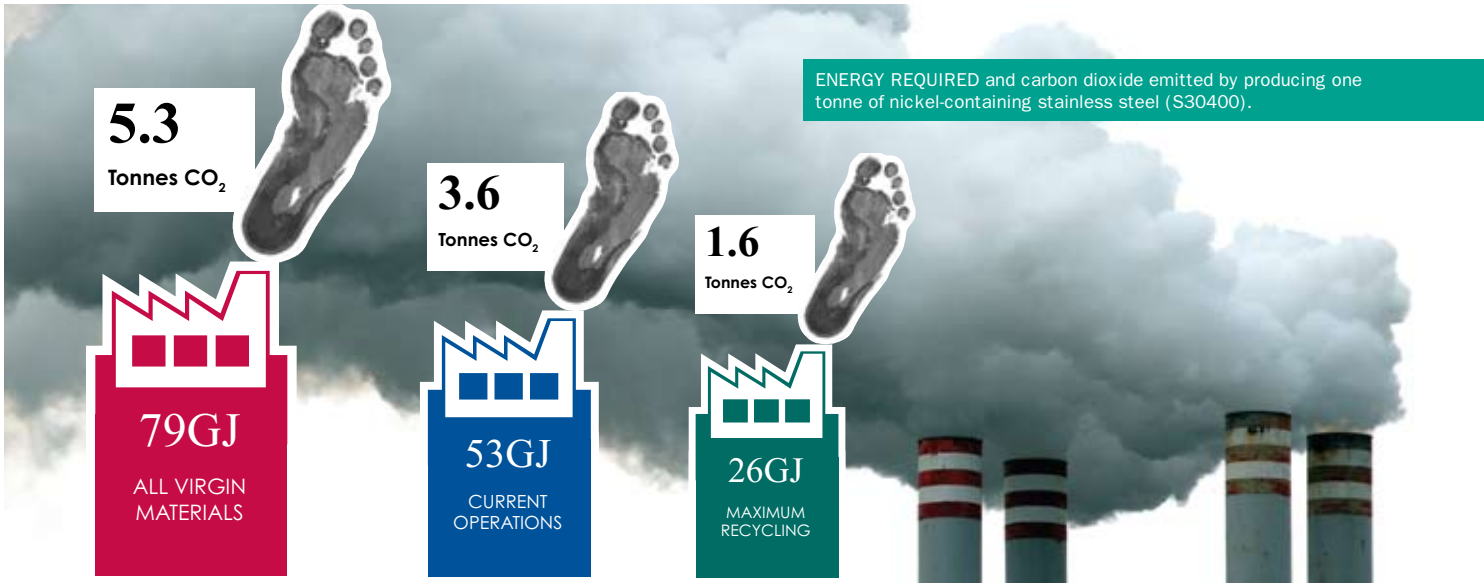
ISTOCK PHOTO

"It confirms common sense," says Barbara Reck, a research associate at the School of Forestry and Environmental Studies at Yale and second author on the paper. "The biggest energy use is in the mining and smelting phase, and you don't have to go through this phase using scrap. But now we have calculated this systematically and our hypothesis has been confirmed."

The lead authors on the paper have each studied the main constituents of austenitic stainless steel separately: Reck focuses on nickel, Johnson, on chromium, and Wang, on iron. They combined their expertise and data to come up with an analysis of stainless steel and its environmental impact over three different scenarios: current global operations; 100% recycling; and use of only virgin materials.

"We had so far only worked quantitatively on the life cycles of the different metals," says Reck. "The idea was to take this quantitative information and use it to try to understand the energy needed to produce virgin materials or reprocess scrap."

MORE INFORMATION:
www.nickelmagazine.org/carbon



ENERGY REQUIRED and carbon dioxide emitted by producing one tonne of nickel-containing stainless steel (S30400).

DIAGRAM BY MARK CROZIER. SOURCE: YALE UNIVERSITY

ALL ENERGY UNITS ARE IN GIGA-JOULES

Alloy Selection Training Module Launched

The Nickel Institute has launched the latest installment in a series of online training modules.

