



***Workshop on***  
Sustainable Stainless Steel for  
Building & Construction  
June 17, 2011-- Pune

***How Green is Stainless Steel?***

***How does it contribute to  
Sustainable Development?***

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Pune -- June 17, 2011

## What is “Green”?

- Leaving minimal carbon footprint, or minimal CO<sub>2</sub> 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?

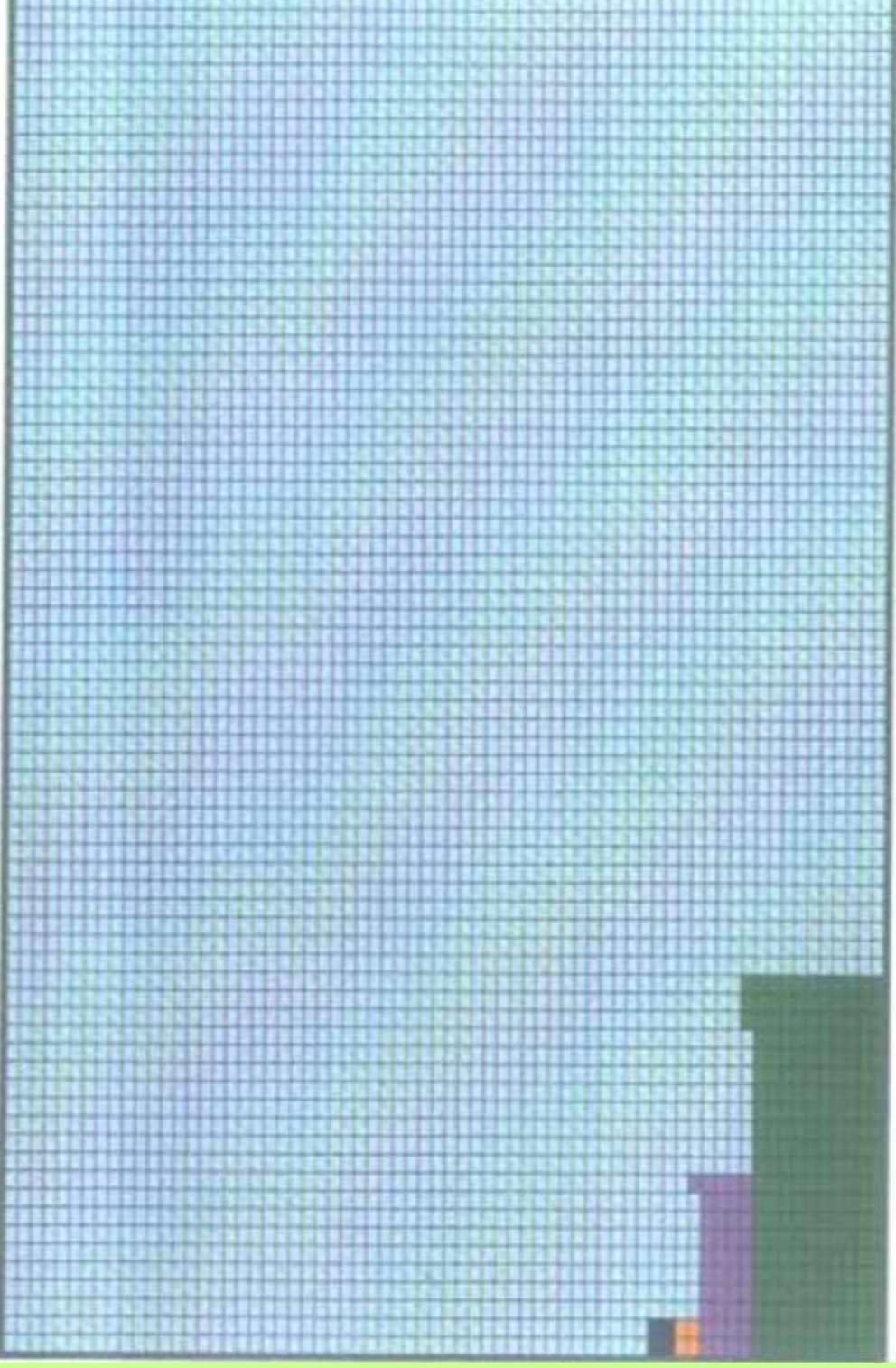
- **The fact is: Every process leaves a carbon footprint, whether it is industrial processing or agriculture.**
- **First, we will see how infinitesimal is the contribution of stainless steel to global warming.**



## Total Global CO<sub>2</sub> Emissions in 2006 (51 Gigatonnes)

- Nickel production (0.04 Gt)
- Copper production (0.04 Gt)
- Aluminum production (0.41 Gt)

- Steel production (2.13 Gt)
- All other sources



- The steel industry as a whole emits 2.13Gt of CO<sub>2</sub> 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 CO<sub>2</sub> could be only about 0.12% of global emission.

