A New Story of Earth Friendliness (vol.1)

There are so many things to tell
about STEEL and others, too.

Thank you for picking up this booklet.

Nippon Steel has the belief:
As a responsible member of society,
we must fill your needs,
while preserving the beauty of nature on this planet earth.

About Environment…….
Won't you hear our story?

Cities Are Wasteful (P3)

Do you know how much garbage is generated from homes in Japan?
Fifty million tons a year!
It's enough to fill the Tokyo Dome, a huge stadium, 140 times.
No wonder so many garbage trucks have to run around towns and cities every morning.
We, indeed, must say thank you to garbage collectors.
As we live better, we seem to get increasingly wasteful.
Oh dear! Can't we do something?

Yes, dumps and landfills.
Burn it, dump it in the sea and we can have reclaimed sites, nice and useful.
But, in reality, things are not so simple.
Even in carefully classified household refuse, there are some which stubbornly refuse to be incinerated.
Such residues cannot be used as landfill or dumped into the sea.
In this land-short country, there is very little space left.
Pretty soon, the whole nation could be literally sitting on a dump!

Any incombustible waste? Yes, we can melt it.
Nippon Steel tackled this task from a new angle.
Our specialty, super-high temperature techniques for steel manufacture, goes into the "urban waste direct melting" process.
Using temperatures of 1,800˚C, high enough to melt even iron, we can melt down urban waste—so thoroughly that not even ashes remain.

Then, what?
The birth of resources that can be recycled for road pavement and other uses. With this process, there is no generation of harmful dioxin.

Here's an answer to this urban waste issue, a real headache to Japan.
Let's melt it!
But, everyone, please do not forget to classify your home refuse, first.

A stop for a tip of information

Dioxin, how does it occur?

Dioxin is a substance which occurs naturally when carbon, oxygen, hydrogen, and chlorine are heated to temperatures of about 300˚C. When wastes are incinerated at low temperatures, dioxin occurs. It is said that dioxin occurs in the natural world also by forest fires and volcanic activities.

What are the resources to be produced from the melting of home refuse?

Nippon Steel's "Urban Waste Direct Melting" process, while burning "combustible wastes," melts down metals, ceramics and other "incombustible wastes" at super-high temperatures of about 1,800˚C. The melt is water-cooled, comes out in the form of slags (sand-like) and metals (granular). Slags can substitute for sands as a material for road pavement and sidewalk blocks. Metals can be recycled as part of the components of shovel-cars or cranes and used as a raw material for iron manufacture at a steel plant.

(Photo) (Photo)
Slags Metals

Steel and Salt (P11)

How do you do?
I'm Steel, strong and tough.
I'm useful in many ways—frames of buildings, automobiles, bridges connecting islands to islands—everywhere.
Strong and durable in service, I'm needed and quite popular in society.
I work hard, but today, I am at the sea, enjoying an outing. Oh, I'm in heaven.
Oh, my! What is this? After a long, long sleep, I'm itching everywhere. My whole body has turned reddish brown and at last started crumbling down.

Yes, however strong and tough, Steel is weak and rusts fast in briny atmosphere.
Steel bridges need to be painted over, in maintenance, once every four years.
Otherwise, Steel goes on rusting.

But, no longer.
Nippon Steel, a steel specialist, has made a steel material, which can strongly resist rusting in briny atmosphere.
The name is a little long, “Marine Atmospheric Resistant Steel.”
This steel does not contain chromium, which is week against salt, but contains nickel, which is strong against salt.
In Japan, all surrounded by the sea, this steel can be useful in many, many places.
No more costly painting job for maintenance.
It saves labor, conserves resources, and is friendly to the environment.

This steel is already being used in bridges over straits and in buildings on salt-sprinkled roads in snow countries.
I myself, being plain Steel, am in a sorry state of rust. But, Marine Atmospheric Resistant Steel coolly cuts a smart figure by the sea, accepting admiring eyes as his due.

A stop for a tip of information

What is rusting?

When iron is exposed to moisture and oxygen in the air, it reacts and changes into “rust.” For instance, suppose moisture contacts iron. Then, a very fine amount of iron in the form of ions dissolves in the water and links with oxygen to become rust. In short, water and oxygen in the air cause iron to rust.

① Iron content dissolves in water to form something that initiates rusting.

Iron
Water
Oxygen

② That something links with oxygen.
③ Becoming rust.

Why does steel rust easily in the presence of salt?

And what is strong against salt?

