

Emisspro[®]: Innovative High Emissivity Coating For Energy Saving in Industrial Furnaces

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Texlore Co., Ltd.
Member of Technology Business in SCG Chemicals Co., Ltd.

APMP-Midyear Symposium
Dusit Thani Hall, June 8 2016

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“You can’t **manage**
what you don’t
MEASURE.”

— PETER F. DRUCKER



Industrial...

Energy consumption

Let's Save the world

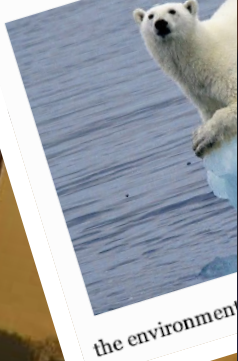
Climate Change

Global warming

ENERGY & ENVIRONMENT

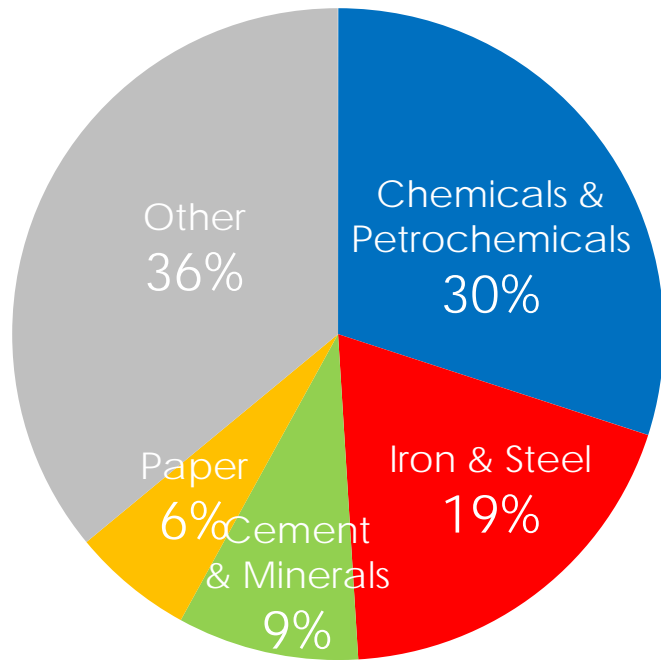
GLOBAL WARMING LINK TO
DROWNED POLAR BEARS
UNDER SEARCHED PROBE

By: **Audrey Hudson**
8/11/2011 03:01 AM



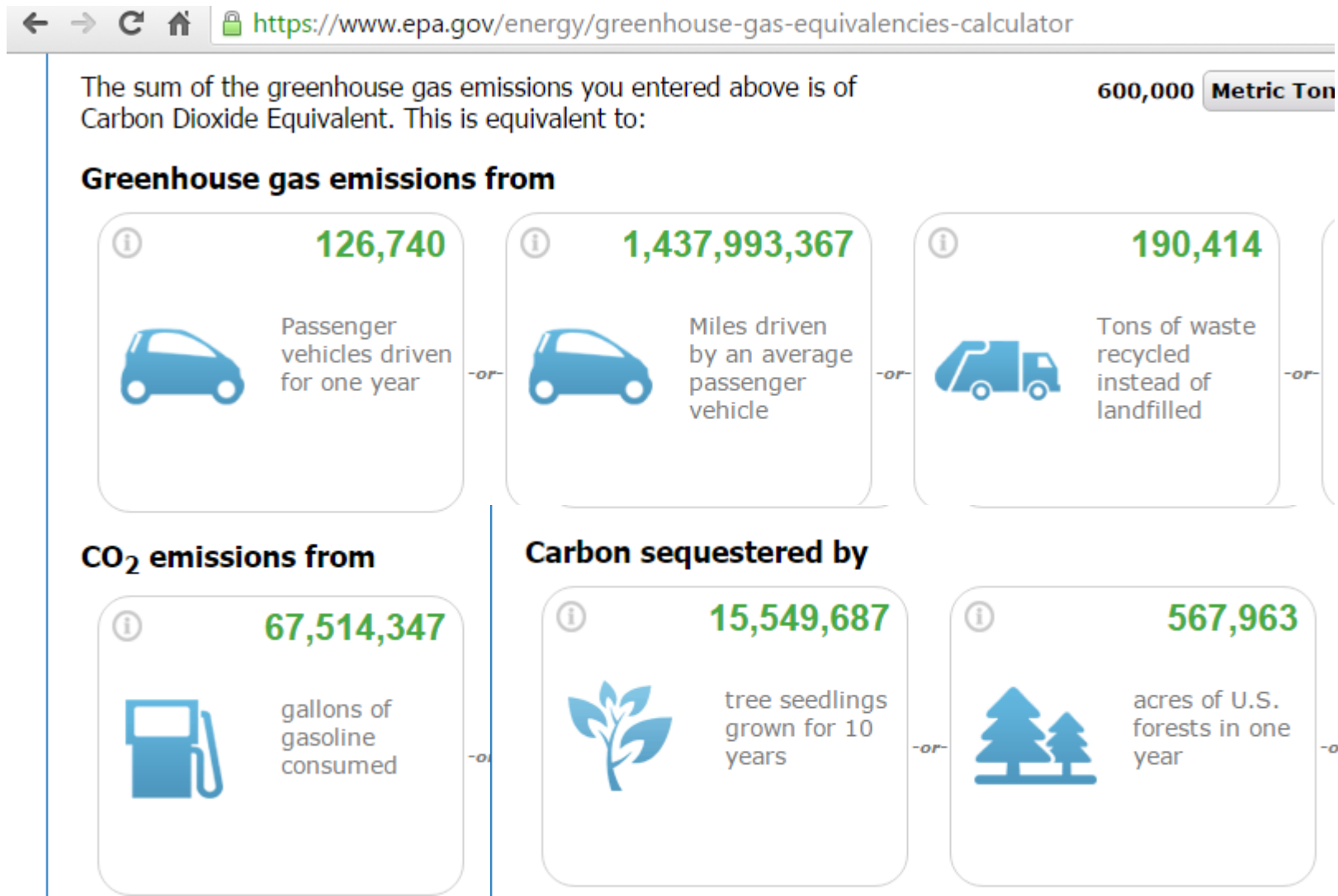
the environment

6,000,000,000 ton CO₂
Released from Industry



140,000,000,000,000,000
Joule of energy
consumed

What if we attempt to help reduce the emission....let's say only 0.01%





1913

Siam Cement Group (SCG)

was founded under the Royal Decree of His Majesty King Rama VI in 1913, to produce cement for domestic consumption, reducing reliance on cement imports, and laying a ground work of country development.

