Workshop on Sustainable Stainless Steel for Building & Construction
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How Green is Stainless Steel?

How does it contribute to Sustainable Development?

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What is “Green”?

- Leaving minimal carbon footprint, or minimal CO2 emission during production and processing.
- Sustainable: minimum usage of materials for the present generation, leaving a lot of earth’s resources for future generations.
• How Green a material is, and to what extent it contributes to sustainable development, are very important considerations for materials decisions by environment-conscious purchasers.
• By the same token, stainless steel industry personnel should also know fully well about the ‘Green Credentials’ of our material.
The important question is whether Stainless steel is part of the problem OR Part of the solution to Climate Change?
Some questions to be answered!

• Carbon Footprint (extent of it and what the industry is doing to minimize it)
• To what extent it is recycled & reused?
• Is it long lasting?
• Does it reduce material intensity (minimize new excavations)?
• Does it extend the life of other materials?
• Does it minimize energy usage?
• Does it help in cleaning the environment?
• How much VOC it emits?
The fact is: Every process leaves a carbon footprint, whether it is industrial processing or agriculture.

First, we will see how infinitesimal is the contribution of stainless steel to global warming.
• The steel industry as a whole emits 2.13Gt of CO2 out of a total global emission of 51Gt, i.e. about 4.2%.
• Stainless steel tonnage worldwide is only 2-3% of carbon steel tonnage. Stainless industry’s share of CO2 could be only about 0.12% of global emission.
Meat Production accounts for nearly 20% of GH Gases!

(FAO)

World feels the heat from meat

TIMES NEWS NETWORK

New Delhi: R K Pachauri, chief of the Nobel prize winning UN climate change panel, has spiced up the debate on kebabs and steaks by suggesting that the best and easiest way of stemming climate change is to not eat meat at least one day each week. What has eating meat got to do with climate change, you may ask. A lot, actually.

The FAO calculates that meat production accounts for nearly a fifth of global greenhouse gas emissions. The emissions arise not because you eat and belch or fart but in the way land is cleared, and feed for animals is grown. And also how the livestock emit methane, when it belches or farts, which is 23 times stronger as a climate-changing agent than carbon dioxide.

So, Pachauri’s suggestion that the world should be biting into meat a little less seems a good idea. But the world is not a monolith. As in emissions, for which the rich countries are much more responsible than the poor ones, so with meat. Some eat it; others gobble it.

A citizen of UAE eats nearly 100 kg of poultry products per person annually. India might be famous for its tandoori chicken, but an average Indian eats just 2.1 kg of poultry products per person per year according to the US Department of Agriculture. An average American chews upon 46 kg of chicken in a year, a Chinese 8.7 kg.

The story is the same for beef. An average Indian consumes 1.6 kg of beef and buffalo products while an average American eats 41.7 kg every year and a Brazilian 37.6 kg.

Go veg, help save the world? P 17
• Having established how small is the CO2 footprint of stainless steel production, let us address the question of how stainless steel contributes to sustainable development.
In the first place, more than 60% of the charge that goes into the furnace for making is scrap metal. This means less ore is depleted from the earth’s crust for Fe, Cr, Ni etc. Scrap ratio keeps increasing, in some units, even 90% scrap is used.

Second, stainless steel products last for a very long time, usually many decades. No need to go looking for fresh supplies for a long time; less need to mine.
Stainless Steel Provides Proven Longevity

- Numerous projects 80+ years of service
  - Excellent performance
- Appropriate specification & maintenance
  - Potentially 100’s of years of service

Chrysler Building
1930
First large stainless roof. Cleaned only twice.

Gateway Arch, 1965
First large stainless structural application
During service, stainless steels hardly ever degrade. No loss of material during service and hence
A) 100% material available for recycling.
B) No pollution of the environment by corrosion products while in service.
C) Paints, usually needed for protection of substrates, not needed for most stainless steels (except utility grades).
Recycled NOT Down-cycled

- Recycling does not deteriorate the quality of stainless steel. Even hygienic surgical equipment are made from recycled stainless steel. Very Safe!
Stainless Steel is one of the world's most recycled materials, even more than glass & paper!
Zero VOC Emission

• Unlike a lot of other building materials there is absolutely no emission of Volatile Organic Compounds by stainless steels.