Iron having deposits of salt attracts water content and becomes easier to rust. When iron is made to contain nickel, formed rust becomes quite resistant to infiltration of salt and arrests further rusting. This is Marine Atmospheric Resistant Steel, with excellent resistance to corrosion.

(Photo)

Ordinary iron

Marine Atmospheric Resistance Steel

After 9 years' exposure tests near the sea.

Carrier of Clean Energy (P19)

To generate electricity for lighting, cooking and running trains,
we need energy every day.
Without it, our daily life is impossible.
But, Japan is very poor in resources.
We depend on imports of oil and other energy sources for most of our energy needs.
For a nation, isn't this a rather scary state?
Don't we want precious energy sources to be preserved through the 21st century?
And, if possible, won't it be better to use clean energy?

Of sources of clean energy, the most promising one is natural gas.
Natural gas means little discharge of carbon dioxide, an offender in global warming, and also very little discharge of air-polluting NO_x.
What's more, it is abundant.

Unlike oil,
natural gas is produced in countries widely spread over the world.
It is produced even in Japan.
Isn't it a good energy source for the 21st century?
Now, Nippon Steel delivers natural gas.

Up until now,
using a wealth of diverse technologies of steel manufacture,
Nippon Steel has undertaken many natural-gas projects at home and overseas.
In future,
we are going to manufacture, more positively, equipment for extracting

natural gas and pipelines for transmitting natural gas from remote regions.
If we can make it possible for people to use natural gas, any time any where, like tap water…
We sets our sights high.

A stop for a tip of information

What is natural gas?

Natural gas is an important energy source in the world, next to oil and coal. Until a means of its transportation was established, it had been used only in some limited regions. Since the 1950's, the spread of pipeline networks has permitted its world-wide use. In around 1960, the low-temperature liquefaction technology was developed, making sea transport by tanker possible. Uses are mainly for electricity generation and city gas.

Why is natural gas clean?

Natural gas has methane as its main component, containing no impurities. It generates little SO_x, an atmospheric pollutant, or Nox whose adverse effects on acid rain and human organism have become issues. It generates no soot and dust, either. During combustion, it generates less CO_2, which is deemed as a cause of global warming, compared to coal and oil.

A Wide Range of Eco-products (P27)

Do you know a throw-away product which can be recycled many times?
The answer is steel can, which you may be holding right now.
Any time, anywhere, steel cans can be recycled into steel products.
Steel can is number one in recycling ratio, beating aluminum can.
Hooray!

Next, do you know what lies underneath an automobile and has tremendous power?
The answer is metal carrier used in the exhaust system.
More and more automobiles running around means more and more exhaust emissions.
So, the honeycomb structure made of the world's thinnest stainless steel foil.
Powerful in cleaning exhaust emissions.
This small structure with giant power is up for the fight.

Then, do you know a steel which can save energy?
It's "High Strength Steel."
With improved properties of steel itself, this steel is very light but very strong.
When used for automotive bodies, this steel is wonderful in fuel economy.

Then, do you know a steel which can beat rust?
It's SUPER DYMA, a revolution in coated steels.
It has resistance to rust 15 times that of conventional zinc-coated steel.
No need for additional coating or painting.
SUPER DYMA is extra-friendly to people and the Earth.

This blue planet, full of life, needs to be preserved.
To this end, many products need to be changed to environment-friendly eco-products.

For environmental preservation,
Nippon Steel has made commitments in materials selection:
To give priority to parts and materials which are friendly to the environment.
To make steels leading to yet better performance in energy conservation.
To extend service life.
To make recyclable products.
Never to use harmful substance.

Nippon Steel's eco-products are up and coming.

A stop for a tip of information

What are eco-products?

Steels which make it possible to cut down carbon dioxide, a culprit in global warming. Steels which can resist rusting and be in long-term service and thus contribute to reduction of wastes. Steels containing no harmful substance from ecological considerations. These are eco-products. To mention some typical ones: high-strength steels which permit weight reduction of automobiles for improved fuel economy, marine corrosion-resistant steels, and SUPER DYMA. There are also zinc-coated steels, which are free from hexavalent chromium, and lead-free coated steels.

Sludge Recycling (P35)

We are black sludge.
We pollute clean water.
Thriving on wastewater from homes and effluents from factories, we settle and keep on growing over a long time.
Look into the bottom of some of the seas, rivers and lakes. You don't have to look. You can smell it. Ho, ho, ho!

Today, we are busily polluting the sea, enjoying every moment of it. He, he, he!
Now, what's that? Hoy, look!
A strange-looking thing, "high-pressure filter press," is above us, sucking us up fast.