Designed to assist engineers, designers and materials specifiers select the proper stainless steel for their particular needs, the module builds on feedback from users of the "Good Practices" training module which was successful launch in 2004. The new module is called "An Introduction to the Selection of Stainless Steel for Corrosion Resistance."

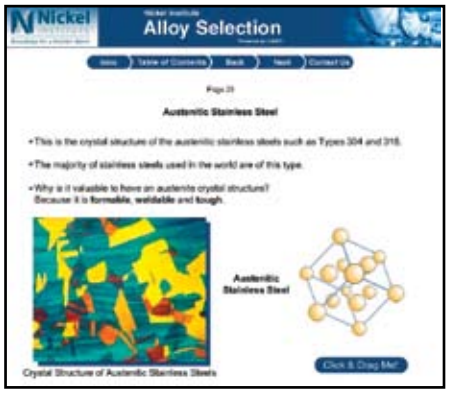
Consisting of 94 slides which are accompanied by audio narration and various interactive diagrams and illustrations, the module provides a total of about two hours of instruction if viewed in one sitting. Users may choose to view the module in smaller segments, returning to a particular point in the presentation at a later date. The design of the module navigation allows users to do this easily.

In general, the module presents basic background information on what stainless steel are and how they work, what alloy additions are made to stainless steel and why they are added. The effects of the various alloy additions (chromium, nickel, molybdenum, nitrogen and carbon) are discussed in terms of corrosion resistance and crystal structure. This leads to a discussion of the families of stainless steels (ferritic, austenitic, duplex and martensitic). This brings the user to the topic of how to select a stainless steel to meet particular technical needs.

Typical compositions of a few grades in each stainless steel family are presented and examples of their application in various industries are nicely illustrated.

The topic of corrosion follows, with a brief description of the various types (general, localized, pitting, crevice and chloride stress corrosion cracking). This leads to a description of the high performance stainless steels and their applications.

At the end of the presentation, links are provided to give feedback and for sources of additional information, including Nickel Institute technical publications and other online training modules.



NICKEL INSTITUTE

MORE INFORMATION:
www.nickelmagazine.org/alloyselection

CORRECTIONS

In a report on water pipes in Japan in our June 2007 issue (page 4), we made an incorrect statement about water resources in that country. The report should have stated that in Japan leaks from taps and the limited amount of space for storing water pose a challenge.

The same issue contained incorrect information about the nickel content of S32003 stainless steel (page 16). The correct amount of nickel in this stainless steel is 3-4%. In addition, the UNS number in the photo caption was incorrect; it should have read S32003.

@www.nickelinstitute.org

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  www.nickelmagazine.org/archive

UNS details

Chemical compositions (in percent by weight) of the nickel-containing alloys and stainless steels mentioned in this issue of Nickel.