• This is one more good reason to use stainless steels in Operation Theatres for floor, walls and ceilings.
Helps other materials last long at minimal cost
Two Piers, Progreso, Mexico

Long service life = no material replacement
Cost effective and environmentally friendly
Minimum service life mandated in countries with green building requirements

• Functional pier
  – Built over 70 years ago (1937-1941)
  – Stainless rebar
• Non-functional pier
  – Service life ~ 20 years
  – Carbon steel rebar

Photo courtesy of the Nickel Institute
Saving Energy

PHOENIX CITY HALL
Perforated, polished stainless steel window sunscreens and roof; US$285,000 one time capital savings in installing A/c equipment; US$200,000 annual air conditioning savings in electricity (35% saving)
Extending the Life of Japanese Apartments to 200 years

An ‘all-stainless steel’ piping system aims to extend the life of residential high-rises
150 East 42nd Street, New York City
Cleaned for the first time after 40 years of service

Photo courtesy of Allegheny Ludlum
Reusing Stainless Steel

525 William Penn Place
Pittsburgh, Pennsylvania
Completed in 1952

- Stainless entrance/lobby
- Exterior spandrel panels
- Lobby renovation in 2002
- Most of the stainless steel was refinished and reused
- Architect IKM
Steeled Against the Elements
Withstand Direct Hurricane Hit at 250 kmph
Largest Gold LEED Certified Building: Pittsburgh Convention Center.

Notice the large bare stainless steel roof
IGBC credits for SS products

• Members of ISSDA are applying for green credits for their products for the building & construction with the Indian Green Building Council.
Sustainable Design
Environmental & Economic Benefits

• Significant opportunity for decreased energy, water, & material resource use
• Building material production, material replacement and building operation
• US statistics for buildings
  – 36% energy use
  – 30% of greenhouse gas emissions
  – 12% of potable water consumption
  – 30% raw material production
• International averages are higher (>40% greenhouse gases)

Empire State Building, 1931
Stainless spandrel panels, window frames and spire
Sustainable Construction Characteristics

• Design for long service life
• Minimize material use, waste & impact
  – Avoid replacement during service life
  – High recycled content or renewable
  – No landfill waste or high recapture rate
• Preserve natural resources & building environment
  – Minimize energy and potable water use
  – Minimize toxic run-off and other environmental impacts
  – Capture and reuse gray water
• Healthy productive indoor environment
  – Low emission materials and natural light
Pittsburgh Convention Center (2003)
World’s First Sustainable Convention Center

- Type 304
- Batten cap design
- High wind uplift resistance

- Heating/cooling by 33%
- High recycled content
- Locally produced
- 50+ year life requirement
Wayne L Morse US Federal Courthouse
Eugene Oregon,
US Gold LEED 2006

Type 304, vibration finish
100 year design life
Stainless Steel
Ideal for Sustainable Construction

- Indefinitely recyclable
- High scrap content
  - not down-cycled
  - highly valued and recaptured
- Can reduce building energy and environmental costs
- Can help to save water
- Extends building life
- Can be restored and reused
Helps in clean energy LNG supply

- LNG is a clean fuel and its liquefaction, storage, transport and regasification need cryogenic materials like 304/316. Not many materials can withstand -196º C and be ductile at those temperatures.
- Mild steel, for instance, would become brittle at -20º C.
Helps reduce GH emissions—through biogas route for generation of electricity. The biogas would otherwise be burned and add to CO2 emissions. Fossil fuel use reduced.

- Austenitic stainless steels are the most cost-effective material for the systems that clean and compress corrosive biogas prior to combustion.
helps in cleaning the environment

- Automotive exhausts using catalytic converters use stainless steel for containment because of their elevated temperature properties.
- Electrostatic precipitators and other environmentally friendly waste containment processes in the industry use stainless steel.
Conclusions

- Production footprint minimal—about 0.6% of the meat industry
- Very durable and highly recycled—Sustainable material, minimizes mining
- Helps other materials last much longer
- Saves energy in buildings
- Helps in production of clean nuclear energy
- Helps in production and transport of clean fuel LNG
Conclusions…cont.

• Helps cleaning up the environment (auto exhausts etc.)
• Reduces Green House Gas emission through biogas and other waste-to-energy processes
Stainless steel is definitely a part of the solution!

Stainless steel helps in saving Planet Earth!

Thank you!
THIS IS IT

Broken Ceramic Sink

Stainless steel sink

Land fill

Induction Furnace
At home with stainless steel

Stainless steels in any form is never a land fill. It is fully recycled into new stainless steels. Unlike Ceramics, crockery, bone china, melamine ware, Concrete etc., which are fit only to be land填写s. This is the reason why we should substitute ceramic tiles, crockery, marble, granite etc with stainless steels. Let us begin at our home by using stainless steel in all possible ways.
Thank you!