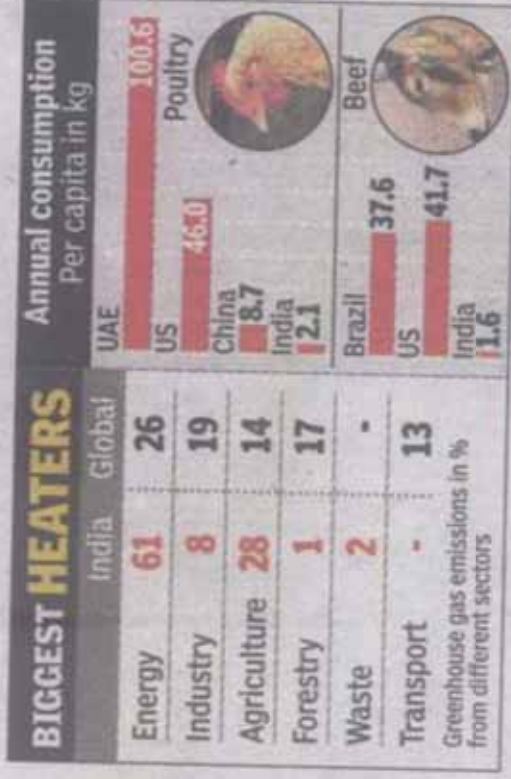
# Meat Production accounts for nearly 20% of GH Gases! (FAO)

## 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,



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.

which is 23 times stronger as a climate-changing agent than carbon dioxide.

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.

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

► Go veg, help save the world? p 17



- Having established how small is the CO<sub>2</sub> 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!

## Medical Equipment Made Using Recycled Materials

### Surgical Grade



Stainless steel is highly resistant to corrosion, making it an ideal material for medical equipment. It is also highly recyclable, with a recycling rate of over 90%. This makes stainless steel a sustainable choice for medical equipment manufacturers.

**Stainless Steel.**  
**One Of The World's Most Recycled Materials**



***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



**Before**



**After**

**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



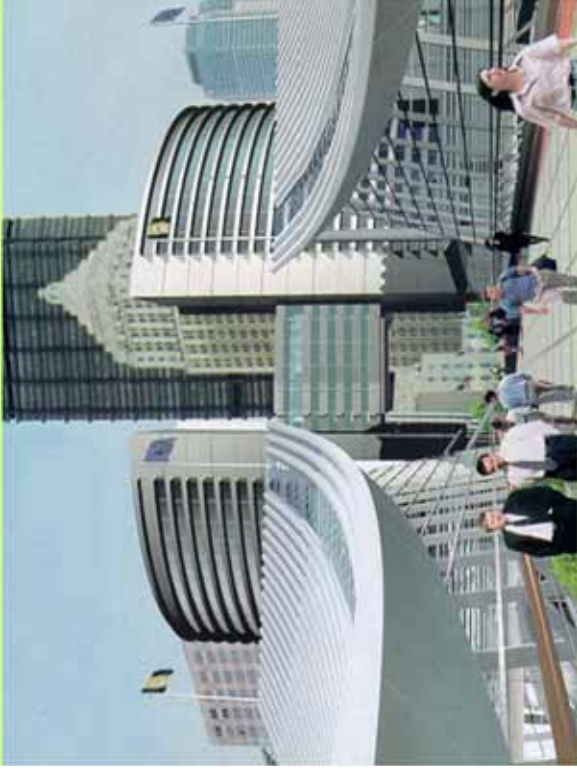
# Sustainable Construction

## 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  $-196^{\circ}\text{C}$  and be ductile at those temperatures.
- Mild steel, for instance, would become brittle at  $-20^{\circ}\text{C}$ .

**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!***

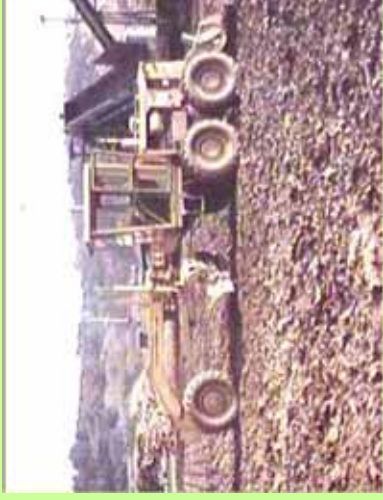
***Thank you!***

# THIS IS IT

**Broken Ceramic Sink**



**Land fill**



**Stainless steel sink**



**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 fills.

**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 !**