103 Years

103 Years of Substantial Imprints



2013 - Now

Chemicals



Cement-Building Materials



Packaging



1998



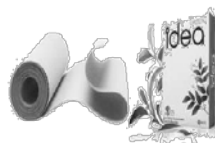
Distribution

1983



Chemicals

1976



Paper/
Packaging

1938



Building
Materials

1913



Cement

- ***Founded in 1913***
- ***Listed in 1975 on the SET***
- ***Market cap approximately of \$16 Billion*** (as of Jul/14)
- ***Major shareholder: The Crown Property Bureau 30%***
- ***Free float of 70%***
- ***49,287 staffs*** (as of Jan/14)
- ***Key figures (2014):***
 - **Total Assets** **465 Billion Baht** (\$14 Billion)
 - **Net Sales** **503 Billion Baht** (\$15 Billion)
 - **EBITDA** **61 Billion Baht** (\$1.9 Billion)
 - **Net Profit** **33 Billion Baht** (\$1.0 Billion)

By 2015, SCG as **ASEAN Sustainable Business Leader**

- **Role Model** in Corporate Governance & Sustainable Development
- **Innovative** Workplace of Choice



HVA = High value added products and services

- An element of brand, technology, or service bundled
- High Margin

Chemicals



“EU-certified PE water pipe”



“Medical grade plastic”



“High Emissivity Coating”



“Inspection Robot”

Cement & Packaging



“Color rendered mortar”



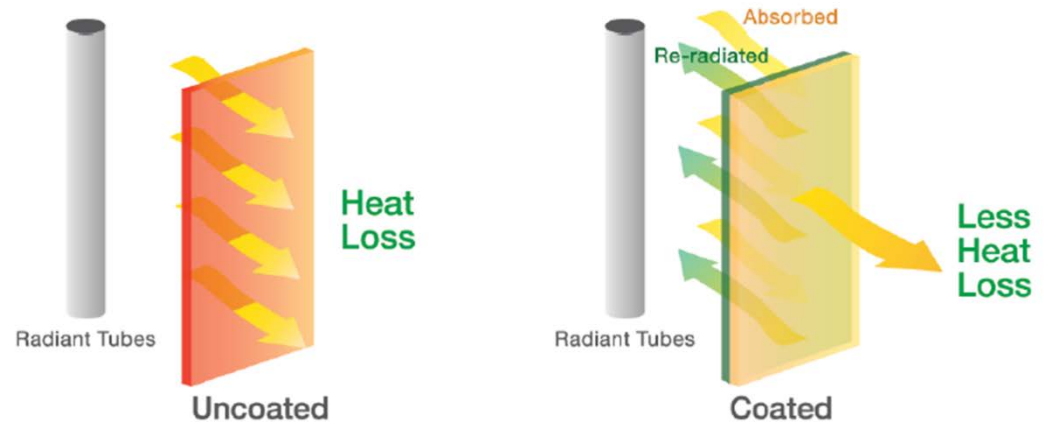
“Lightweight packaging”

Introduction of emisspro

emisspro® : Innovative high emissivity coating for energy saving in industrial furnaces