Alloy	Al	B	C	Cb	Co	Cr	Cu	Fe	Mn	Mo	N	Ni	P	Pb	S	Si	Sn	Tl	V	W	Y	Zn	Zr	Other
N06022 p. 5	-	-	0.015 max	-	2.5 max	20.0-22.5	-	2.0-6.0	0.50 max	12.5-14.5	-	rem	0.02 max	-	0.02 max	0.08 max	-	-	0.35 max	2.5-3.5	-	-	-	-
N10276 p. 5	-	-	0.02 max	-	2.5 max	14.5-16.5	-	4.0-7.0	1.00 max	15.0-17.0	-	rem	0.030 max	-	0.030 max	0.08 max	-	-	0.35 max	3.0-4.5	-	-	-	-
S30400 p. 4, 7 & 12	-	-	0.08 max	-	-	18.00-20.00	-	-	2.00 max	-	-	8.00-10.50	0.045 max	-	0.030 max	1.00 max	-	-	-	-	-	-	-	-
S30403 p. 4	-	-	0.03 max	-	-	18.00-20.00	-	-	2.00 max	-	-	8.00-12.00	0.045 max	-	0.030 max	1.00 max	-	-	-	-	-	-	-	-
S31600 p.7	-	-	0.08 max	-	-	16.00-18.00	-	-	2.00 max	2.00-3.00	-	10.00-14.00	0.045 max	-	0.030 max	1.00 max	-	-	-	-	-	-	-	-
N06625 p.13	0.40 - max	-	0.010 max	3.15-4.15	-	20.0-23.0	-	5.0-max	0.50 max	8.0-10.5	-	rem	0.015 max	-	0.015 max	0.50 max	-	0.40 max	-	-	-	-	-	-
N07718 p.13	0.20-0.80	0.006 max	0.08 max	4.75-5.50	1.00 max	17.0-21.0	0.30 max	rem	0.35 max	2.80-3.30	-	50.0-55.0	0.015 max	-	0.015 max	0.35 max	-	0.65-1.15	-	-	-	-	-	-
N08825 p.13	0.2 max	-	0.05 max	-	-	19.5-23.5	1.5-3.0	rem	1.00 max	2.5-3.5	-	38.0-46.0	0.03 max	-	0.03 max	0.5 max	-	0.6-1.2	-	-	-	-	-	-
N09925 p.13	0.10-1.50	-	0.03 max	0.50 max	-	19.5-23.5	1.50-3.00	22.0 min	1.00 max	2.50-3.50	-	38.0-46.0	-	-	0.03 max	0.50 max	-	1.90-2.40	-	-	-	-	-	-
S31803 p.13	-	-	0.030 max	-	-	21.0-23.0	-	-	2.00 max	2.50-3.50	0.08-0.20	4.50-6.50	0.030 max	-	0.020 max	1.00 max	-	-	-	-	-	-	-	-

Sustainability Programs Manager Appointed

SOPHIA WONG Sustainability Programs Manager

Sophia Wong has joined the Nickel Institute as Manager, Sustainability Programs.

Formerly the Director of Education and Outreach for Engineers Without Borders Canada, Wong brings a passion for sustainable development to this new position at the Nickel Institute's head office in Toronto.

She holds a Certificate in Adult Training and Development from the University of Toronto and a Bachelor of Science in Engineering from the University of Guelph in Ontario. Also, with the Aga Khan Foundation in India, she received training in international development management.

While at Engineers Without Borders, Wong developed an education and outreach strategy, organized national and international conferences, and designed and facilitated training for engineers. She also has experience as an engineering design consultant in water and wastewater treatment with CH2M Hill Canada. She has had field work assignments in Latin America, Africa and India.

In her new position, Wong will provide in-house sustainable development training, education and support capacity and will manage the Nickel Institute's sustainable development program under the direction of Bruce McKean, Group Director, Sustainable Development & Product Stewardship.

COMING EVENTS

Australian Nickel

Nickel Institute President Stephen Barnett will deliver the keynote address at the 2007 Australian Nickel Conference which will be held in Perth Australia, October 24-25, 2007. Organized by the publications Paydirt and Gold Mining Journal, this conference is billed as "Australia's No. 1 Nickel Event". It is designed to inform mineral explorationists, mining stockbrokers and investors of the latest nickel exploration and mining developments in Australia. For more information: www.australiannickelconference.com

SUSTAINABLE DEVELOPMENT The Minerals Council of Australia is hosting a conference in Cairns, Queensland, Australia on October 29 – November 2, 2007. Called SD 07 : A Climate for Change, the conference promises to bring together leaders, experts and practitioners from around the world to exchange ideas, information and practical examples of sustainable development in the mineral industry. This is the 32nd year such an event has been held. www.minerals.org.au/mcaevents/sd07_sustainable_development_conference

CRU Events is hosting the 10th Stainless Steel World Conference in Taiyuan, China on November 4-6, 2007. This conference is advertised as "the most prestigious event for the global stainless steel community." The conference will focus on changes in global trade patterns and will ask the question: Are the trade winds blowing from or towards the East? Speakers include: Chuanping Chen, president of TISCO, Pekka Erkkila, Executive Vice-President, Outokumpu Oyj, Pascal Payet-Gaspard, Chairman and CEO of Arcelor Stainless International and Nirmal Mathur, Director of Jindal Stainless. More information: www.cruevents.com