Yes, this press is Nippon Steel's latest technology that can clear out black sludge.
While powerfully gathering sludge, the press can perform high-speed de-water at a maximum pressure of 40kg per $1cm^2$.

In no time, the press turns sludge into hard and small cake (solid) form.
Sludge is sucked in and comes out as cakes.

Now, totally repentant sludge, reborn in cake form, is going to be useful as soil for embankment and reclamation.
Small and tight, it is easy to handle.
Water after the de-watering of sludge is returned to nature as water good for organism.

Bad-smelling sludge, now turned a good guy, is serving as a bed for grass and flowers in the embankment.

A stop for a tip of information

Why does sludge pollute water?

Sludge is a mixture of small-particles of earth and sand, sewage water and factory effluents infected by bacteria-microbes and water content, forming a mass at the bottom of rivers and nearshore waters. When bacteria-microbes contained in sludge become decomposed, harmful gas and offensive odor occur. Also, in the process of decomposition, bacteria-microbes use up oxygen which is dissolved in the surrounding water, thus turning the surrounding water not livable for fish, shellfish

and other organism.

Where does the high pressure filter press work?
The press is also used to remove what causes sludge, such as effluents, muddy water from tunnel excavation, muddy water occurring in quarries. Mud (cake) separated from water by the high-pressure filter press is recycled as soil and materials.

Renewal of Plastics (P43)
One day, a boy Steel met a girl Plastics.
Plastics is crying, sorry for herself.
You, Steel is OK. Even when you are scrapped, you can be recycled many times.
Used cans can be reborn as a new steel material.
For us, Plastics, they say that once we are thrown away, recycling is a difficult job.
Pretty toys, if thrown away, can never be born again. How sad!

At present, society is aiming at a recycling-type society, recycling resources and energy.
But, not much progress is being made in recycling of Plastics.
After so many years of useful life…

Steel thought very hard.
Yes, a steel plant where they recycle steels may know a good way.
Let's go there, Plastics.

Here we are, at Nippon Steel's steelworks in deeply wooded areas.

Good news was waiting for the boy and the girl.
Nippon Steel has been receiving and processing about 100,000 tons of waste plastics a year.
By utilizing coke-oven batteries for steel manufacture, plastics can be renewed as 100% reusable resources by pyrolysis.
And 40% of it is recovered as oil for recycling in a way friendly to the environment. The rest is used as energy for steel manufacture.

We've done it! Thank you, Steel.
A smile returned to the pretty face of Plastics.

A stop for a tip of information

Why is renewal of plastics friendly to the environment?

Because waste plastics is difficult to treat, it is conventionally incinerated or dumped. But, at Nippon Steel's steelworks, waste plastics is not burned but decomposed by the action of heat at high temperatures and renewed as oil. Since plastics is made from oil in the first place, pyrolysis can make plastics as good as new plastics in quality. Compared to incineration, pyrolysis is very low in generation of carbon dioxide, contributing to the prevention of global warming. Dumping waste plastics would require a wide stretch of land, causing environmental disturbances.

Reuses include: container packaging, tennis rackets and coating materials.

Friendly to the Earth (P51)

1970, about 30 years ago,
Nippon Steel was born.
Since then, we have consistently been environment-oriented.
We have made environmental efforts, working hard on what we can, step by step.

We have heaved and plodded, like ants.
In building steelworks to produce steels for structuring society, we must not become a nuisance to neighboring communities and surrounding nature.
We have imposed on us strict restrictions against pollution. While building steelworks, we also planted seeds to make forests.
In the now dense, bordering forest of one of our steelworks in Hokkaido, foxes are often sighted.

Internal energy-saving endeavors at our steelworks have now achieved the world's highest level of energy efficiency.
Energy saving leads to reduced discharge of carbon dioxide.
That is, it is an effective means of prevention of global warming.
If icebergs begin to melt, terrestrial parts of the world become submerged.
We have to stop it.
We make a point of producing products helpful in conserving energy.

Steel is like a phoenix.

Steels used in bridges, buildings and automobiles can all be reborn.
At present, steel products accumulated in Japan are said to total about 1,300 million tons. All of them, after their service life is over, can be used again as valuable resources.

Steel can be a great mainstay of a recycling-type society.
Nippon Steel will continue efforts in recycling steel as well as in recycling by-products being generated during steel manufacture.
We stand ready to serve needs for technical cooperation and environmental preservation anywhere in the world.

With sights set on global environment, Nippon Steel will continue to endeavor to do better. We want to stay a steadfast friend to this planet and go on this never-ending way toward environmental preservation.