Absorbed & Re-radiated Energy



90% of heat transfers
in high temperature
furnaces by radiation



1

Conduction
 $(kA/x)\Delta T$

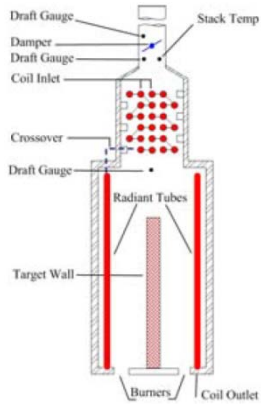
2

Convection
 $hA\Delta T$

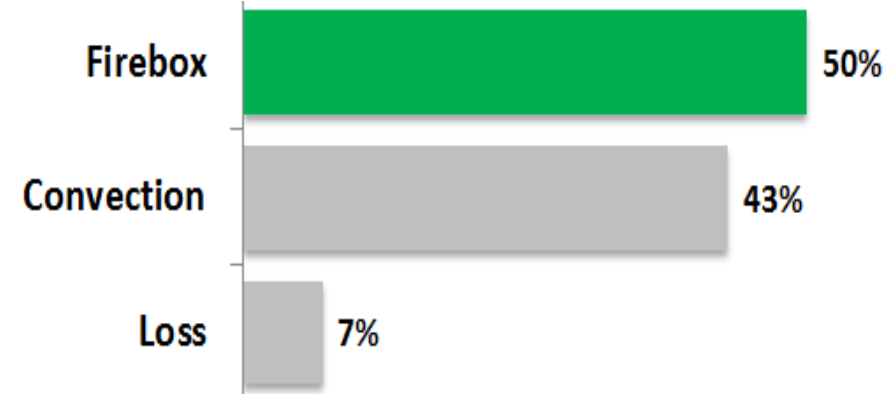
3

Radiation
 $\sigma \epsilon A T^4$

Heat distribution in fired heaters

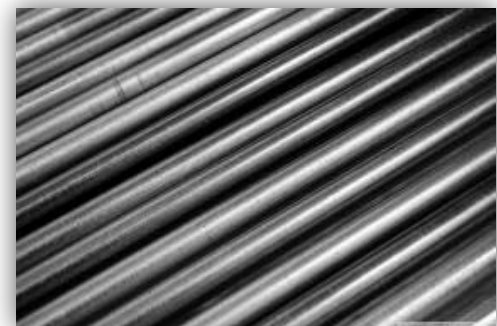
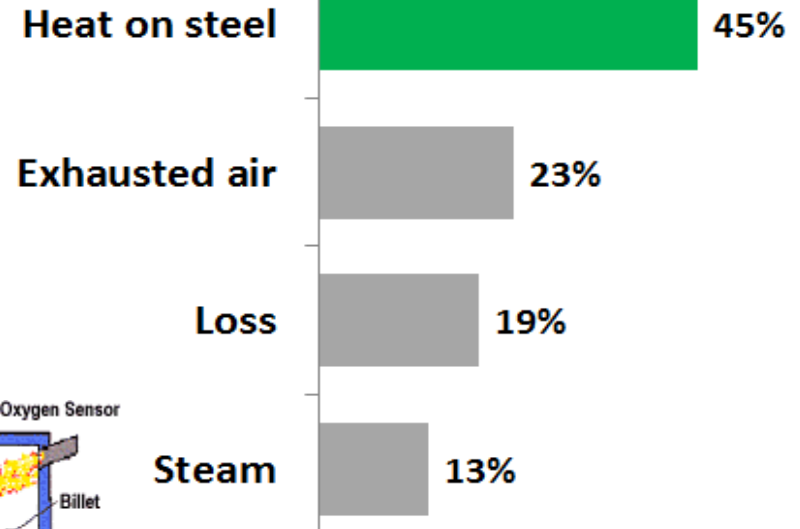
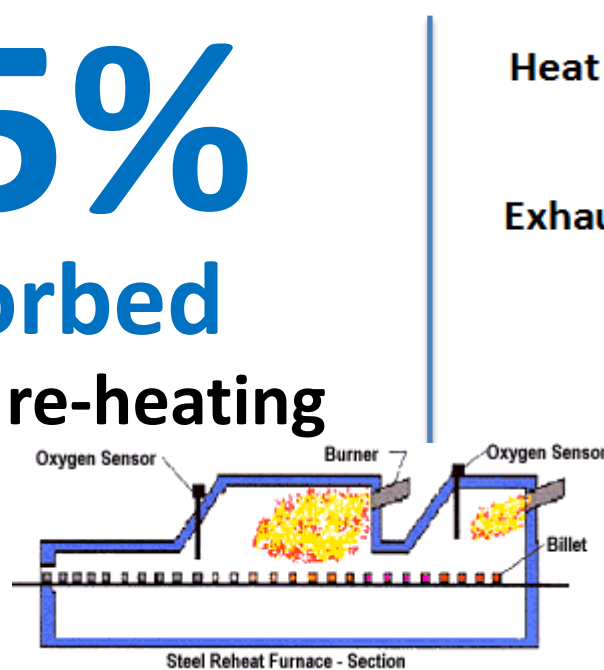


50%
transferred
to the process
fluids in firebox



Heat distribution in reheating furnaces

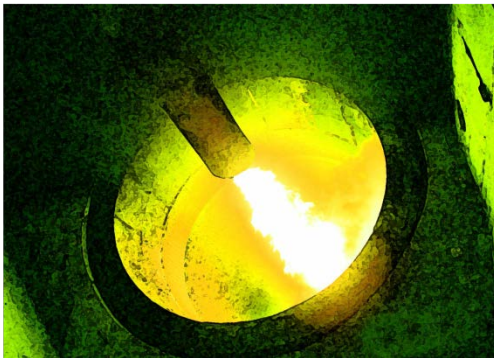
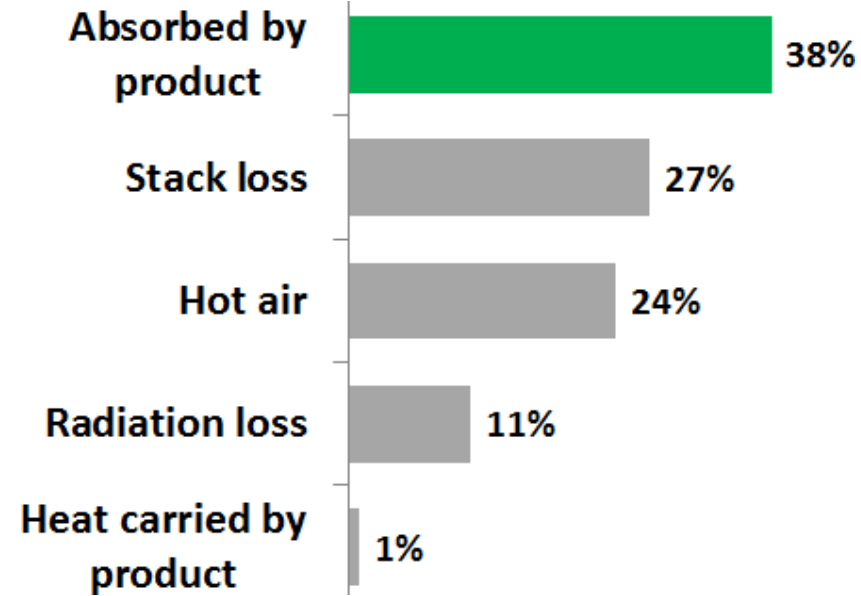
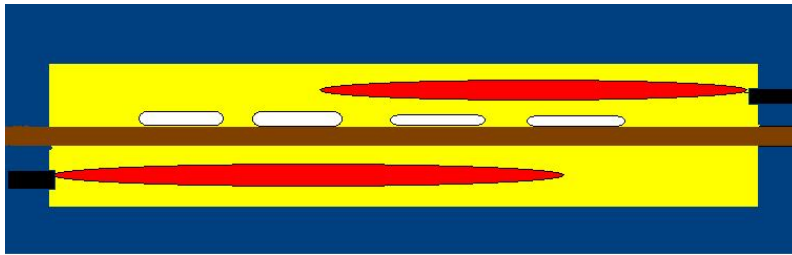
45%
absorbed
by steel in re-heating
furnace