DESIGN AND FABRICATION The international publication Stainless Steel World will host a 2-day conference in Maastricht, the Netherlands on November 6-8, 2007. Called The Stainless Steel World Conference, it will focus on the oil & gas industry, chemical & petrochemical industries, power generation, welding, fabrication, marketplace trends and other special topics in the areas of maintenance and inspection, equipment design, scapping & recycling and the availability of grades. More information: www.stainless-steel-world.net/ssw2007main/ShowPage.aspx

METAL BULLETIN The 23rd International Ferro-Alloys Conference will be held Nov. 11-13, 2007 in Monte Carlo. Leading industry experts will talk about the increasing growth in demand for raw materials (including nickel), where new projects are being developed and what strategies are in place to fulfill demand. More information: www1.metalbulletin.com/events/conference.asp?id=171&cat=3

STAINLESS STEEL TUBING An international conference "Stainless Tubes and Pipes 2007" will be held Nov, 14, 2007 in Moscow. Organized by the Rusmet Group, this conference will discuss the current market situation in Russia and will present forecasts for 2008. The objective is to give a Russian perspective on the market and to give practical recommendations. More information: rusmet.com/news.php?id=11039

FERRO-NICKEL ALLOYS The Nickel Institute will host the special international seminar "Nickel and Ferro-nickel Alloys with Stainless Steel Market" on November 28-30, 2007. The seminar will be held at the Shangri-La Hotel in Qingdao City, Shandong Province, China and will examine the following topics: Chinese policy on stainless steel and minerals; analysis of nickel, nickel pig iron and ferro-nickel markets; and the market outlook for laterite nickel ore. Some of the Chinese speakers who are expected to present include: Zhang Mei, information centre researcher at the Ministry of Land & Resources; Li Cheng, Executive President of the China Steel Association; Li Xiaobo, General Manager of TISCO; and Liu An, General Manager of Baosteel Stainless Steels. Leading stainless steel producers and nickel, ferro-nickel and pig iron producers are expected to attend as are nickel traders and investment executives. For more information: www.ferro-alloys.com/nickel-conf

Nickel INSTITUTE
knowledge for a brighter future

SUSTAINABILITY CHARTER

The Nickel Institute and its Members:

- Seek ways to drive responsible standards in good practice in all aspects of worker safety, health, training and the environment: we collectively and individually engage with the downstream user industries in the adoption and implementation of good practices in this respect;
- Strive to provide users with easily accessible and understandable technically up-to-date information and training packages on the safe use of nickel products;
- Promote sharing and adoption of good practice throughout the nickel industry across all aspects of our 'A Step further' programme through our Good Practice Forum;
- Seek to reduce any potential harm across the full lifecycle of the product through Nickel Stewardship;
- Through our Nickel Stewardship Clearinghouse, actively engage with the user value chain to share latest knowledge and encourage the safe and responsible use and disposal of nickel containing products throughout their lifecycle.

Our 'A Step Further' programme drives:

Protection of worker safety and health within the nickel industry;

Promotion of awareness and responsible practices in relation to nickel and its applications in downstream user industries;

Safe handling, use, reuse and disposal of nickel-containing products throughout their lifecycles;

Protection of the environment.

This is achieved through continuous improvement measures at operating facilities and research programmes of the Nickel Institute aimed at developing knowledge.

A STEP FURTHER
RESPONSIBILITY IN THE NICKEL INDUSTRY

(Revised 30 August 2007)

Nickel Producers Commit to Charter

Fourteen of the world's leading producers of nickel, representing more than 90% of annual output, have agreed to a Charter of Sustainability (see above).

The Charter commits the members of the Nickel Institute to various principles of sustainability including stewardship of all kinds.

MORE INFORMATION:
www.nickelmagazine.org/charter