Heat distribution in ceramic kilns

38%

Absorbed by product

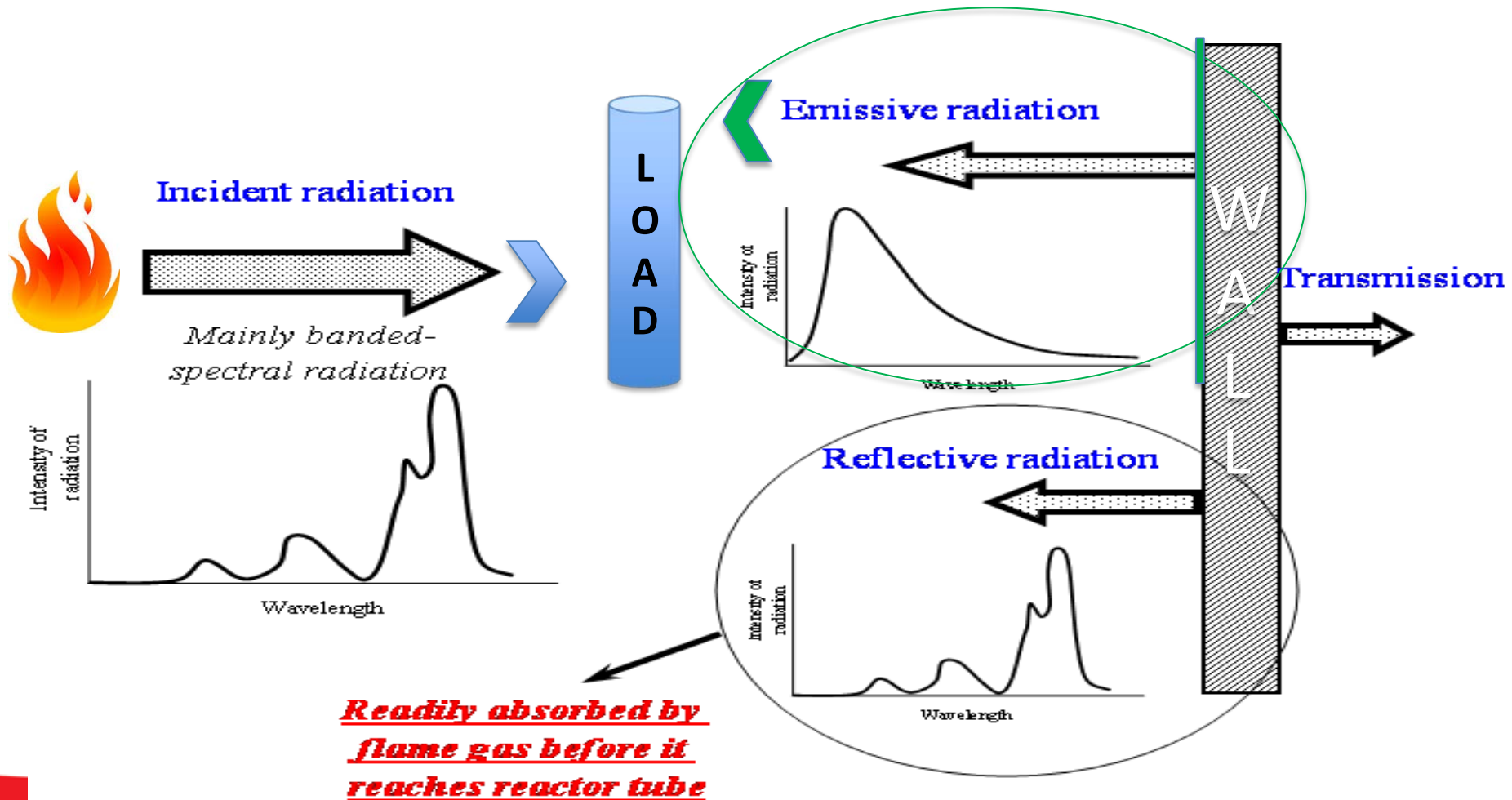


Mechanism of effectiveness of Emisspro



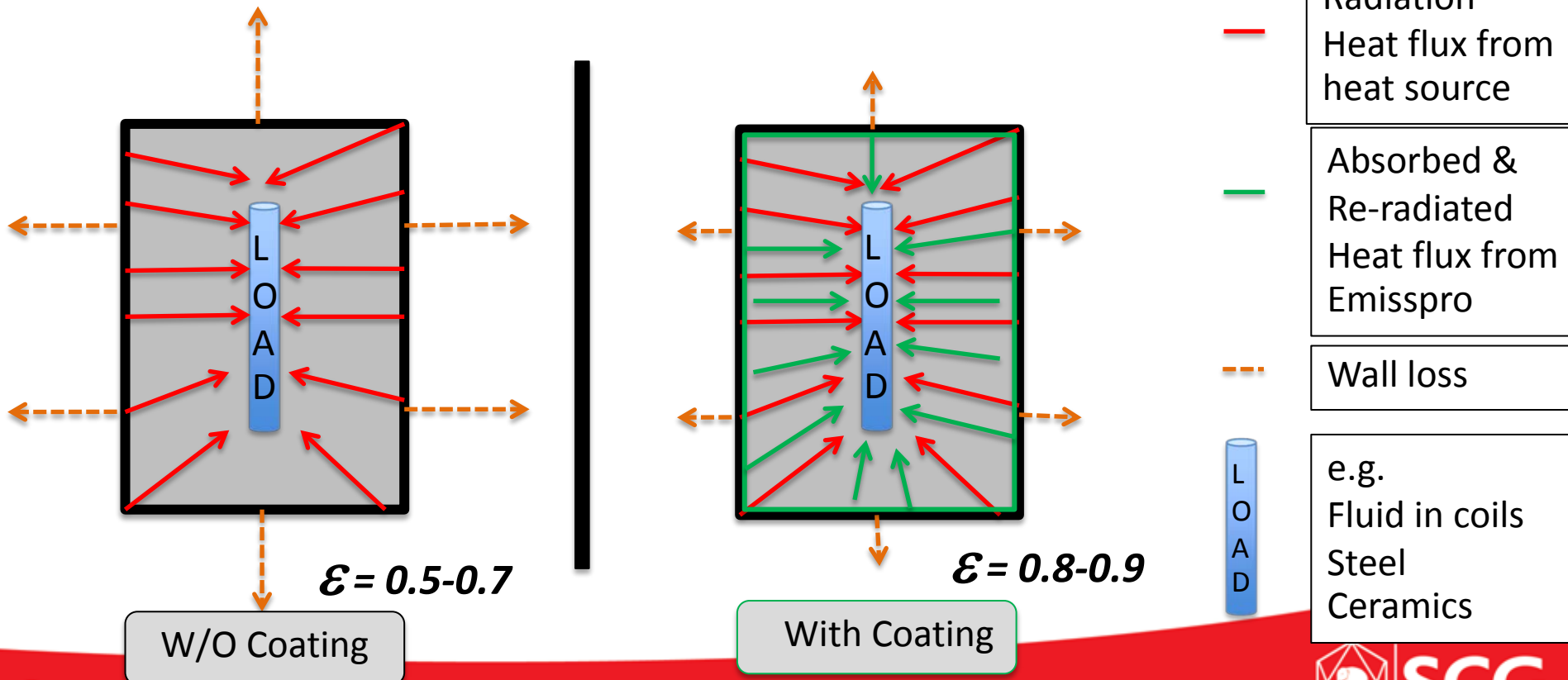
Reduces 'Reflective Radiation' and increases 'Emissive Radiation'.

So, the **LOAD** receives more energy using the same amount of Fuel



Why 'High Emissivity' means 'Lower Energy Consumption'

High Emissivity Coating help increase “**Emissivity**” (ϵ)
.....It helps absorb the energy and re-radiate back to **LOAD**



Application process

01

Refractory Installation or Maintenance



02

Surface Preparation & Coil Protection



Application process

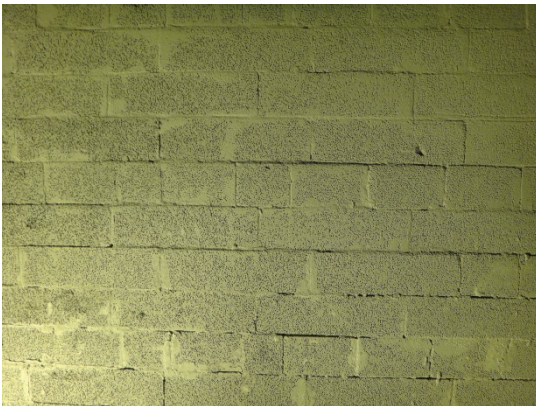
03

Coating Work



04

Completed Work

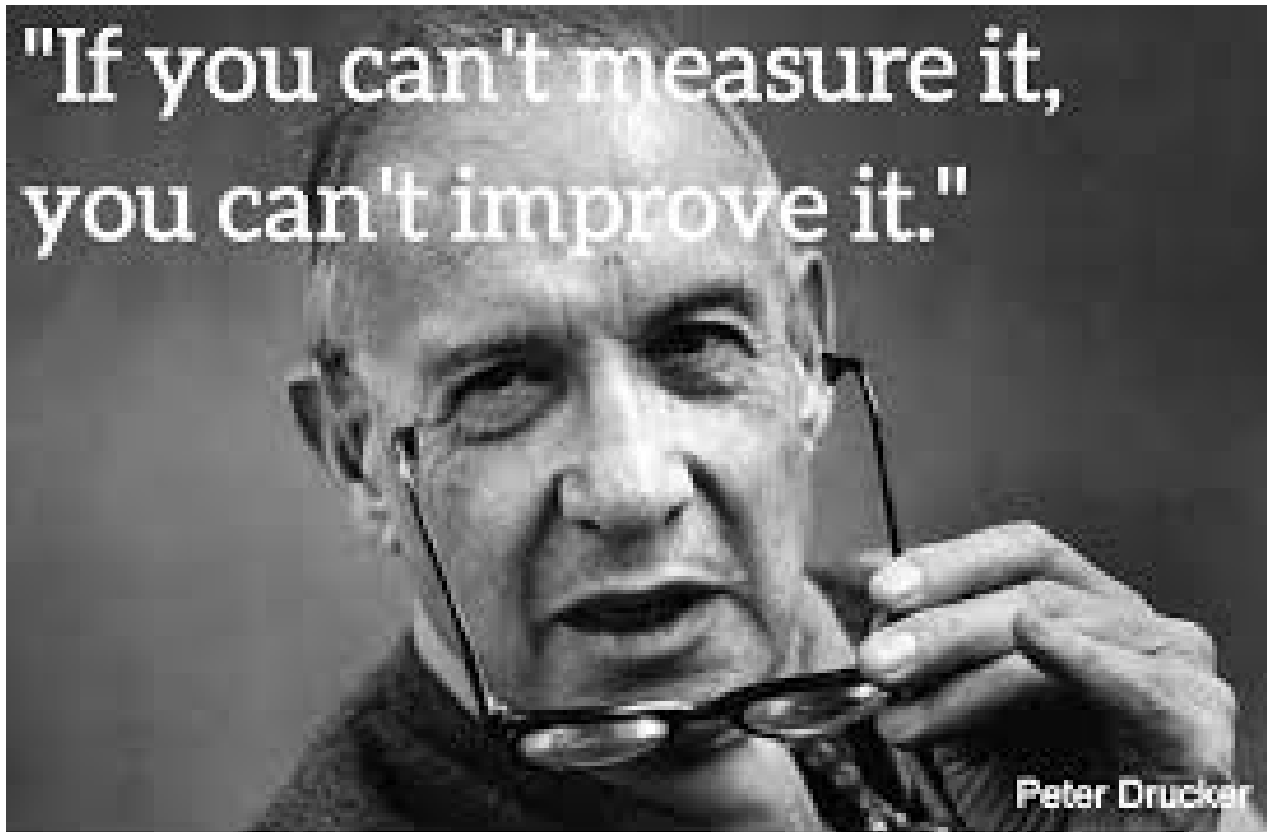




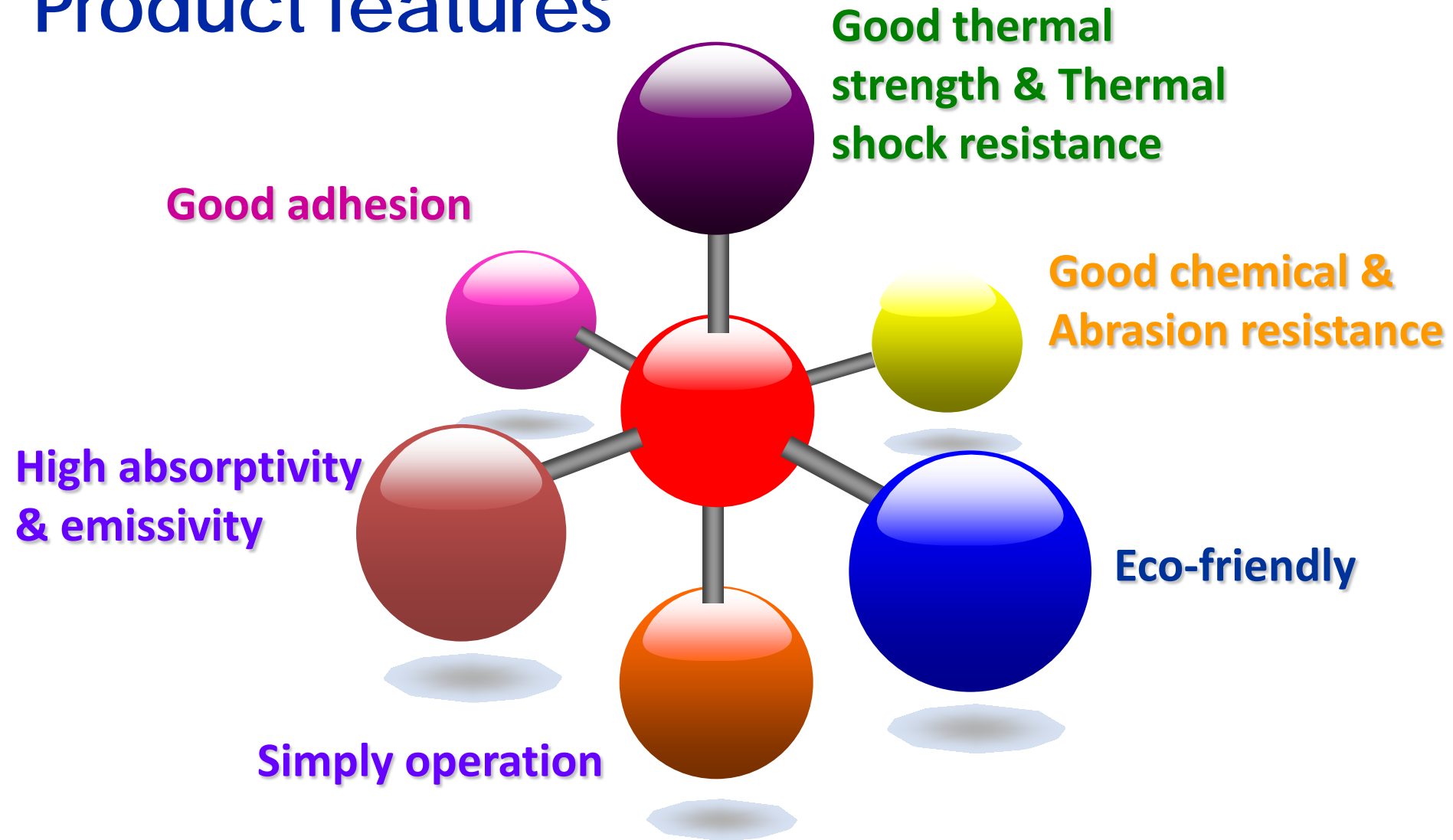
SUCCESS STORY

Nice Photo from: <https://sites.google.com/a/aiesec.net/national-newsletter/home/06062013/auth-success-story>

Measurement has an important role both in product development and verification

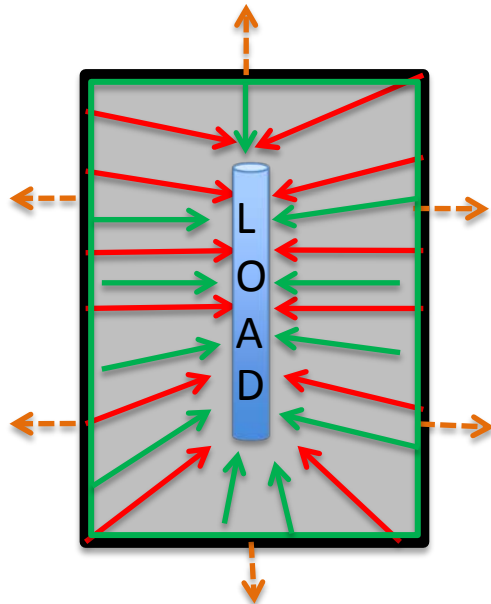


Product features



Emissivity Measurement is key for Product improvement

SCG Collaborates with NIMT for correct “**Emissivity**” (ϵ) measurement

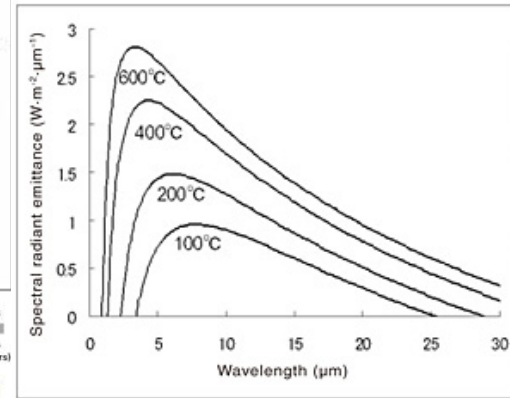
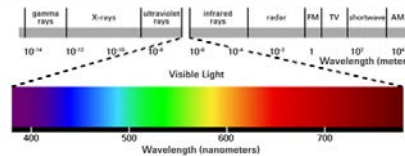


W/O Coating

$\epsilon = 0.5-0.7$

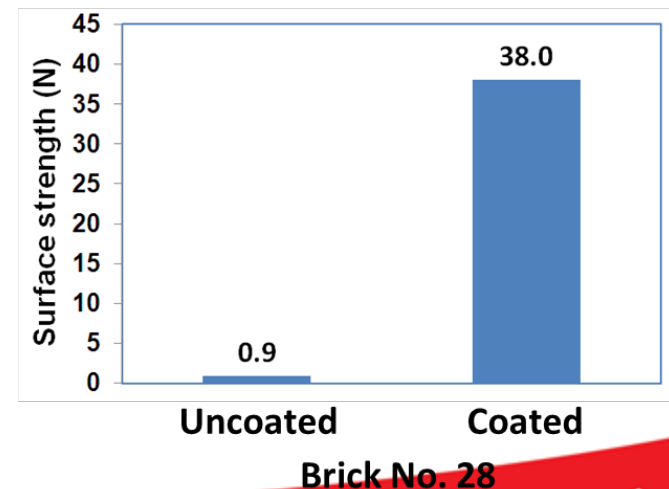
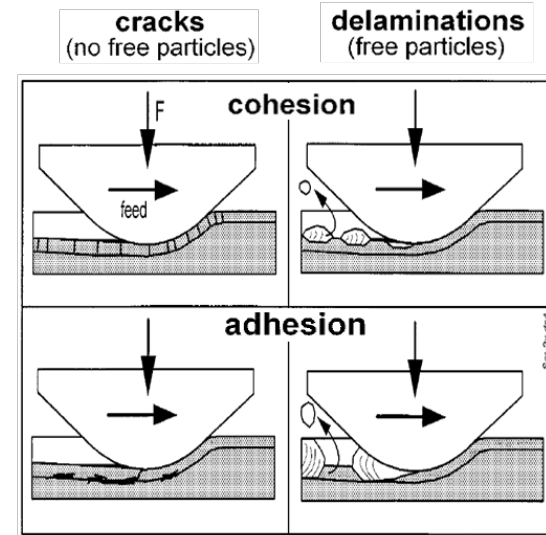
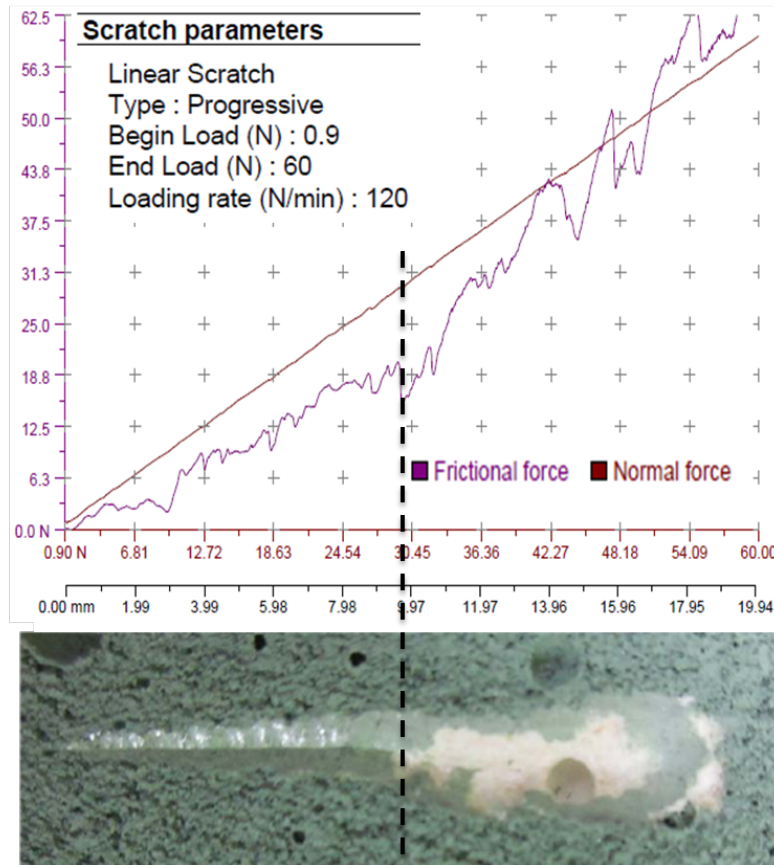
With Coating

$\epsilon = 0.8-0.9$



Measurement of adhesiveness: Our key competitiveness

Surface strength



Superior adhesiveness of results in Better performance and longer service life

Competitor A



3 Months



3 Years



Emisspro®



6 Months



3 Years



Success Story: Ethylene Plants



Capacity: 1,200,000 ton/Year

Average saving: 4.1%

Fuel gas saving : 15,700 Ton/Year

GHG reduction: 43,000 Ton CO2/Year



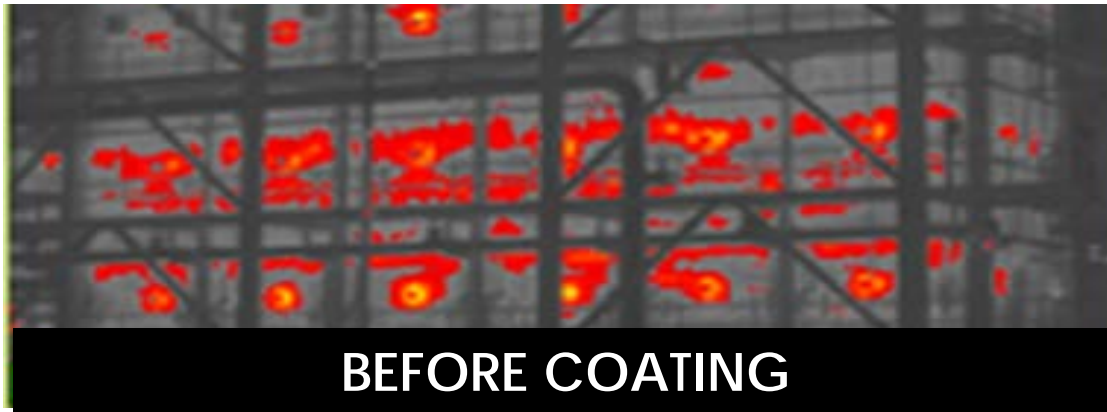
Capacity: 1,700,000 ton/Year

Average saving: 3.1%

Fuel gas saving : 13,800 Ton/Year

GHG reduction: 38,000 Ton CO2/Year

Thermo-graphical Analysis: Ethylene Plant



Position	Casing Temperature (°C)					
	Before Coating		After Coating			
	1st	2nd	3rd	4th	5th	6th
1	97.1	90.4	79.1	77.2	73.2	78.4
2	93.8	87.0	71.6	67.5	68.8	78.1
3	86.3	82.7	64.5	64.9	67.7	74.4
Sub-AVE	92.4	86.7	71.7	69.9	69.9	77.0
Overall AVE	89.6		72.1			

Success Story: Steel reheating furnace

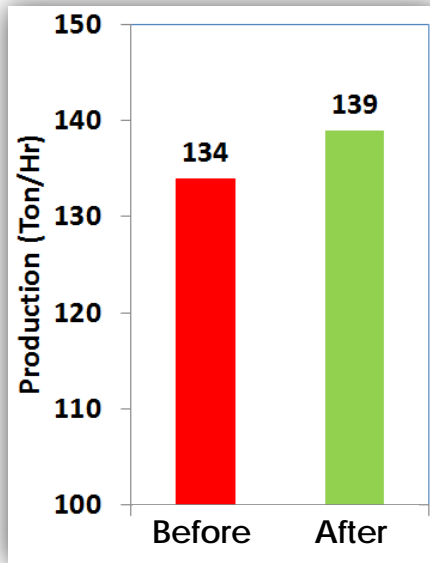


Capacity: 400,000 Ton/Year

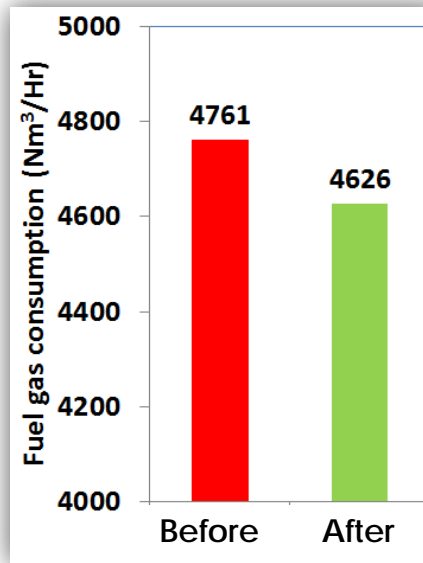
Average saving: 6.5%

Fuel gas saving : 600 Ton/Year

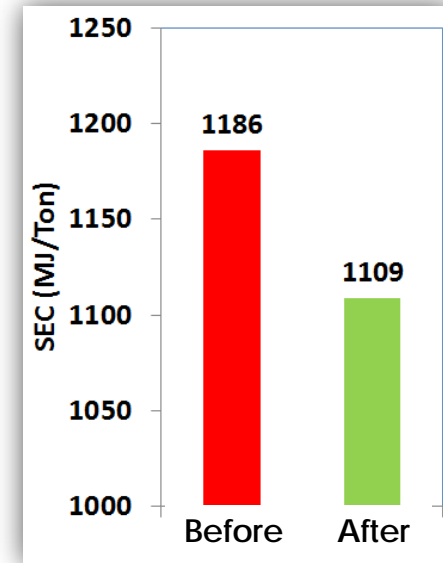
GHG reduction: 1,650 Ton CO₂/Year



Production






Fuel consumption



SEC

Application results: Energy distribution

(of a steel reheating furnace)

Segment	Before coating	After coating
Billet heating	43.6 %	49.6 % 
Exhaust gas loss	40.2 %	34.0 % 
Wall loss	5.6 %	4.5 % 
Cooling loss	9.2 %	8.2 %
Scale	0.3 %	0.4 %
Other	1.1 %	3.3 %

Success Story: Ceramic tile kilns

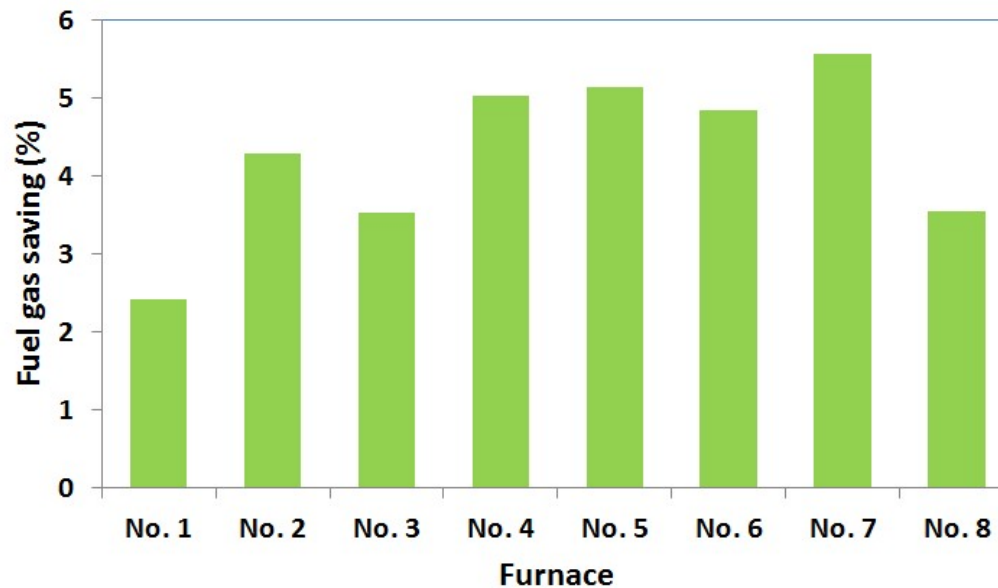


Capacity: 20,000,000 M2/Year

Average saving: 4.3%

Fuel gas saving : 525 Ton/Year

GHG reduction: 1,450 Ton CO2/Year



Certification & Awards

- SCG Eco-Value Product
- Best of Innovative Products, Idea Plus Contest 2009
- Best of Innovative Services and Non-Manufacturing Processes, Idea Plus Contest 2013
- Energy Innovation, Thailand Energy Awards 2014



Thank You for your attention

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